



### **Company Information**

<b>Company Name</b>	<i>Thomas Built Buses</i>	<b>Date Submitted</b>	<i>11/14/2023</i>
<b>Project Title</b>	<i>Research and Testing to Develop Improved Reliability for Coolant Connections (TBB_COOL)</i>	<b>Planned Starting Semester</b>	<i>Spring 2024</i>

### **Senior Design Project Description**

#### **Personnel**

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills.

<b>Discipline</b>	<b>Number</b>	<b>Discipline</b>	<b>Number</b>
Mechanical	4	Electrical	
Computer		Systems	1

#### **Company and Project Overview:**

Thomas Car Works started out as a builder of streetcars. By the late 1930s, cars and buses were beginning to make streetcar transportation obsolete. Perley A. Thomas Car Works adapted, and in 1936 ceased production of streetcars and launched a new product: school buses. By the early 1960s company had built a national reputation in the school bus business. In 1972, to reflect better its core business, the company changed its name to Thomas Built Buses. In 1977 Thomas introduced its first bus chassis and began producing the popular Saf-T-Liner® transit-style bus. Thomas expanded to manufacture a smaller school bus, the Minotour®, and in the 1980s entered the commercial transit market.

In 1998, Thomas Built Buses became a wholly-owned subsidiary of Freightliner LLC, a Daimler company. The strength of Freightliner LLC, now known as Daimler Trucks North America LLC, has helped Thomas Built Buses grow and adapt to changes in the transportation industry.



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In 2011, Thomas Built Buses became the first school bus manufacturer to achieve Zero-Waste-to-Landfill operations, demonstrating its industry leadership as a driving force in facility waste management and environmental commitment. Since then, Thomas Built Buses also has developed the C2 Propane and C2 CNG, which allow customers to determine which fuel best fits their needs.

Today, Thomas Built is more than a leading North American manufacturer of school buses. Born of hard work, inspired to innovate, Thomas Built continues its forward-thinking legacy of excellence to create intelligent advancements that meet the needs of transportation directors, drivers, and most important, students. It's this commitment that has sustained Thomas Built Buses for the last 100 years. It's what will drive innovation for the next 100 years.

### **Project Requirements:**

On internal combustion engine school buses, engine coolant is circulated through the bus body to a series of heaters to warm the bus. The coolant travels through rubber heater hoses and is connected to fittings using hose clamps.

TBB would like a student team to review the current designs used in these hose connections and research to find improved alternatives that would improve reliability, sustainability, performance and potentially the cost. The new designs would also consider ease of installation by the operators and eliminate any possibility of incorrect installation.

Current product data from TBB's warranty system will be provided for the students to understand the current performance baseline of the existing designs.

Project will explore common connection methods in automotive, heavy truck, and modern water plumbing and narrow the list based on selection criteria. The narrowed list will undergo a testing regimen to determine which alternatives have the best characteristics for customer satisfaction.

Main project deliverable will be recommendation of best alternative connection method. Based on the testing data.



**Expected Deliverables/Results:**

- Exhaustive survey of coolant connection methods
- Purchase cost and life cycle cost comparison for alternatives
- Performance testing design of experiments for specifications
- Recommendations for replacement connections

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

Students are graded based on their display and presentation of their team's work product. It is mandatory that they exhibit at the Expo, so if the work product was tested at the supporter's location, it must be returned to campus for the Expo. After the expo, the team and supporter should arrange the handover of the work product to the industry supporter. This handover must be concluded within 7 days of the Expo.

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

- Interest in analysis warranty data to determine new design ideas
- Engineering experimental design – SEGR 4141
- Mechanical fastening interest
- Engineering economics to understand trade-off in high volume production
- Travel to Thomas Built Bus may be required.