



UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE of ENGINEERING

Senior Design Project Description

Company Name	<i>Daimler – Mt. Holly Truck Plant</i>	Date Submitted	<i>12/4/2020</i>
Project Title	<i>Re-design of a Frame Rail De-nesting Operation (DAIM RAIL)</i>	Planned Starting Semester	Spring 2021

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	
Computer		Systems	3
Other ()			

Company and Project Overview:

Daimler Trucks & Buses is one of the world’s largest commercial vehicle manufacturers, with more than 35 primary locations around the world and around 100,000 employees. The company brings seven vehicle brands under one roof:

[Mercedes-Benz](#) (light, medium and heavy trucks as well as city, intercity and touring coaches) and [Setra](#) (intercity, long-distance and premium coaches) are our traditional European brands; our U.S. brands [Freightliner Trucks](#) (trucks in weight classes 5 to 8 for a wide range of commercial vehicle applications), [Western Star](#) (heavy trucks for specialized and long-haul transports) and [Thomas Built Buses](#) (light- to medium-duty buses); and our Asian brands [BharatBenz](#), based in Chennai, India (trucks in the weight classes 9 to 55 t and medium- and heavy-duty buses) and [FUSO](#), headquartered in Japan (trucks and buses for Asia, Middle East, Africa, Europe and Latin America).

The Mount Holly Truck Manufacturing plant produces the full line of Freightliner medium-duty Business Class® M2 / SD models as well as an ecoated cab for the Western Star units built at the Cleveland Truck Plant. See photos below of product:



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The assembly process begins with the chassis frame rails. This project will be associated with that part of the process.

Project Requirements:

Chassis frame rails are the underpinnings for every truck produced in Mt. Holly. The frame rails are made in Mexico and arrive multiple times per week by flatbed truck. There are several types for frame rails for different truck models that come on the trucks. The frames are nested in a pair and are off loaded from the truck onto temporary storage racks or loaded directly into the factory.



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See Figure 1.



Figure 1 – Flatbed unloading area

Fork lift trucks are used to take the nested frame rails to a conveyer which takes them into the building. See Figure 2.



Figure 2 – Conveyor that transports frame rails into building to the “Denester” station



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The “Denester” station pulls the rails apart, in a way that allows an overhead crane to pick up the rails and places them onto pedestals which are holding fixtures used to start the next steps of the frame building process. See Figures 3 and 4.



