**Test Protocol for Tray Dispenser**

**Objective:**

The objective is to verify that the tray dispenser conforms with all the requirements of the machine

**Requirements**

* Dispenser should have maximum dimensions 600x500x500
  + This holds true
* The dispenser needs to be able to place the trays on a conveyor belt moving at 5 m/s with a center to center distance of 250mm +/- 15mm
  + This was true for the first three trays, after that the system broke down￼
* The dispenser should be turned at 35 rpm and dispense the trays consistently
  + This was true for the first three trays, after that the dispenser became sporadic
* The weight of the tool should not exceed 15 kg
  + This was true, the tool with shielding weighs 6.8kg

**Procedure:**

1. **Measurements**
   * Measure the weight of the dispenser ✔
   * Measure the height of the tower to check that 15 trays fit ✔
   * Measure the tower opening to check if trays fit ✔
   * Measure the total dimensions of the dispenser to conforms with the maximum sizing ✔
2. **Setup**
   * Place the tray dispenser on the conveyor belt adapter ✔
   * Mark the center points of the trays ✔
3. **Measurements during use of the dispenser** (this title could be changed)
   * Dispense the trays until there is no more space on the conveyor belt
     1. Machine could not consistently keep up output to fulfill this
   * Measure the center-to-center distance between the trays
     1. Measurements for first three trays were within allowed ranges, after that the data was borderline unusable
   * Check the margin of error
   * Rerun test for extra data if necessary
     1. We did not have enough time on the conveyor belt to do this
4. **Analysis**

Throughout testing our machine was not able to maintain consistent output of trays which compromised its functionality as per our requirements. The identified cause for this was the trays not falling after being separated by the top set of pistons. The probable causes that were identified were the back holding lip being at too low of an angle, the trays becoming dirty over time leading to them sticking together, as well as the entrance of the slide being too early, leading to trays getting snagged by it. The possible remedies to be applied are an increase in the holding lip angle as well as the use of new trays which would hopefully slide smoother. As for design alterations, the diameter of the top set of pistons could have been increased with a taper near the end to physically push apart the trays while also separating them. Another observed issue was the dysfunctional state of the timed-release system which was uncalibrated or even not feasible in design. Sadly, due to the actual dispensing being so erratic, further testing of the timed-release system was not possible.