

White Paper

The Bottle FlowPacker Case Packer

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Patent Pending

Summary

An innovative material handling system was previously created by Pack Flow Concepts LLC (PFC) and a full patent application was filed. A novel embodiment of this system has been created by PFC that creates a simple compact bottle case packing system that is documented herein. The key market driver is the need to package bottles in cases where traditional case packing equipment is too complex and costly.

Traditional Bottle Case Packers

Traditional case packers consist of many design and methodologies. There are electromechanical automation systems and those based on the use of existing commercial industrial robots, both traditional arms and Delta style robots. There is usually found a queuing station where either rows or entire case loads are accumulated to keep the pick and place transfer rate reasonable.

But there are many industries where slower bottle filling rates do not warrant the replacement of human operators. Here, no cost effective solution exists.

FlowPacker Bottle Case Packer

The FlowPacker Bottle Case Packer uses the patent pending concept found in many other packaging concepts of Pack Flow Concepts LLC. The core principle is the loading of a flexible conveyor, moving the flexible conveyor, and placing the product in a case in multiple locations. This is applied in Figures 1 and 2, where the round filled and capped bottles enter from the left on the beige conveyor. The flexible conveyor is running horizontal to the floor. There are flights attached at an angle to each conveyor chain length to grab a bottle from the conveyor escapement and transport the bottle to the right by sliding each bottle on the large red slippery conveyor. The red conveyor moves from the bottom to the top as viewed in Figures 1 and 2. The reason for this motion will be shown later.