Denester

Frame Rails being Denested

Figure 3 – Denester Machine

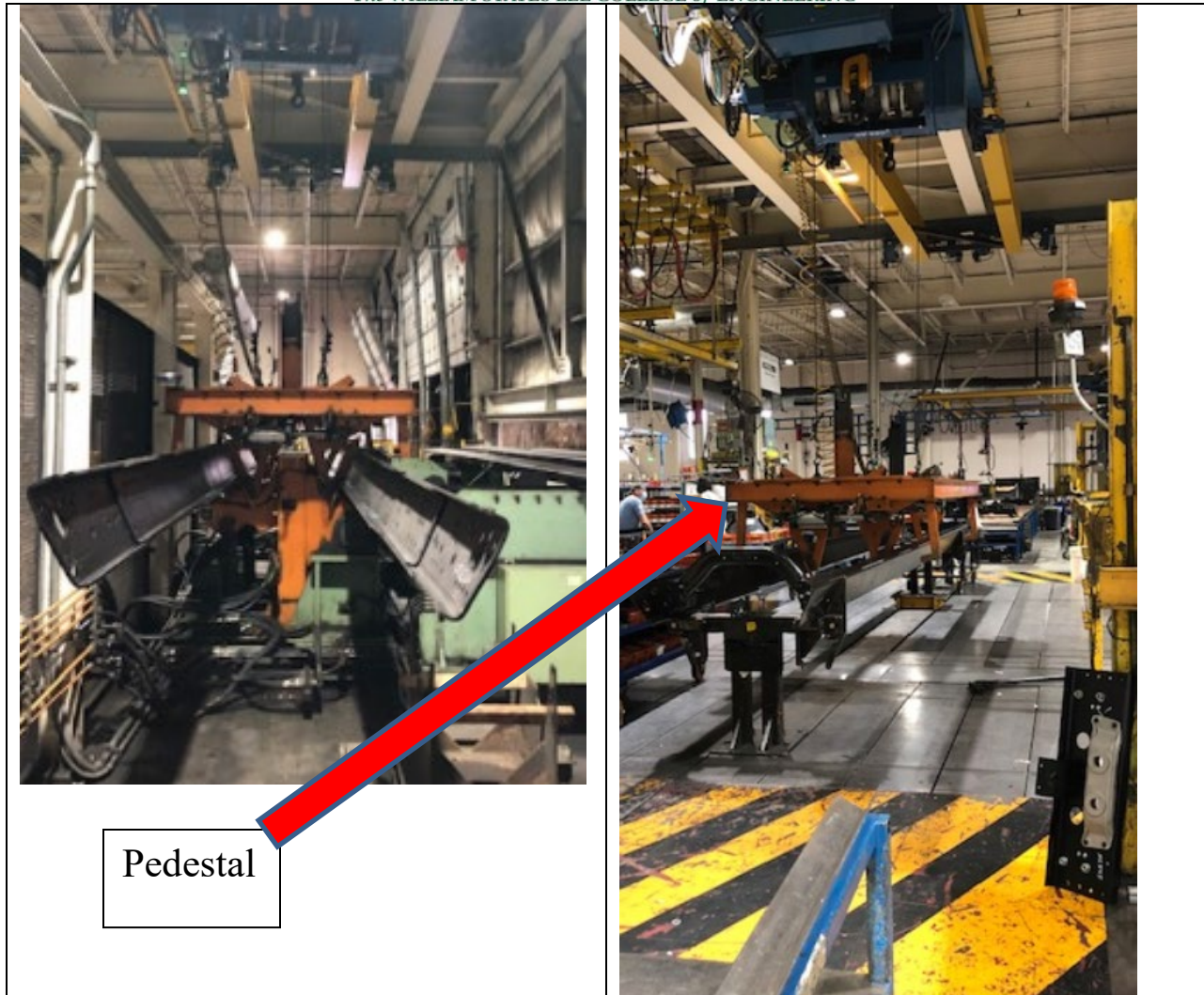


Figure 4 – Crane which puts Frame rails onto Pedestal

This process and equipment are very old. Freightliner management feel that there is a lot of opportunity to revisit everything in this process and design improvements that improve efficiency, safety and reliability. The scope would encompass the process from the unloading of the flatbed, to the loading of the frames on the pedestal. The student group will have the opportunity to interface with many departments of the plant including Production, Materials, Maintenance, Union, Safety, Environmental, Quality and Finance. The student team will have the opportunity to consider this operation with “Fresh Eyes” and develop short term and long term changes to achieve the project goals. The Fall 2019 Senior Design project FCCC_RAIL projected looked as a similar operation at the Freightliner Gaffney, SC facility. That facility did not have a denester or a crane, but some of the work done by that team, may be useful for this team.

Expected Deliverables/Results:

- Analysis of the current process with recommendations for change using the existing equipment or modifications that can be done in a short period of time (2 months) with testing and



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implementation planned for the second semester.

- Recommendations for improvements that are beyond what can be implemented during the project due to time and budget considerations.

Disposition of Deliverables at the End of the Project:

Hardware developed is the property of the Industry Supporter. The work product is displayed at the last Expo then immediately handed over to the supporter unless arrangements have been made to deliver at a future date.

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

- This is a good representation of a project that would be assigned to a manufacturing/plant engineer or an outside consulting company. This project is open ended with a broad scope for engagement and improvement, but students selecting this project should be prepared to think outside the box and come up with creative solutions. In this type of engagement, part of the process is “selling” your solution ideas to the multiple constituencies involved in this process.
- Ability to travel to the Daimler Mt. Holly, NC facility for data gathering and solution implementation.
- Design reviews (when not virtual) are desired to be help at the Mt. Holly location.