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The WILLIAM STATES LEE COLLEGE *of* ENGINEERING

UNC Charlotte – Lee College of Engineering Senior Design Program

Senior Design Project Description

Company Name	*Deere-Hitachi Construction Machinery*	**Date Submitted**	*11/05/19*
Project Title	*Design for Implementation of AGV's in the Deere-Hitachi Factory* **(DH_AGV)**	**Planned Starting Semester**	*Spring 2020*

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	1	Electrical	
Computer		Systems	4
Other ( )			

Company and Project Overview:

Deere-Hitachi Construction Machinery Corporation is an over 1 million square foot manufacturing facility in Kernersville, NC. As a joint venture company formed in 1988 between John Deere and Hitachi, the factory produces Deere and Hitachi branded hydraulic excavators for the North, Central, and South American markets.

The state-of-the-art factory uses high quality materials, advanced welding robotics, CNC machining centers, plasma plate-cutting machines and cranes capable of transporting as much as 25 tons. Each manufactured machine is made-to-order, made possible by a lean manufacturing system combined with a thorough quality assurance process.

Operations of Deere-Hitachi are housed in two facilities across 145 acres: the Main Campus and the East Campus. Main Campus processes include plate processing, welding, machining, and paint, and the East Campus location focuses on assembly and logistic operations.

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At Deere-Hitachi parts and weldments move from plate processing to fabrication and then to paint. We currently have four weld lines with those being the boom, arm, track frame, and mainframe lines. Moving forward the company would like to explore the use of automated guided vehicles (AGV's) for in line weld moves within our weld lines. Currently the company is using cranes, forklifts, and pallets jacks for the transport of weldments and parts. Our senior design project would like for the students to do an initial investigation on the use of AGV's in factories and then report back to the company of a way for Deere-Hitachi to use them on their factory floor.

Project Requirements:

Project Objective:

Research and analyze Deere-Hitachi's current weld process lines and design a replacement system using commercially available AGV systems. There are many AGV companies and products available commercially, this project will first design how the current processes will need to be modified to replace the current material handling system with an AGV based system. All aspects of the material transfer and production operations to be considered. A simulation of the current state and new design will be produced for comparison purposes. New design incorporating the use of automated guided vehicles should target improvement in process flow, quality, and cost savings from manual labor reductions.

Expected Deliverables/Results:

- Research on the use of AGV's in factories along with the companies that currently manufacture them (Compare/Contrast).
- 2D layout drawings of hypothetical process flows of the AGV's for each of the weld lines.
- Documentation of expected return on investment, expected time savings, and improvements.
- 3D Simulation of AGV recommendation to test and verify one of the designs to demonstrate cost, time, and quality improvements.
- If a co-operating AGV vendor can be found, attempt to implement and test a portion of the team's design using vendor loaned demonstration equipment.

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Disposition of Deliverables at the End of the Project:

Project material to be provided to Supporter after Expo

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

- Some level of knowledge of lean manufacturing / creation of mapping processes
- Some background in Manufacturing and Logistics

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