THE WILLIAM STATES LEE COLLEGE OF ENGINEERING

# ***Company Information***

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| **Company Name** | *Carolina Stakes and Wood Products LLC* | **Date Submitted** | *11-24-2021* |
| **Project Title** | *Design of an Automation System for Wood Stake Manufacturing Operation* **(CSW_STAKE)** | **Planned Starting Semester** | *Spring 2022* |

# ***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 | 1 |
| Other ( ) | | | |

## Company and Project Overview:

Carolina Stake is a manufacturer of wood survey stakes and other wood products. It was started when the founder, Mr. Long, was 13 years old to give him something to do after school. The business was started with just a Craftsman radial arm saw and now has evolved to supplying construction and survey stakes all over the Southeast. See product examples below:

Raw blocks being fed into first operation:


Pointing Operation:

Pointed stakes emerging from the ripping saw:

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The founder sold the company some years ago and recently purchased it back and is interested in modernization of the operation. The demand of the company's products is increasing and at the same time, it is increasingly difficult to find employees to supply the needed demand. This project's objective is to automate some part of the operation to reduce the labor requirements.

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| NCMEP North Carolina Manufacturing Extension Partnership | This project is partially supported by a grant from the NC Manufacturing Extension partnership, an organization the helps to support business and job growth for NC companies. To learn more about the NC MEP, click on this link: https://www.ncmep.org/. |

**Project Requirements:**

The project team will review the current operation to determine the best option for automation in the process. The process starts with blocks being fed into a machine that cuts the stake point ends. The sharpened block then is carried by conveyor to the ripping saw that cuts the board into eight individual stakes. Exiting the ripping saw, the stakes are examined for defects. Defective items are removed and the remaining stakes are staked and sent down a line for staking and packing. It is thought that the stacking and packing operation may be the best option for automation, but the team will have the freedom to consider the entire operation and present

what they feel are the best automation design options during the project. The automation will focus on one size of stake to keep the problem tractable, but be expandable in the future for other sizes. The facility is close to campus which will make visits convenient for the student team.

**Expected Deliverables/Results:**

- Review of the entire process flow and identification of the best option for automation.
- Detailed design for the operation to be automated.
- Development of a prototype to implement and test the automated system.
- Detail changes needed in future iterations for different size products

**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 control systems and automation.
- SEGR 3102 - System Simulation, Modeling, and Analysis