





UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE of ENGINEERING





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## **Rubber hoses**

Tristone is a market leader offering a full range of technologies and materials to customise product solutions within all specifications. Tristone continuously innovates, and it has secured major technical advances with many automated technologies including Creatube automated hose manufacturing as well as mono, bi-layer knitted rubber hoses, short fiber reinforced monolayer hoses. Rubber hoses are one of the products made at the Tristone Mooresville, NC facility.



When a customer project is awarded, prototype assemblies must undergo rigorous testing as

specified by the customer. Although each customer's specific test parameters vary, they all require a pressure pulsation test. During this test, the hose assembly is filled with heated coolant and cycled in excess of 250,000 cycles at various frequencies. Currently, Tristone only has one certified laboratory, in Poland, that conducts all required testing. There is significant cost to ship sample parts to the laboratory on top of increasingly long lead times for testing. In order to avoid this, Tristone Flowtech USA is seeking to design and build a repeatable and accurate pressure pulsation test rig that has the adjustability to run at any customer's required parameters.

### **Project Requirements:**

To design, build and test a pressure pulsation test rig for EPDM coolant hose assemblies. The rig shall be designed to accommodate hose assemblies of various size and complexity. The test chamber shall be sealed in such a manner as to protect the lab technician in the event of a hose failure and must provide a way to recover the coolant safely. The rig shall heat the coolant medium as well as the test chamber atmosphere to any temperature specified by the customer. The test pressure as well as the pressure pulse frequency must be fully adjustable. The entire rig must be PLC controlled with a simple user interface and fully automated with the exception of loading and unloading test assemblies. Automation shall include data acquisition and monitoring of the



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process parameters to detect a failure and stop the test.

Examples of test rigs:



### **Expected Deliverables/Results:**

- Comprehensive design package including but not limited to:
  - Bill of Materials
  - 3D models and CAD drawings
  - Electrical and Hydraulic schematics
  - Engineering calculations and Simulations
  - Cost avoidance calculations
- Functional pressure pulsation test rig – to the extent possible within the project budget, which may be increased at Tristone’s option.

### **Disposition of Deliverables at the End of the Project:**

All hardware developed is the property of the Tristone Flowtech. Immediately following the final Expo, all materials and equipment must be handed over to Tristone Flowtech unless other arrangements are agreed upon in writing.

### **List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):**

- PLC programming (with interface for MatLab or similar GUI)
- Thermal-fluid design
- Heat Transfer (with electrical controls)
- Fluid Dynamics