



Company Information

Company Name	<i>Robert Bosch Tool Corporation</i>	Date Submitted	<i>04/10/2024</i>
Project Title	<i>Design for Automation of Manual Blade Packaging (BOSCH_BLADE3)</i>	Planned Starting Semester	<i>Fall 2024</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	1
Computer	1	Systems	

Company and Project Overview:

Bosch Power Tools is a world leader in the manufacture of power tools and power tool accessories. The power tool accessory plant in Lincolnton, NC manufactures circular saw blades, reciprocating saw blades, and oscillating multi-tool blades under the Diablo brand.

Currently the oscillating multi-tool blades (OMT) are packaged in three variations, two of which are manual packaging operations. Automated solutions are being explored to increase process efficiency and address points of ergonomic concern.

During the 2022-2023 school year, a Senior Design project was commenced to design a small prototype machine to replace one of the manual packaging processes, and a prototype concept was successfully demonstrated at the end of the two semesters. This concept was improved upon during the 2023-2024 school year, focusing on the blade handling system and safety features of the machine. The intent of the third iteration of this project is to finalize the comprehensive design of the machine prototype and demonstrate a high level of technical availability.

Project Requirements:

The objective of this project is to continue the development of the BOSCH_BLADE system, generating a comprehensive design package and fully demonstratable prototype. The system should be capable of the following:

- Automated loading of opened, prepared OMT set cases
- Automated loading of five different OMT blades
- Automated closing of the OMT set case
- Automated verification of the presence of all five OMT blades
- Running without machine operator intervention for ten minutes
- Starting and stopping through an operational interface
- Displaying the operational state of the machine
- Monitoring safety devices present on the machine



The general specifications for the project are as follows:

- Size: The entire BOSCH_BLADE system should have an overall footprint smaller than 9 feet x 13 feet.
- Output: The system should have a maximum cycle time of 30 seconds.
- Noise: The sound produced by the system should be less than 85dBA.
- Electrical Power: AC – 120V, DC – 24V
- Pneumatics: Minimum supply of 80 PSI
- Efficiency: The system should have a technical availability greater than 90%.
- Design Considerations: Considerations should be taken for safety, ergonomics, quality, and operations for all parts of the system.

Expected Deliverables/Results:

- Fully demonstratable machine prototype
- 3D CAD model
- 2D drawings of all machined or fabricated parts
- Tabular parts list
- Electrical schematics
- Standard operating procedure



- PLC program

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):

- Travel to Bosch facility in Lincolnton, NC
- CAD modeling - needed
- Knowledge of AC and DC circuits - needed
- Control systems – suggested
- Programming - suggested