INDUSTRIAL SOLUTIONS LABORATORY

# ***Company Information***

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| **Company Name** | *Eli Lilly* | **Date Submitted** | *11/13/2024* |
| **Project Title** | *Design of a Straightening Device for Syringe Tub Containers (LILLY_TUB)* | **Planned Starting Semester** | *Spring 2025* |

# ***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 | 1 |
| Computer | | Systems | |

## Company and Project Overview:

**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.

**Concord, NC**

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 a brand-new facility that is in the process of being qualified.

**Project Overview**

One of the main areas for operational human error and potential operator strain is with the bag adjustment when new tubs of syringes (which are inside of a sterile shipping bag) are removed from the shipment box and adjusted to the where the tub sits at the back of the bag with the corners stretched out and then placed on the line.

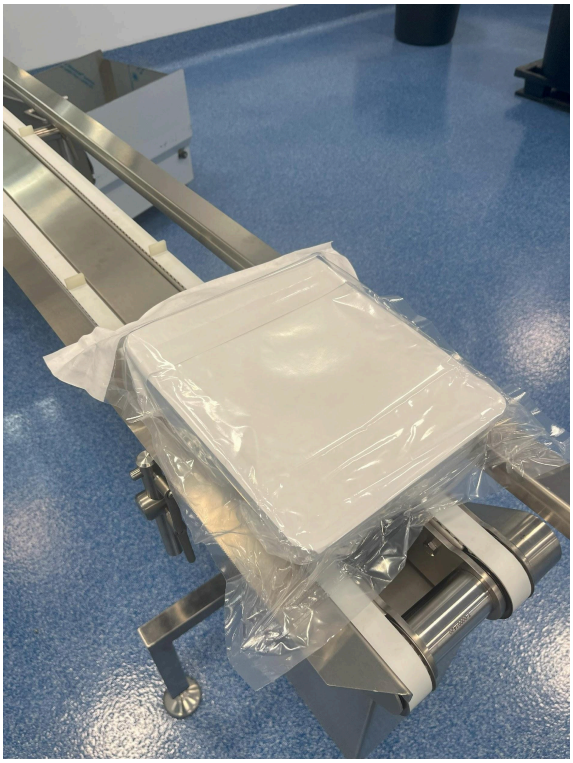
This is what a tub of Syringe vials looks like when they are removed from the shipping box and protective bag:

This is a photo of the box, that the syringe tubs come in, looks like:


The operators open this box and pull out a syringe tub that is inside a sterile protective bag.

This is what the tub in the bag looks like:

The operator then puts this bag on the intake of the assembly line, shown here:



The tub has to be adjusted inside the bag and the flaps of the bag need to be spread out. It is common to have the tub not adjusted correctly and then placed onto the line where it has the potential to stop the line due to its placement. Reducing the amount of downtime from this issue would greatly help line efficiency while reducing potential operator strain.

The goal of this project will be to design a solution that can effectively adjust the tub position within the bag so it will be ready to be placed onto the line without compromising the bag or tub integrity.

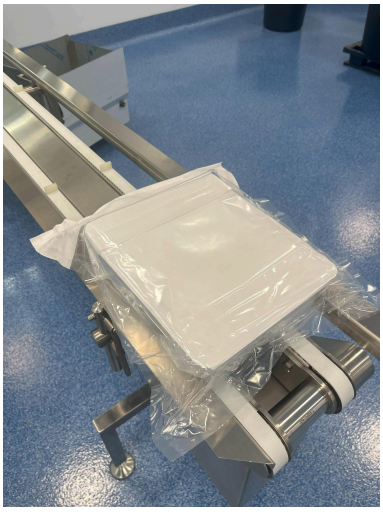
**Project Requirements:**

**Full Description of Current Process**

- The tubs come into the filling area staged in boxes. Example:


- The operator then takes a tub that is double bagged out of the box. All four corners of the bag are tucked in and close to the tub. Example:

- The operator then adjusts the tub to sit at the bottom of the outer bag and all four corners stretched out and flat with the inner bag still tucked. The tub is then placed onto the line. Example:



- This process is repeated continually during the filling process.

**Design Problem**

The main problem with the current design is that it requires human judgment/intervention to

ensure that the tub is adjusted correctly before it is placed onto the line. It is also a source of potential operator strain during this manual adjustment.

**Project Objectives**

The main objectives of this project would be to design a solution that would allow the operator to place a tub from out of the box with the corners still tucked in and tub unadjusted into a device that can adjust the tub for the operator and have it ready to be placed onto the filling line with the corners stretched out and flat.

This solution would need to not damage the integrity of the tub, inner bag, or outer bag.

**Desired Output**

The desired output would be able to adjust 3 tubs per minute.

**General Requirements**

- The solution must be no bigger than the following dimensions (L x W x H): (4 ft, 3.5 ft, 4 ft). Exceptions can be made if deemed necessary to the design solution.
- The solution must be made of pharmaceutical friendly materials acceptable in a clean not classified (CNC) area. Example: 316 SS , Delrin, Peek.
- The solution must be safe for operator use and have guarding in place for moving parts and be free from sharp edges and burrs.
- The solution may use a standard wall outlet as a power source if deemed necessary for the design solution.
- The solution must not damage the integrity of the bags or tub.

**Expected Deliverables/Results:**

- A solution that satisfies the design problem, project objectives, desired output, and general requirements.
- A detailed design of the solution so it can be replicated for other lines within the site.
- A standard operating procedure (SOP) on how an operator can use the designed solution.

- A share point or digital site containing the project files and data generated from this solution.
- A solution that is safe in function and use for the operator.

**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):**

Suggested:

- Mechanical design knowledge of manufacturing machinery
- Any pharmaceutical industry experience would be helpful, but not required
- Interest in the pharmaceutical industry