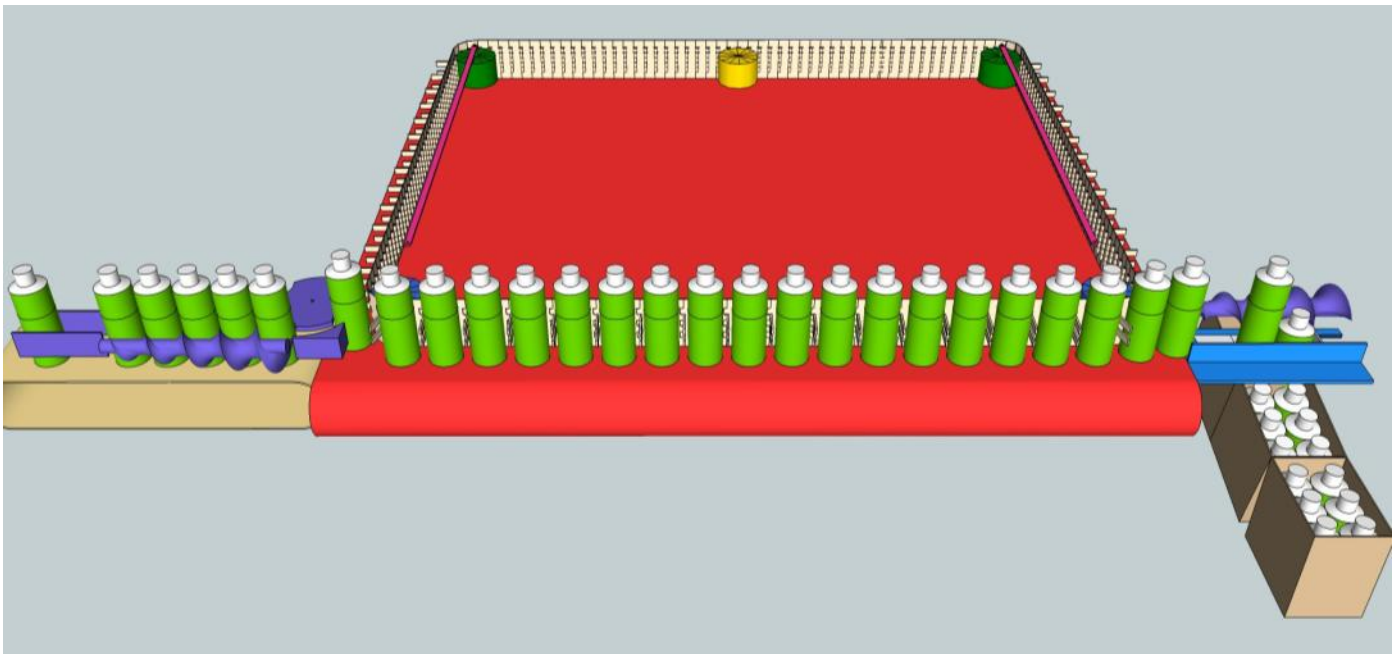


Figure 1 FlowPacker Bottle Case Packer – Overall View

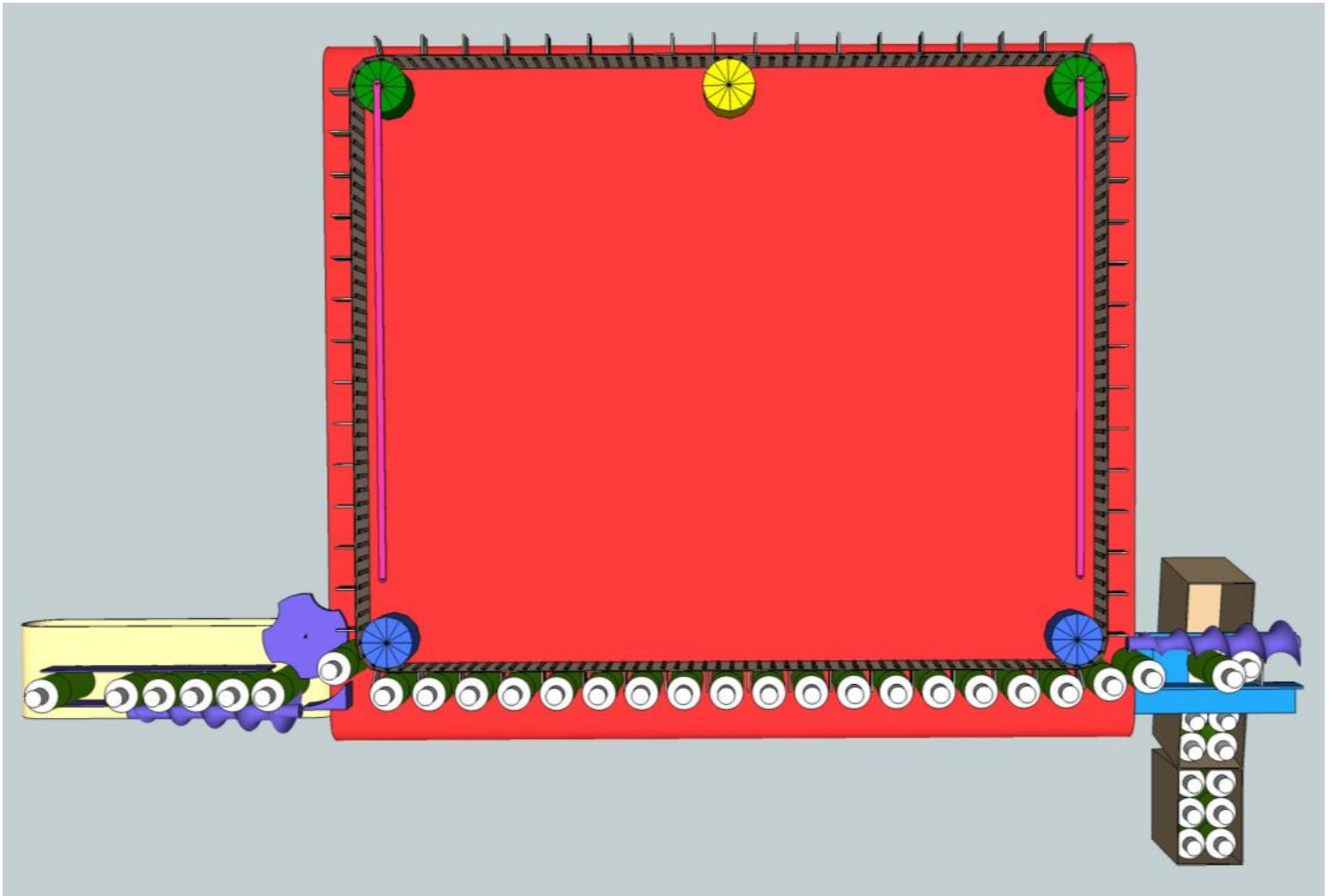


Figure 2 FlowPacker Bottle Case Packer – Top View

The bottle is moved by the flexible conveyor from the red conveyor to the blue platform. Here, the flexible conveyor is brought to rest for a fraction of a second to allow the bottle to engage with the purple timing screw (Figure 3). The blue platform (which is a double hinged door) opens and drops the bottle into the case. Though these figures do not show the added feature, the case is inclined by a small angle so when the bottle is dropped it stays in the same location in the case. The blue platform can be moved to a series of positions right to left as per the figures. For depositing the second bottle in the same row the blue platform move to the left for depositing the second bottle (Figure 3). When the current case row is completely filled, the cases index on their own conveyor so as to allow the next row to be filled.

The flexible conveyor is also fed from the left side with a purple timing screw (Figure 4). This coordinates the existing flow of filled bottles into the packing system.

When an empty case is delayed and the bottle filling process cannot stop instantaneously the flexible conveyor over the large red slippery conveyor becomes an accumulator (Figures 5 and 6). By adding more bottles to the left side while the right side is waiting, the length of the flexible conveyor needs to be lengthened. The angled flights on the flexible conveyor still control each bottle, but the large red slippery conveyor generally moves the captured bottles in the direction of the red conveyor motion (Figure 6). The number of empty lengths of the flexible conveyor is therefore reduced. When the case arrives the loading process is accelerated so that the buffer of extra bottles can be emptied. The comparison of the normal number of bottles to the full accumulator is shown in Figure 7.

