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Objective: Bayer has requested our team to develop a device that will transfer bags of seed from a pallet to a conveyor at their seed production facilities.

Background:

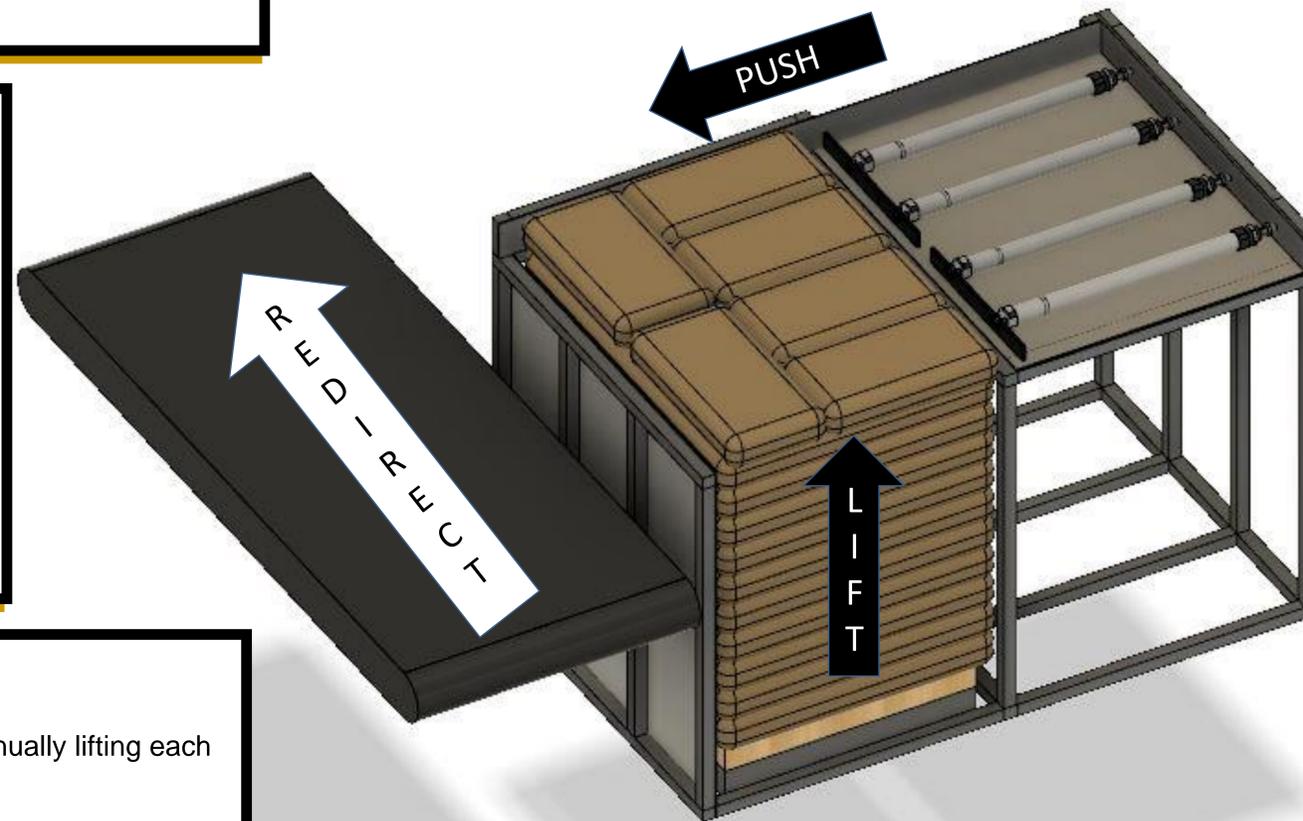
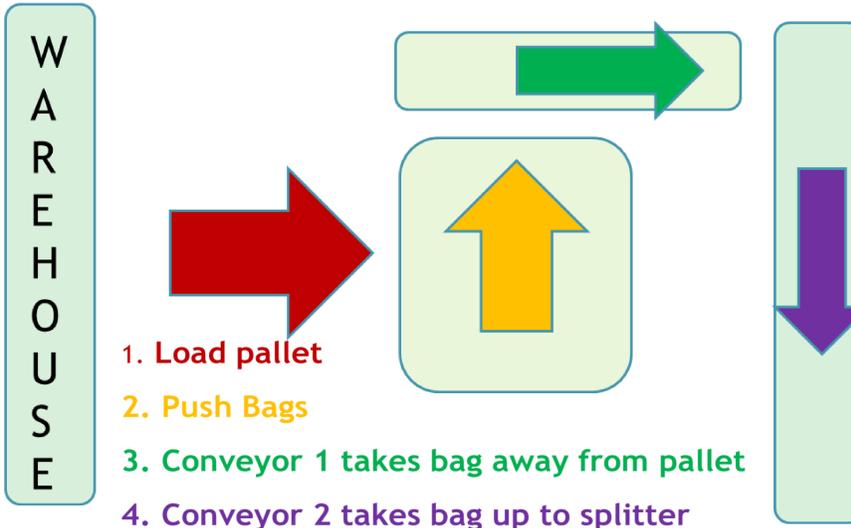
- Bayer receives unused seed at production sites
- Seed needs to be unloaded, cleaned, treated, and re-bagged
- Pallets are currently unloaded by hand or by an expensive robot
- Bayer is looking for a healthier and/or cheaper solution to this process

