INDUSTRIAL SOLUTIONS LABORATORY

Company Information

Company Name	*Schaeffler Group USA*	**Date Submitted**	*5/18/2022*
Project Title	*Automation Design for KX Assembly -Phase1* **(SG_KX)**	**Planned Starting Semester**	*Fall 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	

Company and Project Overview:

Schaeffler is one of the largest private companies in Germany (with global operations). It operates both in the Industrial sector (approx. 25% of sales) and Tier 1 to the Auto industry (75%). In the Industrial arena, the main products consist of bearings (all sizes – catalogue and customs), Linear guiding systems and actuators. Schaeffler is the #2 global bearing provider. On the Automotive side, Schaeffler focus has historically been in Engines, Transmissions and Chassis systems. A very targeted focus in the last few years has been on powertrain electrification where Schaeffler now provides full hybrid modules E-axles and builds its own electric motors.

Project Requirements:

The project proposed is in the Industrial business in our Fort Mill 2 factory which manufactures linear guiding systems. A small line assembles a cylindrical bearing that is mounted on a shaft. See pictures below that show an assembled bearing and the unassembled part.

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Here are some photos of the current hand build operation:

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Typical applications for this bearing is exercise equipment. This product family has variations in diameter and design. About a dozen sizes are in scope but there are variations within these sizes. The assembly line is very manual with 2 workstations and 2 operators. The target of this project is to automate a part of the first operation which consists of assembling 2 plastic components, inserting a raceway and placing the part in a position that is conducive to ergonomics and will enable future automation of the next operation. The first operation is the target of this project and is the bottleneck today

Expected Deliverables/Results:

The system proposed must accommodate the full spectrum of part size variations and allow for a rapid changeover from one part to the next. It must be robust both in design and manufacture and kept simple so that an operator with very low skills can operate. If motion systems (linear actuators, etc.) are used, Schaeffler's components must be the preferred supplier. A quality risk and safety assessment must be provided, and the risks must be addressed in the design and manufacture (such as emptying feeders to ensure that there are no remaining parts from the last batch, etc.). The cycle time cannot be higher than it is today in manual mode. Changeover must be addressed and minimized, both in terms of skills and necessary time. The expected outcome of the project is to install a machine and then have a Phase 2 team continue the automation of the workcell. A list of necessary drawings, programs and a bill of material must be provided. A list of spare parts that are critical must also be provided and include supplier, part numbers and quantities. Metric dimensions are preferred.

As much as possible, components should be sourced from reputable sources and will be available in the marketplace with relative ease.

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):

- Mechanical design, CAD, Electrical design, PLC programming, Industrial Automation
- Travel to Schaeffler's Ft. Mill site. Mileage will be reimbursed per ISL purchasing policies.

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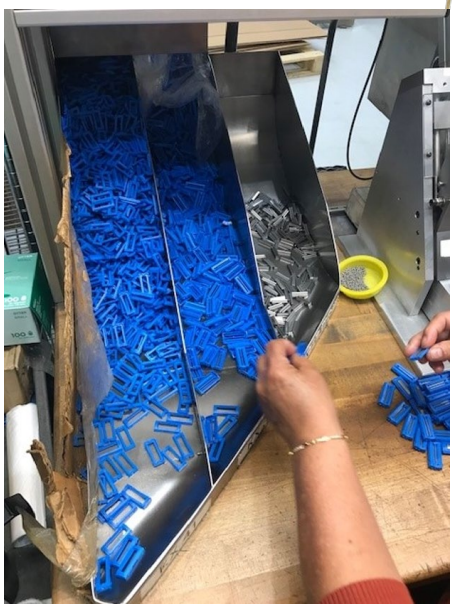
- 

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