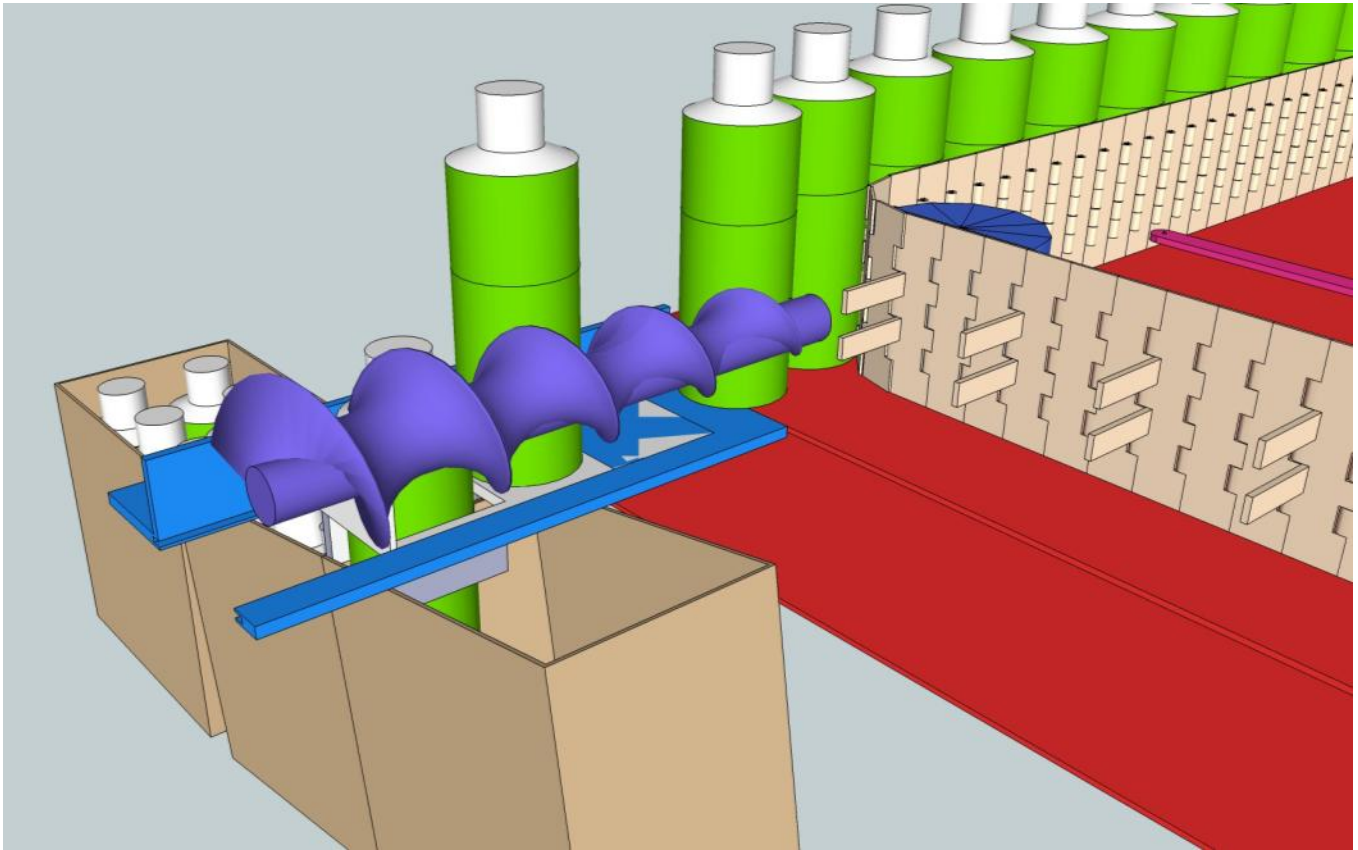


Figure 3 Blue Platform Doors Open and Drop Bottle into Case

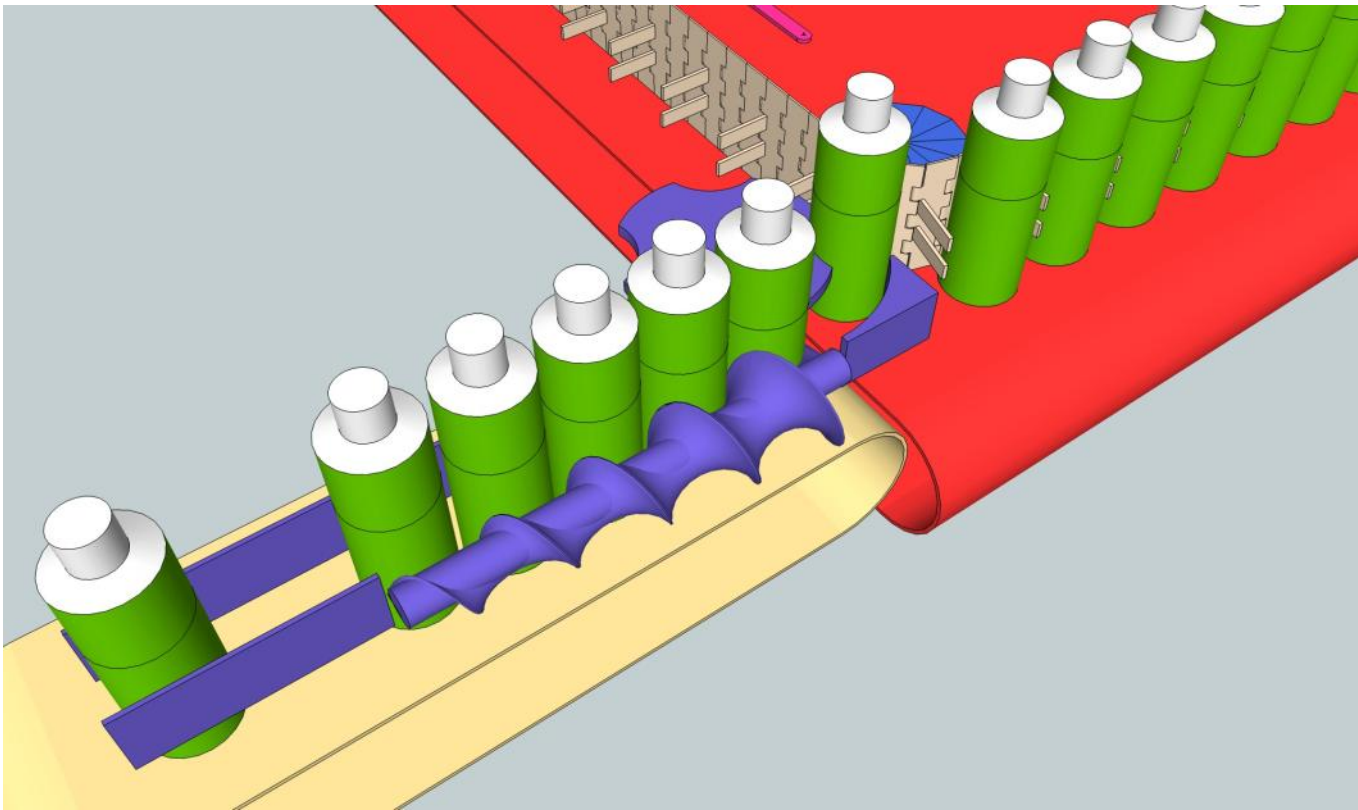


Figure 4 Bottle Infeed Station – Bottles are Engaged Into the Flexible Conveyor

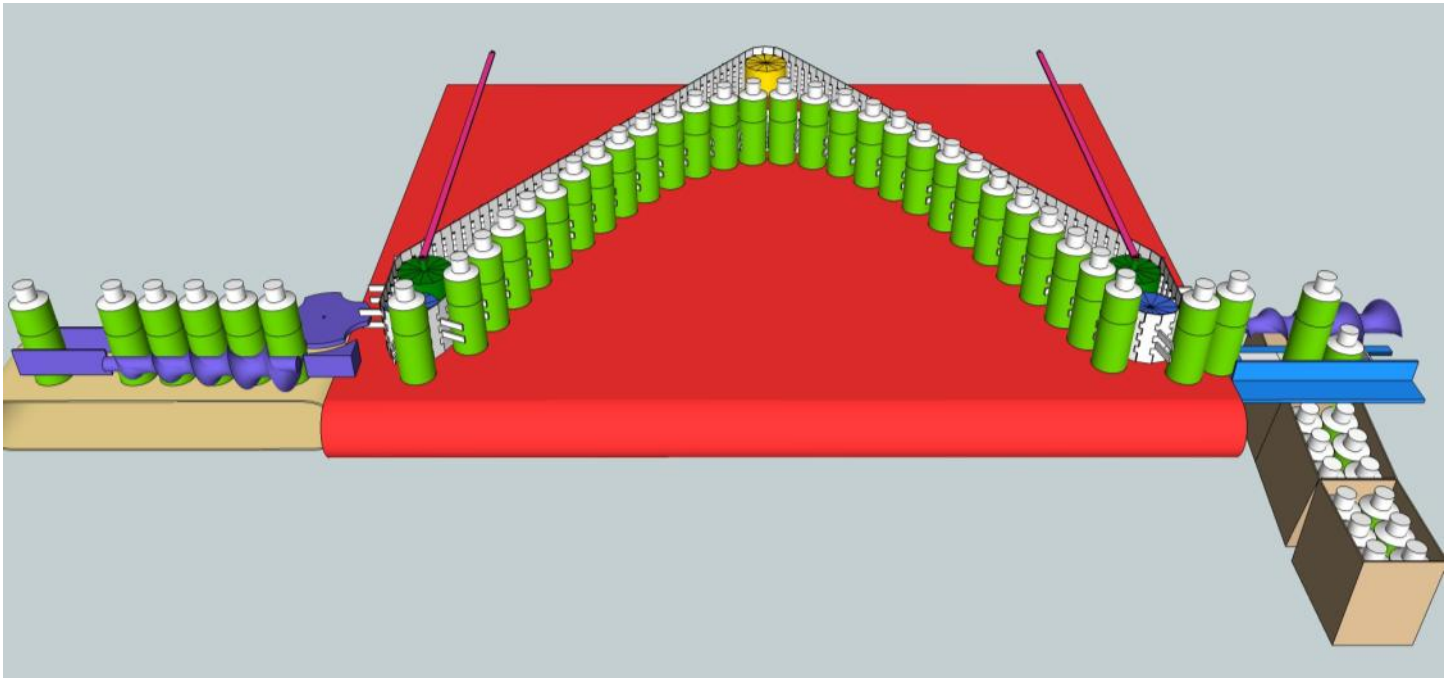


