INDUSTRIAL SOLUTIONS LABORATORY

Company Information

Company Name	*Schaeffler Group USA*	**Date Submitted**	*5/11/2022*
Project Title	*Design of a Stamping AI Camera* **(SG_STAMP)**	**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	2	Electrical	2
Computer	2	Systems	

Company and Project Overview:

Schaeffler Group is a multinational corporation that supplies engineered components to automotive, aerospace and industrial sectors. Recently, Schaeffler has accepted a significant number of E-mobility projects and is rapidly pivoting into the electric vehicle business.

Some notable customers of the Fort Mill 1 plant are Ford, General Motors, ZF and Stellantis (Chrysler). Some of the components made at the Fort Mill location are needle thrust bearings and catalog cages – mostly for automotive transmission applications.

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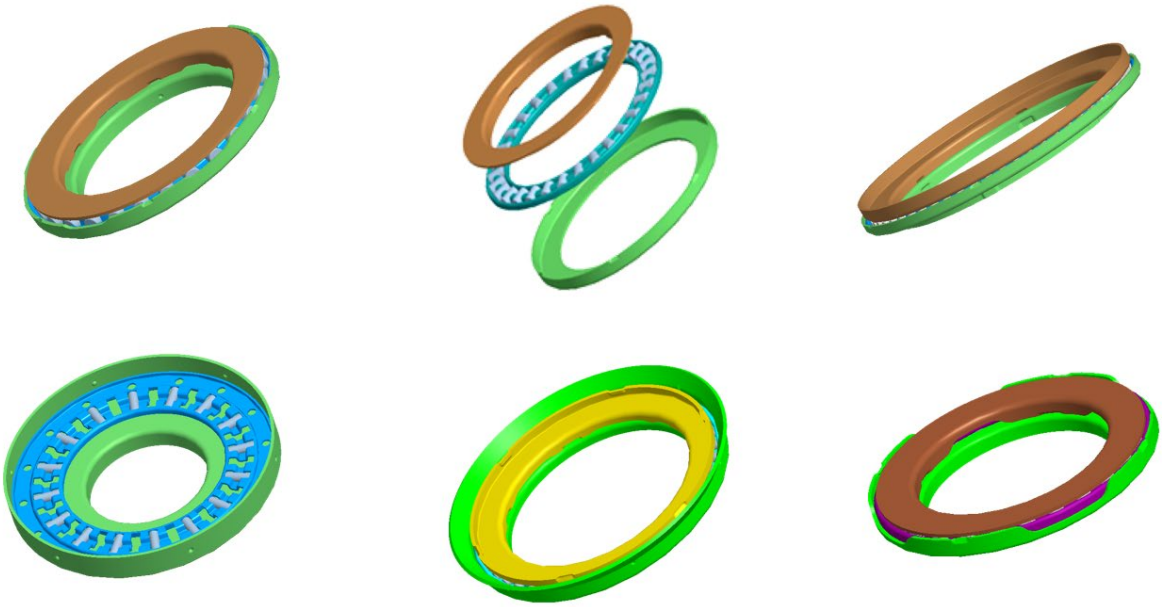

This project's main objective will be to develop a system that can extract a part after the stamping operation and use a 3D/AI camera to pick out defects and alert an operator in the case of a defect.

Project Requirements:

UNC Charlotte students will design, fabricate and program a defect analysis station. System must be able to:

- Remove a part from the conveyor system
- Present the part to a camera
- Analyze the part and identify if there are any defects
- Either return the part (OK) or hold the part (defect)
- Alert the operator in the case of a defect

The students will have design freedom for this project. Schaeffler will support in providing hardware that does not fit within the student budget. During the project, the students will have access to our local manufacturing plant for idea generation and benchmarking. During the idea generation phase, students will be able to see the stamping process and the conveying process therein.

Technical skills required for this project are, but not limited to: CAD design, wiring, wire diagrams, Arduino (or similar) programming, ability to understand camera software and integration, ability to select and procure hardware, technical writing, safety integration, process understanding, print reading, manufacturing principles, and communication.

Expected Deliverables/Results:

- Functioning Camera cell
- CAD models of all components
- BOM of all components
- Wire diagram for electric circuits
- Final version of programs/code
- Work instructions for how to use the machine
- Run-off in production setting to verify usability

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. The final machine will be picked up after the 2nd semester Expo by Schaeffler.

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

- CAD design
- Wiring and wire diagrams
- Arduino (or similar) programming
- Ability to understand camera software and integration
- Ability to select and procure hardware
- Technical writing
- Safety integration
- Process understanding
- Print reading
- Manufacturing principles
- Communication
- Travel to Schaeffler's Fort Mill location. Mileage reimbursement will be made according to ISL purchasing procedures.