

UNC Charlotte – Lee College of Engineering Senior Design Program

Senior Design Project Description

Company Name	<i>ASSA ABLOY</i>	Date Submitted	<i>11/25/2019</i>
Project Title	<i>Spring-Tube Automation Machine (ASSA_TUBE)</i>	Planned Starting Semester	<i>Spring 2020</i>

Personnel

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

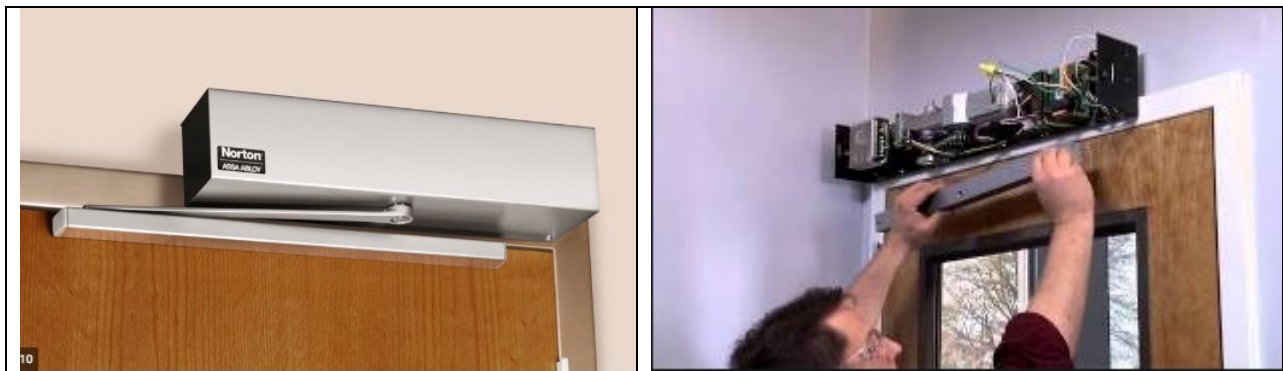
Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

Discipline	Number	Discipline	Number
Mechanical Engineer	3	Electrical	2
Computer		Systems	

Company and Project Overview:

ASSA ABLOY group offers a complete range of access solutions to ensure people are safe and secure. This global company with nearly \$9billion (2018 sales) is the leading provider of door closer, entrance systems, and numerous other entrance environments. ASSA ABLOY has 45,000 employees and operations in over 70 companies.

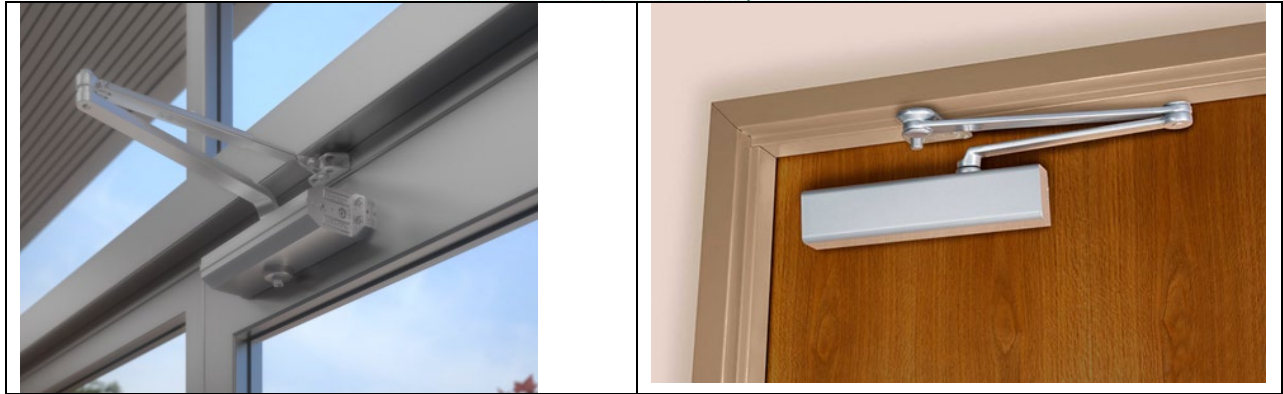
The facility in Monroe, NC is responsible for mechanical door closers and electronic operators.