Testing Conclusions:

- 55-85 lbs. required pushing force per paddle
- Cage needed around pallet
- Conveyors pull bags away from pallet and orient them appropriately
- Hand loading & unloading is physically taxing, even in our test trials
- 48" stroke required
- 4 total cylinders will provide best scenario

Impact:

- Ergonomic Benefit: Employees will not be manually lifting each bag off the pallet
- Reducing labor force required to remove bags
- Eliminates need for \$1Million robot
- Potential for mass implementation into 20+ Bayer seed production sites



Design Dimensions L: 120in. W:56in. H: 52in.



Design Considerations:

- Space requirements: Structure will be placed in existing facilities and must fit into their schemes and not inhibit daily operations
- Safety: Operator position is important; the cage is designed to protect the operator from any bags that could otherwise fall and cause injury
- Facility systems: Bayer primarily uses pneumatic systems to run their machines. Therefore pneumatic cylinders trumped hydraulics as they will fit the current scheme
- Multiple bags and configurations: There are 6 different bag sizes that Bayer uses and two stacking patterns that our machine must be able to handle
- Bag durability: Seed bags are easily punctured and can bust if dropped from an excessive height

Economic Analysis:

| | Eliminate Shift | Eliminate Days | Current |
|--------------------------------|-----------------|-----------------|------------|
| Current Days | 90 | 90 | 90 |
| Eliminated Days | 0 | 28.8 | 0 |
| Current Shifts | 3 | 3 | 3 |
| Eliminated Shifts | 1 | 0 | 0 |
| Employees | 2 | 2 | 3 |
| Wage and Overhead / Hour | \$ 25 | \$ 25 | \$ 25 |
| Days Depalletizing / Year | 90 | 61.2 | 90 |
| Shifts / Day | 2 | 3 | 3 |
| Work Hours / Shift | 8 | 8 | 8 |
| Operating Costs / Year / Site | \$ 72,000 | \$ 73,440 | \$ 162,000 |
| Depalletizer Costs / Site | \$ 15,000 | \$ 15,000 | |
| First Year Costs / Site | \$ 87,000 | \$ 88,440 | |
| First Year Savings | \$ 75,000 /Site | \$ 73,560 /Site | |
| Annual Savings After YR 1 | \$ 90,000 /Site | \$ 88,560 /Site | |
| Yearly Savings Across 20 Sites | \$ 1,800,000 | \$ 1,771,200 | |