



Company Information

Company Name	<i>Pallet Tower, LLC</i>	Date Submitted	<i>05/28/2021</i>
Project Title	<i>Real-time, customizable marking of product during extrusion and laminating process.</i> (PALLET_MARK)	Planned Starting Semester	<i>Fall 2021</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:

Discipline	Number	Discipline	Number
Mechanical	3	Electrical	2
Computer	1	Systems	
Other ()			

Company and Project Overview:

Pallet Tower™ was formed in 2020 to address a need for a simpler, more cost-effective way to pack and ship live plant material without the hassle of returning shipping racks. Pallet Tower’s patented corner boards allow for easy assembly of a fully customizable vertical racking system. This allows the tower to accommodate products of multiple sizes for shipping and retail sales without the risk of damage caused by stacking individual products. Pallet Tower™ also works with our manufacturer to create eye-catching branded boards, allowing shippers and retailers to integrate marketing seamlessly into the shipping process.

Pallet Tower™ corner boards can bear several hundred pounds, yet are lightweight, easy to disassemble and fully recyclable. This alleviates the need for customers to schedule rack returns or have valuable space consumed by unused shipping racks. See image below for example of completed and loaded Pallet Tower™ racks:



Figure 1: Pallet Tower™ product assembled, loaded and being moved for transport to customer.

During the construction process of the corner boards, a plastic/paper composite is extruded into a flat profile shape. While still molten, this composite material is wrapped with a layer of craft paper and formed into the desired angle profile. The paper used in this process can have a print applied prior to the production process, but current limitations on the production line do not allow for indexing the cutting action of the cutterhead to the print location.



UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE of ENGINEERING
Industrial Solutions Laboratory



Figure 2: Layering the molten paper/plastic composite into the kraft paper facing.



Figure 3: Cutting device (inside yellow box) and downstream cooling table for freshly cut corner boards.

A recurring request from customers is for an integrated measurement system allowing for easy alignment and placement of pallets. Currently, the inability for indexing means that any printed measurement system will not be guaranteed to match from corner board to corner board, rendering them unusable.



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 objective of this project is to develop a way to produce a clearly visible mark on the inside of the corner boards. This mark must occur in real time during the production process, and it must have a way to be indexed to the cutting action (i.e. the marks always end up at the same place relative to the ends of the final product). Customers will need to be able to specify the type of mark(s), location of mark(s) and any subsequently needed identifying information.

Expected Deliverables/Results:

- A mobile device capable of repeatable printing marks on the inside of the corner board that meet the customer's specifications.
- The printer must be able to easily integrate into an existing production line, but easily removed/moved to a different production line

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):

- Travel to Darlington, SC to understand process integration requirements and design constraints.
- Travel to Darlington, SC to demonstrate final design prototype.
- Interest in rugged industrial equipment design and integration.