



Company Information

Company Name	<i>Windsor Windows and Doors</i>	Date Submitted	<i>04/18/2022</i>
Project Title	<i>Design of an Improved Caulk Gun for Impact Products</i> (WINDSOR_IMPACT)	Planned Starting Semester	<i>Fall 2022</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	

Company and Project Overview:

About Windsor Windows & Doors

Established in 1946, Windsor Windows & Doors manufactures and markets Pinnacle wood windows and patio doors, Next Dimension vinyl windows and patio doors, Legend cellular PVC windows and Revive pocket replacement windows. Windsor is owned by Woodgrain Millwork, which is the largest U.S. manufacturer of prefinished moldings and interior pine doors. Windsor operates its divisional headquarters in West Des Moines, IA, and has an additional manufacturing facility in Monroe, NC. In their total commitment to customers, Windsor promises quality, service, responsiveness and value. For more information, visit www.windsorwindows.com.



 <p>North Carolina Manufacturing Extension Partnership</p>	<p>This project is partially supported by a grant from the NC Manufacturing Extension partnership, an organization that 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/.</p>
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Project Requirements:

During the manufacturing process for windows, sealant caulk is applied to the frames. As this is high volume, a semi-automated system has been developed to handle the volume. Windsor Windows also offers the Pinnacle Impact Series of products that is Hurricane Impact Rated. Impact Rated products utilize a special structural glazing sealant that provides a seal and a structural bond between the insulated glass and the product.

While Impact Rated products are an important part of our business model; they are relatively low volume in comparison to our higher volume products.

Structural glazing sealant (Dow 995) for the Impact Rated products is currently applied using an air activated caulk gun. Application of the sealant is a 2-part process:

- 1.) Application of primary seal in a clean, consistent manner is difficult due to the ergonomic challenges of using a caulk gun (and dispensing a uniform bead) in a straight line across distances between 12" and 120" in a rectangular pattern.
- 2.) After glass is installed; there is an 1/8" wide by 3/4" deep space between the glass and the frame that must be backfilled with sealant. This process is slow and tedious. The backfilling process must be clean and free of mistakes as getting the structural sealant on incorrect areas of the product can yield aesthetic issues with the end product. The objective for this project is to develop a semi-automated method to consistently dispense the impact sealing in the frame to improve the quality and cycle time for the operation.



Expected Deliverables/Results:

- Develop an application process for sealant and backfill that is more repeatable with less skilled labor.
- Can not interfere with higher volume production practices.
- Must be hand-held or easily movable so as to not take up floor space.
- Windsor Windows will supply examples of current caulk gun, sample components, and sealant.

Disposition of Deliverables at the End of the Project:

- Working Prototype
- Design, Documentation, Drawings, Specifications to be handed over to Windsor Engineering Team following project completion.

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

- General knowledge of pneumatic tools
- Ergonomics
- Mechanical
- Must be able to travel to Windsor's Monroe, NC operation as required. Mileage expenses will be reimbursed by following the procedures in the Purchasing lecture.