INDUSTRIAL SOLUTIONS LABORATORY

# ***Company Information***

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| **Company Name** | *Eli Lilly* | **Date Submitted** | *11/29/2022* |
| **Project Title** | *Bag Straightening Guide/Device for Optima Filling Line DBA-S* | **Planned Starting Semester** | *Spring 2023* |

## ***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 | 5 | Electrical | |
| Computer | | Systems | |

**Company and Project Overview:**

Provide background information about the company (what the company does, product examples, pictures, etc.), and an overview about the context for the project.

**About Lilly**

**Creating Medicines That Make Life Better**

Lilly was founded in 1876 by Colonel Eli Lilly, a man committed to creating high-quality medicines that met real needs in an era of unreliable elixirs peddled by questionable characters. His charge to the generations of employees who have followed was this: "Take what you find here and make it better and better."

More than 145 years later, we remain committed to his vision through every aspect of our business and the people we serve starting with those who take our medicines, and extending to health care professionals, employees and the communities in which we live.

**Project Overview and Examples**

At the Eli Lilly site in Concord, NC we are a sterile manufacturing and filling facility that will produce filled syringes and the delivery device for Eli Lilly's products. We are currently a brand new facility that is in the process of being built but have a sister site in Raleigh Triangle Park (RTP) that has the exact same filling lines and layout that will be in the Concord, NC site. Currently with the loading portion of the Optima syringe filling machine in the parenteral building there are issues with the loading portion of the line when operators are placing tubs on the belt to be sent to the outer bag removal system (DBA-S). The goal will be to design a part/solution that will allow for the tubs to be repeatedly sent to the DBA-S system in the correct orientation which will help prevent jams and line stoppages.

**Product Examples**

Example 1: Syringe and Delivery Device

Example 2: Filled syringe from the Optima filling machine.

Example 3: Loading Conveyor and DBA-S system

**Project Requirements:**

The tubs come in double bagged and it is the DBA-S systems job to remove the outer bag from the tub to be sent to the next portion of the filling line. Currently the bags come in a tighter fashion as seen in Example 4 below. The operator straightens the bag as seen in Example 5 and places it on the line as seen in Example 6 with the Tyvek side of the tub facing forward and all corners of the bag flattened out so the end of the bag can be grabbed by the grippers of the DBA-S. Once the outer bag is grabbed by the grippers of the DBA-S system the Tyvek side is sliced and the tub with the remaining bag is sent to the next portion of the filling line while the outer is sent to a vacuum disposal system.

Some of the issues that have been seen on the line are when the front of the tub of the bag corners are not flattened out all of the way which can cause line stoppages and jams if the grippers are unable grab the back corners of the bag or if the slicer is unable to cut the front of the Tyvek bag all of the way. A solution needs to be designed for the conveyor that will allow the tubs to be sent to the DBA-S while minimizing the current issues that we are seeing.

**General Requirements-**

1. Being removeable to avoid permanent changes to the line
2. Free of any sharp edges, burrs, or points and safe for operators to work around
3. Cleanable and suitable for a pharmaceutical CNC space
4. The outer bag can only be pierced or broken by the DBA-S system and not on the conveyor

Example 4:

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Example 5:

Example 6:

Example 7: Red box is one of the grippers of the DBA-S System

**Expected Deliverables/Results:**

1. Solution that allows to reduction in DBA-S bag errors as described above
2. Physical prototype available to test on the line in RTP
3. Detailed design that can be can given to a machine shop to manufacture out of 316 SS if the prototype is successful
4. Stand Operating Procedure on how to use the device/solution

**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):**

- Interest in machine design