**UNC Charlotte – Lee College of Engineering Senior Design Program**

**Process for Supporting a Senior Design Project**

Thank you for your interest in participating in the UNC Charlotte Lee College of Engineering Senior Design Program. The Program’s goal is to provide students with industry design challenges as part of their Senior Design academic course. In this capacity, our students gain real world engineering experience while companies benefit from completed work on elective research projects. The ideal project should not be on a critical path for the company (“backburner” projects are good candidates), nor pertain to trade secrets or corporate sensitive information.

The senior design teams typically consist of 4-6 students, a faculty mentor and a technical contact from the industry supporter. We estimate about 250 hours of work output per student over two semesters. The tax deductible donation to cover the costs of participation is $8,000. $3,000 of this amount is given to the students to cover their material and travel costs for the project. The balance of the donation is to cover the overhead costs of running the Program. Project expenses in excess of $3,000 will be not be authorized unless the supporter agrees to additional funding. Un-used material budget money does not roll over to future projects and is returned to the Program to offset overheads. Donations will be invoiced (Net 30) once the Project Description (pages 2-3 of this document) is finalized and the project is accepted for the upcoming semester. We have additional opportunities for corporate naming rights for our events, if interested in this please contact Jim Hartman.

As a tax-deductible donation to a non-profit educational program, results cannot be guaranteed and the project work should not be considered contract engineering.

Our goal is to have Fall 2022 Semester Projects defined by 5/15/2022. There are a limited number of slots and once sold out, a project will be put on a waiting list for the following semester.

The documentation (see following pages) required from the industry supporter:

1. Company information for the technical and the financial representatives.
2. A short description of the intended project with expected deliverables/results (Project Description Form). Students will use this information to select their project preferences and Faculty will use it to develop a staffing plan for the project. Examples of completed forms from past projects can be viewed at: <https://isl.uncc.edu/senior-design-program/project-examples>

Email forms to the Program Director, Jim Hartman ([jim.hartman@uncc.edu](mailto:jim.hartman@uncc.edu)). If you have any questions or need help defining the scope, please email or call Jim at 704-614-9766.

Project work starts in August 2022 with the Senior Design Kickoff Event on August 31, 2022. This is the first meeting between the team and the industry supporter with the objective being the further definition of the Statement of Work and Specifications for the project. The first semester is the design phase and the second semester is the implementation/build phase. The teams will meet weekly with their faculty mentor to discuss progress. Supporter technical representatives are invited, at their option, to attend by phone, virtual meeting or in-person. Each semester, there are two design reviews and an end of semester exposition – attendance of these 3 events is mandatory to ensure awareness and agreement for project direction. The first semester Senior Design Expo is December 9, 2022 and the second semester Expo is May 4, 2023. We look forward to your participation in the Senior Design Program!

***Company Information***

|  |  |  |  |
| --- | --- | --- | --- |
| **Company Name** | *Corning* | **Date Submitted** | *5/6/2022* |
| **Project Title** | *Design of Automation for the Movement of Optical Fiber Spools* | **Planned Starting Semester** | *Fall 2022* |

**Faculty Mentor**

Faculty Mentor will be assigned to the project. If you have been previously working with a faculty mentor and want to continue that relationship, then enter their name here \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­­­­­­­­­­­. We cannot guarantee that faculty mentor will be available, but we will try to make that assignment if possible.

**Technical Contact(s)\***

|  |  |  |  |
| --- | --- | --- | --- |
| **Technical Contact** | **Name** | **Email** | **Phone** |
| **1** | Carlos Felix | FelixCJ2@corning.com | 984-209-8292 |
| **2** | Kevin Schneiderman | SchneidKN3@corning.com | 704-569-6618 |
| **3** |  |  |  |

\*We would like to have more than one technical contact, so there is a back-up in case of travel, sickness, job re-assignment, etc. Also, these are the people that will have Event (Kick-off/Expo) invitations and name badges made for them, so please identify them to us so we can properly include them.

**Financial Contact\*\***

|  |  |
| --- | --- |
| **Name** | Ruchi Tandon |
| **Phone Number** | 607.974.9453 |
| **Email Address** | TandonRS2@corning.com |
| **Billing Address** | One Riverfront Plaza Corning, NY 14831 |

\*\* This is the person that will receive and process the invoice

***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:**

Corning is one of the world's leading innovators in materials science, with a 166-year track record of life-changing inventions. Corning applies its unparalleled expertise in glass science, ceramics science, and optical physics. Corning has approximately 45,000 employees worldwide and annual sales of $10.5 billion. Corning invented the world’s first low-loss optical fiber in 1970. Since that milestone, they have continued to pioneer optical fiber, cable and connectivity solutions. As global bandwidth demand driven by video usage grows exponentially, networks continue to migrate from copper to optical-based systems that can deliver the required cost-effective bandwidth-carrying capacity.

**Project Requirements:**

As part of the current fiber manufacturing process, spools of fiber are manually removed from small monorail shuttles and sorted onto different carts depending on product disposition (good, rework, scrap, audit). Spool disposition is identified using a handheld scanner to read the small barcode on the spool and querying the MES system as to its disposition. Finally, the employee places an empty spool on the now empty shuttle, and releases it, sending it to the draw to be wrapped with fiber. Currently, this requires 1 dedicated full-time employee per shift simply removing and replacing spools. **The goal of this project is to automate this process by designing and building an automated cell with a 3-axis gantry system that can pick and place these spools.**

Constraints for this project include**:**

* Cannot change the use of the monorail or shuttles currently used
  + Monorail CAN be modified to take whatever path necessary through the cell
* Cell must fit in a 15’X20 envelope. Can be expanded to 20x20’ if needed.
* Currently we have two different styles of carts that could be used
  + While it would preferable that the carts used today would be used in the cell, this can be flexible as well

Goal: The goal of this project would be to develop process improvements.

**Expected Deliverables/Results:**

* Design concept for the automated cell
  + 3D CAD model
  + Process flow chart through process
  + Explanation of how goal throughputs (or best possible throughputs) could be achieved
  + Documentation of design process
* Prototype of Automation Cell
  + 3 axis gantry to pick and place the spools
  + 3D model of a fully designed end of arm tooling for picking and placing spools
  + Prototype of end of arm tooling
  + Prove EOAT prototype using actual spools/shuttle/cart and test pick and place
    - A stretch goal would be to integrate in barcode reading
    - Perform cycle time study and potential ideas on how to improve
* Plant can help support testing and create PLC interface depending on scope of project

**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):**

* 3D modeling (Solidworks/Inventor/etc)
* Mechanical design
* Electrical Design
* Robot/PLC programming
* Automation design
* Team must travel to the Corning site in Midland, NC as required to understand current design and test prototypes, mileage will be reimbursed per ISL purchasing procedures.