Figure 5 Accumulator Waits While the Next Case is Delayed – Overall View

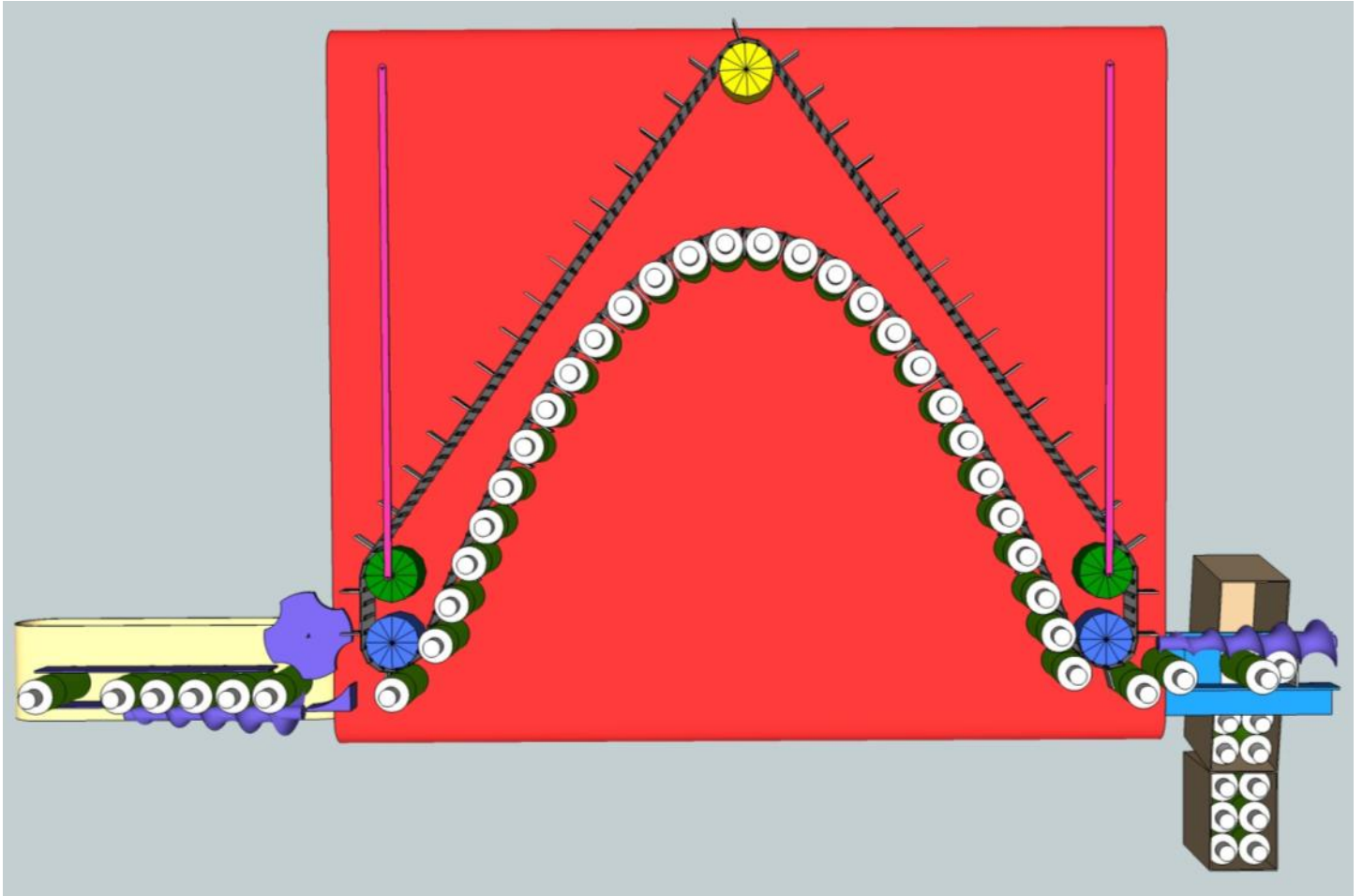


Figure 6 Accumulator Waits While the Next Case is Delayed – Top View

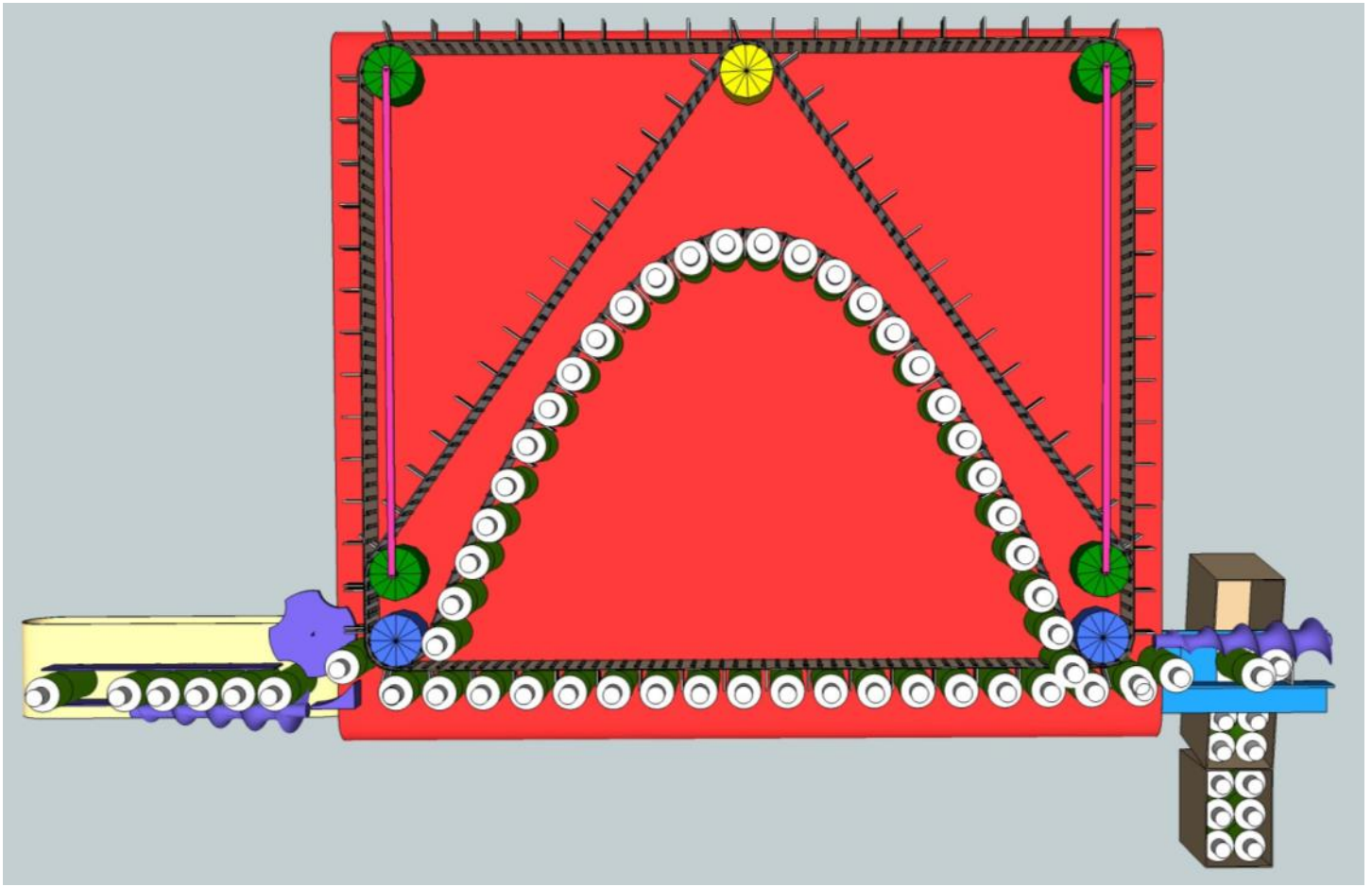


Figure 7 Comparison of Number of Bottles in Normal Mode vs. Accumulator Mode

The comparison in Figure 7 shows an increase of 12 bottles. If the packing rate averages 60 bottles per minute this buffer amount provides a 12 second delay for the next case to arrive before having to signal the bottle filling line to pause.

Conclusions

The FlowPacker Bottle Case Packer uses Patent Pending technology in a cost effective format that allows for bottles to be case loaded when other case packers cannot be used due to higher costs. The number of motions and moving parts is minimal compared to traditional automation and robotic case packing systems.