



Company Information

Company Name	<i>GKN Automotive</i>	Date Submitted	<i>04/04/2023</i>
Project Title	<i>Design and Build a Universal Ergonomic Material Handling System (GKN_ERGO)</i>	Planned Starting Semester	<i>Fall 2023</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	4	Electrical	1
Computer		Systems	1

Company and Project Overview:

GKN ePowertrain, is a Global leader in Tier 1 automotive drivetrain components and component manufacturing, supplying them to most vehicle manufactures around the world. There are 2 plants on the Newton site. Plant 1 is the machining facility where hypoid ring and pinion gears are manufactured. Plant 2 is the assembly plant. With 15 assembly lines and 4 major products it is a lean and diverse facility. The four main products that are manufactured are RDM (Rear Drive Module), FDU (Front Drive Unit), PTU (Power Transmission Unit), and Hydraulic disconnect clutches. With each of these units there are variants of clutch engagement and differential gear ratio, up to 18 variants per product, per customer. Some product examples:



INDUSTRIAL SOLUTIONS LABORATORY



Figure 1 - Product examples

GKN strives to ensure a safe working environment for the nearly 1,000 workers at the Newton, NC location where this project would be rolled out. If successful, this is a project that could be considered for most GKN locations around the world.

Project Requirements:

Within our manufacturing space we have 15 large assembly lines and several smaller lines. These assembly lines have traditional flow racks that allow for a person to pick material from a box or bin directly from the rack. In many cases these racks are placed over a conveyor and part that the person is working on. Since our conveyors with parts can be as high as ~45 inches from the floor it means that the loading side of the flow rack is sometimes at head height for the person to load material onto the material flow rack. This is a potential safety concern given the weight and number of boxes that are required for production. This project will attempt to allow a person to load material at a safe working height to a rack or system that provides enough material to be stored and used throughout a shift at an ergonomically acceptable working height. This is a think outside the box project since the basic feed systems are widely available. The student team will meet with GKN at the Newton site to see typical workstation feed systems and understand the drawbacks of these systems to understand where design improvements can be made.

Expected Deliverables/Results:

- Engage some of operations team and engineers to understand the potential needs of the project and tabulate those for consideration.
- Produce a solid model in .stp format of an ergonomically acceptable universal material feed/rack system.
- Build a full-scale prototype that can be tested on one of our assembly lines.
- Pilot the prototype on one of our assembly lines in a production environment.

Disposition of Deliverables at the End of the Project:



We expect that the team can set up and demonstrate the working model on our shop floor in a production environment, allow our operations or engineering team to test the model and possibly utilize the working model for a period of time in the production environment. The working model should be trialed and then be returned to campus prior to the expo.

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

- Solid modeling skills
- Metal fabrication skills
- Electrical/controls if the project requires an electrified solution to aid in material movement
- SEGR 3103 for SEGR student