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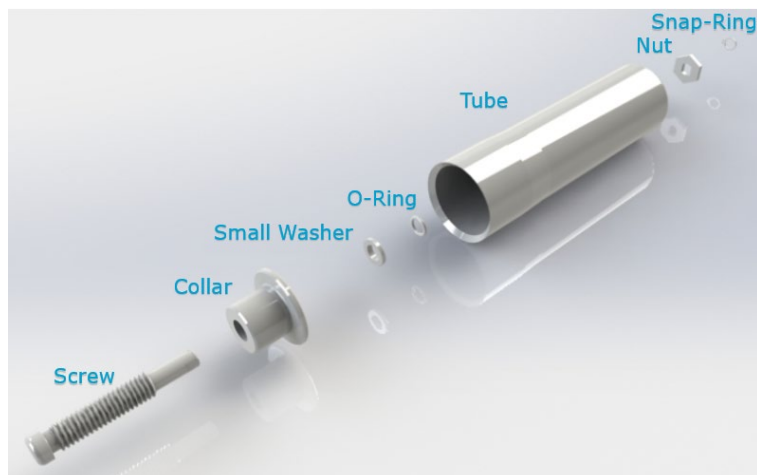
The plant provides cutting-edge door control solutions for swing door applications. This door closer center of excellence for North America is responsible for the machining, assembly, and testing of door closers and operators.

Project Requirements:

ASSA ABLOY door closers and operators are known for their quality, efficiency, and long term performance. ASSA ABLOY is always looking to improve product quality, while managing production costs. The project requires a cradle-to-grave design/build of an automated spring-tube assembly. To remain competitive in the market, ASSA ABLOY is looking to automate manual assembly processes. One process that Assa Abloy would like to automate is a Spring-Tube assembly.

The Spring-Tube assembly consists of the following 7 parts (shown in following page):

- Screw
- Collar
- Small Washer
- O-Ring
- Tube
- Nut
- Snap-Ring





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The objective of the project team will be to design, build, assembly, debug, and commissioning of an entire automated assembly machine. This station cost is likely to exceed the student project budget. ASSA ABLOY will consider supplying parts or additional funding as the project progresses. The equipment must meet a Takt (completion time for one cycle) time of 30 seconds. Key parts of the project will be:

- Concept Design
- Design Review
- Print Creation / Stack-up Analysis
- Quoting
- Ordering
- Assembly
- Debugging
- Testing/Commissioning

Expected Deliverables/Results:

- 3D Conceptual Designs – must accomplish FFF (Form/Fit/Function)
- 2D Prints – must detail all mechanical design elements utilizing GD&T
- 2D Electrical Prints – must provide drawings for electrical cabinets and peripheral devices used in automated assembly. Should include load/heat calculations for the cabinet and comply with UL standards for Industrial Control Panels (UL 508A)
- Risk Assessment – must review design and provide feedback on PFD (Process Flow Diagram), PFMEA (Potential Failure Mode and Effects Analysis, and PCP (Process Control Plan).
- Quoting Phase – must send prints and receive quotes for assembly system.
- Order Components
- Build Components and assembly automated machine.
- Program PLC and HMI for application utilizing Allen-Bradley Software (FactoryTalk View).
- Debug/Test Equipment
- Commission – Release machine to production while providing documentation for how to run and maintain machine.

Disposition of Deliverables at the End of the Project:

Display at Expo, then make arrangements to have delivered to Supporter's location.

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

- 3D Modeling – SolidWorks
- 2D Electrical Software – preferably AutoCAD Electrical
- Mechanical Aptitude to assembly and build equipment
- Ability to travel to Monroe, NC for review/build of equipment.