

The design of a pick-and-place mechanism for boxes of Brussels sprouts

Martijn Schepers and Victor Laermans

Bridging programme for Master of Electromechanical Engineering Technology

BACKGROUND

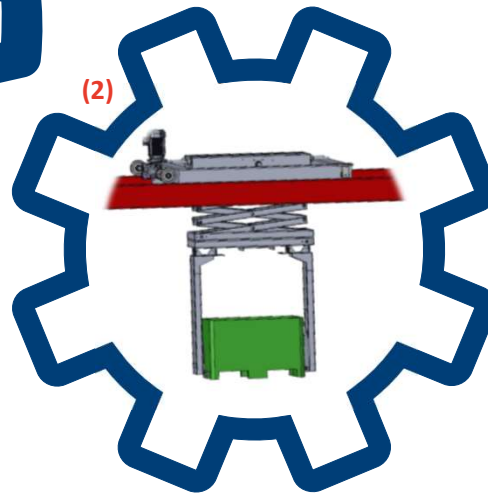
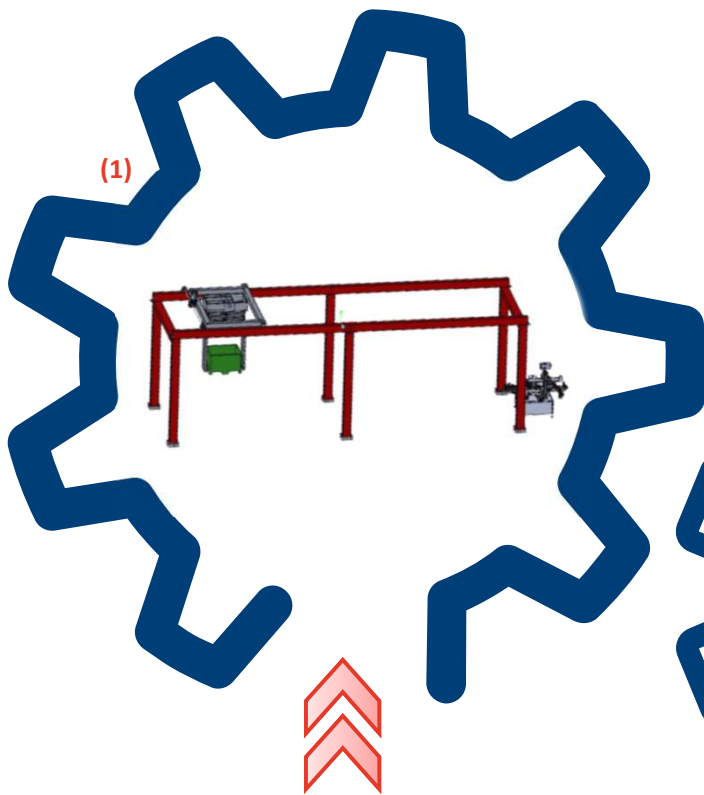
Primeale United is part of the international cooperative Agrial. They are specialized in fresh vegetables, as they take care of the whole chain from harvesting the vegetables to the final product that you can find in the supermarket. Last year, this company bought a plant in **Dinteloord in the Netherlands**. This site processes Brussels sprouts. The subject that will be covered in this project is part of this processing line of **Brussels sprouts**.

PROBLEM

The sorting line, studied during this project, is **insufficiently efficient**. The main problem that makes this installation insufficiently efficient is located entirely at the end of the sorting line. There, discharge belts will fill the crates with different batches of sorted batches of Brussels sprouts. The crates are located on load cells, these load cells will send a signal to the discharge conveyor when the set weight is reached. At this point, the discharge conveyor will stop and there is the possibility of replacing the full crate of Brussels sprouts with an empty crate so that the sorting process can start again. For now, this crate change is done manually using a **forklift truck**. Because this change often takes a long time, the discharge belt lies idle for an unnecessarily long time, which does not help the efficiency of the installation. Moreover, it is not an easy job to lift a full crate from the load cells and move it. Due to the complexity of this operation, the load cells are **regularly damaged by an operator**, requiring recalibration or sometimes even making the purchase of a new load cell inevitable. A final problem regarding efficiency is that these operators also have to be compensated all the time. As this sorting line is sometimes operational for 22 - 24h/day, this **cost is fairly high**.



Figure 1: Unloading via forklift



RESULTS

The mechanism designed for this problem consists of 3 different parts.

- Frame (1)
- Gripper (2)
- Sticker unit

The frame is composed of two similar rectangular frames that differ in size. These will ride over one another **with rollers**, achieving movement in the horizontal plane. This frame will support and transport the gripper over the entire working area.

Using pneumatic cylinders, this gripper will pick up the boxes. To ensure that these boxes cannot fall, we will also provide **mechanical clamping**. Up and down movement will be done with a scissor lift. The sticker unit will be purchased from codipack and will be installed on the side of this installation.

METHOD

To overcome these problems, a **mechanism is designed** that will pick up a full crate of Brussels sprouts from the load cell and transport it to a discharge zone. One requirement here was to provide the full crate with information about the particular crate. This is done by means of a **sticker device implemented** in this installation. After this, the mechanism will take an empty crate and place it on the load cell again. The design of this machine will be created using the Creo Parametric drawing program.

Supervisors / Co-supervisors / Advisors: Ing. John Bijns
 Prof. Dr. Ing. Karel Kellens
 Prof. Dr. Ir. Michael Daenen
 Prof. Dr. Jeroen Lievens