INDUSTRIAL SOLUTIONS LABORATORY

Company Information

Company Name	*Lowe's*	**Date Submitted**	*06/12/2024*
Project Title	*Lawnmower Blade User Experience Improvement (LOWES_BLADE)*	**Planned Starting Semester**	*Fall 2025*

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	5	Electrical	
Computer		Systems	

Company and Project Overview:

Lowe's Companies, Inc. (NYSE: LOW) is a FORTUNE® 50 home improvement company serving approximately 16 million customer transactions a week in the United States. With total fiscal year 2023 sales of more than $86 billion, Lowe's operates over 1,700 home improvement stores and employs approximately 300,000 associates. Based in Mooresville, N.C., Lowe's supports the communities it serves through programs focused on creating safe, affordable housing and helping to develop the next generation of skilled trade experts.

Lowe's serves a diverse customer base that includes both do-it-yourself (DIY) homeowners and professional (Pro) contractors. Among our many product categories, lawnmowers are a high-volume item with millions sold annually. However, many customers—especially DIY users—lack the mechanical knowledge, tools, or confidence to safely and effectively change out mower blades when they become dull.

Dull blades can lead to poor cutting performance, increased strain on the equipment, and customer frustration. In many cases, this can result in negative product reviews or returns, even when the underlying

issue is simply a worn blade. Improving the user experience for replacing lawnmower blades not only enhances performance and safety but also contributes to better customer satisfaction and brand perception

Project Requirements:

Changing lawnmower blades is a critical maintenance task for homeowners and landscaping professionals, but the current process is cumbersome and potentially hazardous. Common challenges include dealing with seized bolts, securing the blade safely during removal and replacement, and managing accumulated dirt and debris that interfere with the process.

This project will explore and develop one of two potential solutions:

1. A quick-connect or tool-less system that allows for safe, rapid, and secure removal and replacement of lawnmower blades.
2. A redesigned lawnmower blade system with disposable or replaceable sharp edge inserts, eliminating the need to unbolt and remount the full blade.

Both concepts aim to reduce time, physical strain, and risk to the user while enhancing overall satisfaction and safety. The project will also consider environmental durability and compatibility with existing lawnmower platforms, especially within Lowe's private brand lines.

Expected Deliverables/Results:

A refined and user-tested product concept for improving lawnmower blade replacement. Deliverables will include:

- Comparative research on existing blade-changing solutions and user pain points.
- CAD models and mechanical drawings of the proposed system
- Functional prototypes of the proposed mechanism or blade redesign.
- Finite Element Analysis and/or simulations to validate safety, strength, and usability of the design.
- User testing and feedback analysis to assess ease-of-use and performance improvements.
- Manufacturing considerations, including cost estimation and potential materials.
- A detailed presentation of findings, models, and testing results at the Senior Design Expo.

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):

- Students selecting this project will be required to sign a Project Agreement form with Lowes that grants any IP created during the project to Lowes and also an additional confidentiality agreement.
- Proficiency in CAD modeling (e.g., SolidWorks, Creo, Fusion 360)

- Knowledge of mechanical fastening systems and materials
- Exposure to mechanical design, especially rotating systems or dynamic load scenarios
- Familiarity with manufacturing methods such as machining and injection molding
- Basic understanding of user-centered design principles and product ergonomics
    - Suggested courses:
        - MEGR 3221 – Machine Analysis and Design I
        - MEGR 3161 – Introduction to Engineering Materials
        - MEGR 2180 – Manufacturing Systems
        - MEGR 3225 – Introduction to Finite Element Analysis
        - MEGR 3232 – Plastic Part Design