



Company Information

Company Name	<i>Columbus McKinnon Corporation</i>	Date Submitted	<i>05/13/2024</i>
Project Title	<i>Design of a Lifting Column for Cobots (CMCO_COBOT)</i>	Planned Starting Semester	<i>Fall 2024</i>

Senior Design Project Description

Personnel

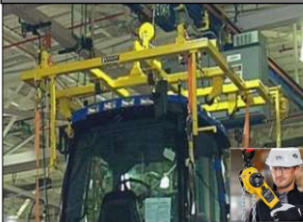
Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

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:

Columbus McKinnon is a leading worldwide designer, manufacturer and marketer of intelligent motion solutions that move the world forward and improve lives by efficiently and ergonomically moving, lifting, positioning, and securing materials. Key products include hoists, crane components, precision conveyor systems, rigging tools, light rail workstations, and digital power and motion control systems. The Company is focused on commercial and industrial applications that require the safety and quality provided by its superior design and engineering know-how. Comprehensive information on Columbus McKinnon is available at www.cmco.com.

Lifting	Precision Conveyance	Automation	Linear Motion
 • Leading global position in lifting • Lifting capacity from 1/8 ton to ~140 tons • Manual chain, electric chain and wire rope hoists • Reliable, high-quality products • End-to-end digital solutions	 • Develops and manufactures complex intralogistics solutions connecting robots and workspaces with asynchronous conveying technology • Specialty conveying provides growth platform in fragmented market • Tailwinds from megatrends like automation, onshoring, ecommerce, electrification and life sciences	 • Design and develop drives and controls for lifting, linear motion and conveying systems • Used in intelligent material handling solutions from ceiling to floor across entire product portfolio • Solutions designed to increase uptime, enhance productivity and improve customer safety	 • Linear actuators with lifting capacity up to 50 tons, screw jacks, rotary unions and super cylinders • Demonstrated leadership and differentiated offering • Serving a breadth of end markets from rail to warehousing to defense



Project Requirements:

Adapt and develop a new lifting column which can be used as a plug & play solution for collaborative robots (Cobot). Extended operating range for cobots, mainly used in material handling applications, specially for palletizing but also used for welding or gluing of big parts. The 7th vertical axis for collaborative robots is designed to enhance the functionality and versatility of cobots, particularly in applications such as palletizing. The 7th axis should be designed to seamlessly integrate with existing cobot models. It should be robust, safe, reliable, and capable of handling the rigors of industrial applications.

- Cost efficient solution, plug & play solution, easy to use
- High positioning accuracy and stability
- Robust column design for industrial use



Expected Deliverables/Results:

- Detailed 3D Model of lifting column (Solidworks)
- Bill of Material in CMCO Format (excel file)
- Functional Prototype capable of lifting 250 lbs
- Source code for firmware for control

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):

- Machine Design and Instrumentation - MEGR 3171, 3221, 322, 3231
- Sensors and Instrumentation, Electrical Machinery/Motors - ECGR 2155, 4111, 4143
- Programming/Control, Robotics – ITCS 4114, 4150, 4152