INDUSTRIAL SOLUTIONS LABORATORY

Company Information

Company Name	*Daimler Trucks North America – Cleveland, NC*	**Date Submitted**	*10/2/2023*
Project Title	*Automation of Paint Spray Booth Mixing Process* ***(DAIMLER_MIX)***	**Planned Starting Semester**	*Spring 2024*

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.

Discipline	Number	Discipline	Number
Mechanical	3	Electrical	1
Computer	1	Systems	

Company and Project Overview:

Daimler Truck North America LLC is an automotive industry manufacturer and is a leader of commercial vehicles headquartered in Portland, Oregon, and LLC of the German multinational Daimler Truck AG. This project is with the DTNA facility in Cleveland, NC which manufactures Class 8 over-the-road trucks.

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Quality and productivity are key metrics that DTNA focuses on to remain a global leader in the trucking industry. This project will seek to improve both of these metrics by automating a part of the cab spray painting process.

Project Requirements:

To ensure fluid paint quality and consistency of the agitation and mix before truck is spray painted using robotic arm. See photo below of this operation:

During the spray-painting process, the paint reservoir is agitated to keep the paint elements

mixed properly. As the reservoir is depleted, the agitation can cause bubbles which can negatively affect the spray and the resulting paint quality. To avoid this, as the reservoir is depleted, an operator gradually reduces the agitation rate to prevent bubbles from forming. Any inconsistency in the timing of the reduction or the amount reduced can negatively affect the quality of the paint finish. The object of this project is to automate the agitation rate reduction so that it is done perfectly every time and the operator is freed up to do more complex tasks.

The student team will develop a way to monitor the reservoir level and gradually reduce the agitation rate to prescribed levels based on how much paint is left in the reservoir. Once the cab is painted, the system will reset to start the next operation.

Expected Deliverables/Results:

- Working prototype that continuously measures the amount of paint in the reservoir and adjust the agitation rate of the mixer based on the paint volume remaining. Explosion pro
- Touch screen interface which will be used to start new cycles, complete cycles, and allow adjustment of the agitation level for defined reservoir volume levels.
- Testing method to be used on campus to debug the operation.
- Verification testing at Cleveland plant.
- Operation manual which pictorially (or via a video) instructs the operator how to use the system and re-program different variables in case of future paint formulation changes.
- Maintenance instructions
- All documentation that would allow DTNA to reproduce a unit in the future.
- Paint is base solvent highly flammable; new equipment must accomplish OSHA safety requirements.

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):

- Ability to travel to DTNA in Cleveland, NC
- Interest in automation and robotics