

Scope of Work

- I. Scope of Solicitation
- II. Instructions to Offerors
- III. Scope of Work / Specifications
- IV. Appendices

I. SCOPE OF SOLICITATION

Clemson University seeks to purchase a used General Motors car for research. This is a one-time purchase and shall be awarded to one offeror.

II. INSTRUCTIONS TO OFFERORS

Regardless of specific requirements below or in this document, Offerors are required to submit their proposal electronically through the Clemson University online bidding system. To do so you must login (registering first) at <https://sciquest.ionwave.net/prod/default.aspx?company=clemson>, and follow specific instructions for this solicitation. You should register several days in advance of the bid closing date so you can be approved and login in time to submit a response.

III. SCOPE OF WORK / SPECIFICATIONS

Clemson University seeks to purchase an automobile as specified herein or a functionally compatible alternate with the same salient characteristics.

- 1) A 2012 Buick Regal, 2.0L GTDI FFV A6 engine is preferred
- 2) Vehicle shall be a GM (General Motors) product between the model years of 2011 and 2013
- 3) The standard vehicle shall have an automatic transmission and between 30,000 and 40,000 miles
- 4) Additional Requirements:
 1. Vehicle shall be in excellent condition with:
 - a. No Rust
 - b. No dents
 - c. Mileage commensurate with vehicle age and average vehicle usage

2. Vehicle shall not have sustained damage by:
 - a. Collision
 - b. Comprehensive incident
 - c. Flood
 - d. Fire
3. Vehicle shall not be a salvage title
4. Vehicle purchase shall be subject to satisfactory personal and professional examination of vehicle by ordering department prior to purchase to include:
 - a. Test drive
 - b. Professional once-over
5. A Carfax or equivalent vehicle accident report with pictures of the vehicle's exterior and interior shall be submitted with bid. Failure to provide this information will result in the rejection of the bid.
6. Vehicles shall be within a 75 mile radius of Clemson ICAR for test drive and visual inspection.
7. Successful vendor shall deliver the vehicle to South Carolina State Fleet Management, 1430 Senate Street, Columbia, SC 29201-3710
8. Vehicle shall meet the requirements of research criteria as determined by Clemson University.

IV. APPENDICES

1. Research Requirements

Gasoline Particulate Filter Regeneration, Control-Oriented Oxygen Storage Capacity Model Identification and Optimization-Based Control Design for Particulate Emissions Reduction

Research Objectives

The following research objectives are derived to address several aspects of the problem statement. These general research objectives will be accomplished through the various project tasks to follow.

- **Assess Gasoline Particulate Filter behavior** – The impact of GPF backpressure on engine operation will be characterized experimentally. Next, the particulate size-number distributions and instantaneous particulate mass concentration in the exhaust will be characterized with the DMS 500 spectrometer, upstream and downstream of the GPF. GPF design and wash-coat specification(s) will be defined by Chrysler. Finally, interplay between different engine operating conditions, combustion control and GPF regeneration will be investigated. The engine operation and combustion control with a Four Way Catalyst (GPF+TWC) will be compared to the baseline with standard TWC.
- **Determine OSC behavior of a TWC with Extension to FWC** – A control-oriented model for OSC will be selected based on the body of published work focused on TWC applications, and extended based on experimental insights. Final version for a chosen set of hardware will be configured through identification of parameters.
- **Characterization of catalyst aging** - Evaluation of OSC behavior during testing of FWC at different life stages will allow identification of the most relevant parameters that affect the system performance with aging. In this, we don't anticipate extended tests at Clemson University ICAR. Instead, our understanding is that Chrysler will provide specimens that have gone through different periods of operation, and CU team will subsequently carry out experiments aimed at identification of an extended OSC model.
- **Optimization-based control strategy of the Engine Aftertreatment System for maximizing Fuel Economy while satisfying PN-PM emission constraints** – Once a control-oriented FWC-OSC model and optimized sensor set have been identified, the most appropriate model-based control algorithm will be selected to optimize fuel consumption in the Engine system with FWC over typical driving schedules.

Specifications:

Clemson University seeks to purchase a 2012 Buick Regal 2.0L GTDI FFV A6 automobile as desired in contract 245-2020294 with Fiat-Chrysler Automobiles.

- 1) Make/Model/Features: 2012 Buick Regal, 2.0L, GTDI, A6, FFV
- 2) The standard vehicle 2012 Buick Regal with an automatic transmission and approximately 35,000 miles in excellent condition
- 3) 2.0L GTDI FFV engine
- 4) Additional Requirements:
 1. Vehicle shall be in excellent condition with:
 - a. No Rust
 - b. No dents
 - c. Mileage commensurate with vehicle age and average vehicle usage
 2. Vehicle shall not have sustained damage by:
 - a. Collision
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