

Arpac Tray Packer Troubleshooting Report

Troubleshooting occurred on Sept 19, 2014

Written by Ben Neher – Westrock Automation Integration Engineer – 9/22/24

Summary:

I was onsite at Manna in Indianapolis working on some miscellaneous automation integration tasks. The Manna tech, Joe, was completing an inspection of the tray packer. When I got back from lunch at about 2:30PM, the tray packer was down, product was backed up, and this took down the line. Manna approached me about this lost product being a major issue, and I told Joe to try to get the machine running long enough to clear out the line. He was able to do that, but the machine stopped again, the line backed up again, and we were not able to get the Arpac tray packer running for any period of time without blanks jamming and tripping the torque limiter (a location that is completely enclosed in the machine and we can't see while the machine is running).

Joe fought this battle for several hours narrowing the issue down to the blank feed area while the line was completely down. Per my discussion with a 2nd shift operations lead, this is an issue that occurs several times a month (and has gotten worse recently). Fortunately for us, the Manna maintenance tech who has been fighting Arpac issues recently and is most familiar with it, Calub Weber, came to site around 7:30 to lead this troubleshooting effort. Joe assisted, and he and I got the opportunity to see the process.

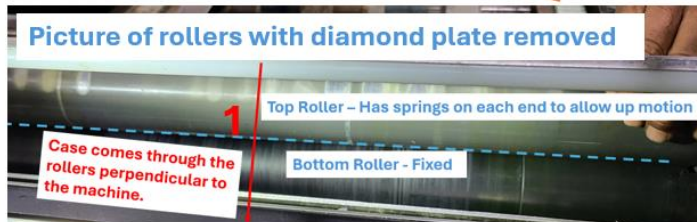
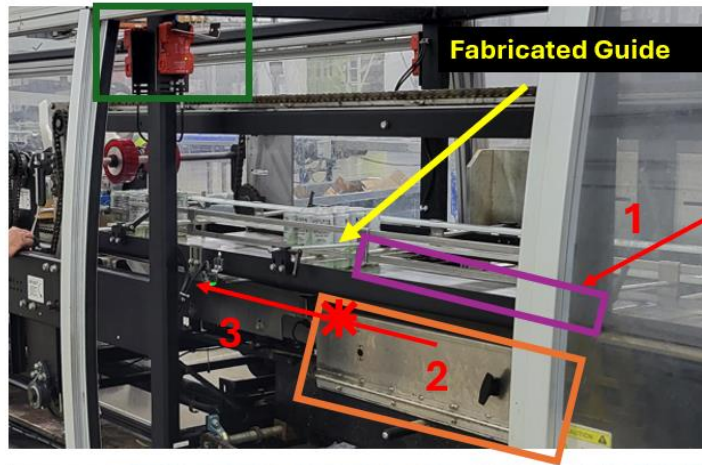
The Arpac tray packer is mostly mechanically geared and requires precise mechanical setup. Since my specialty is automation and electrical work, not mechanical work, I wasn't much help. I focused my efforts on taking detailed notes and documenting the details of the work that Calub and Joe did over the next 3 hours to get the machine working again. Site lost a lot of production due to this issue (and had to dispose of some product), but I believe that Manna will benefit from the knowledge gained from this experience.

During this troubleshooting process, we ran into the many issues on this Arpac tray packer that have clearly built up over many years. Note site had been through a similar troubleshooting process only a few days before this downtime event, and at least 20 mechanical adjustments were made while troubleshooting. Also note that due to the construction of the machine, many of these adjustments and jam points are not visible without removing machine covers and then putting them back on for testing. Adjustments affect each other, so there was a lot of trial and error as well as removing and reapplying covers.

This report is a detailed step-by-step description of the troubleshooting starting at 7:30 when Calub arrived on site and took control of the troubleshooting process up until the time when we went back into product at about 10:15PM.

General Description of machine operation:

1. The blank feeds through the machine

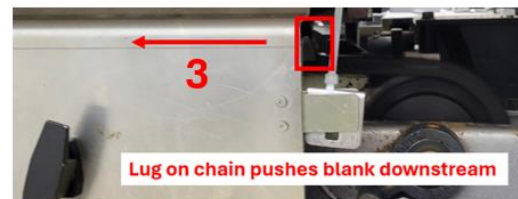


Blank Process:

1. Blank moved into machine with an enclosed feed roller perpendicular to machine
2. Blank hits the metal backstop
3. Blank is pushed downstream by a lug on a chain. **Jam Location ***

Area is completely enclosed by:

- A. Safety Door with safety switch
- B. Blank metal backstop needed to stop the blank
- C. Top diamond plate the cans slide across.

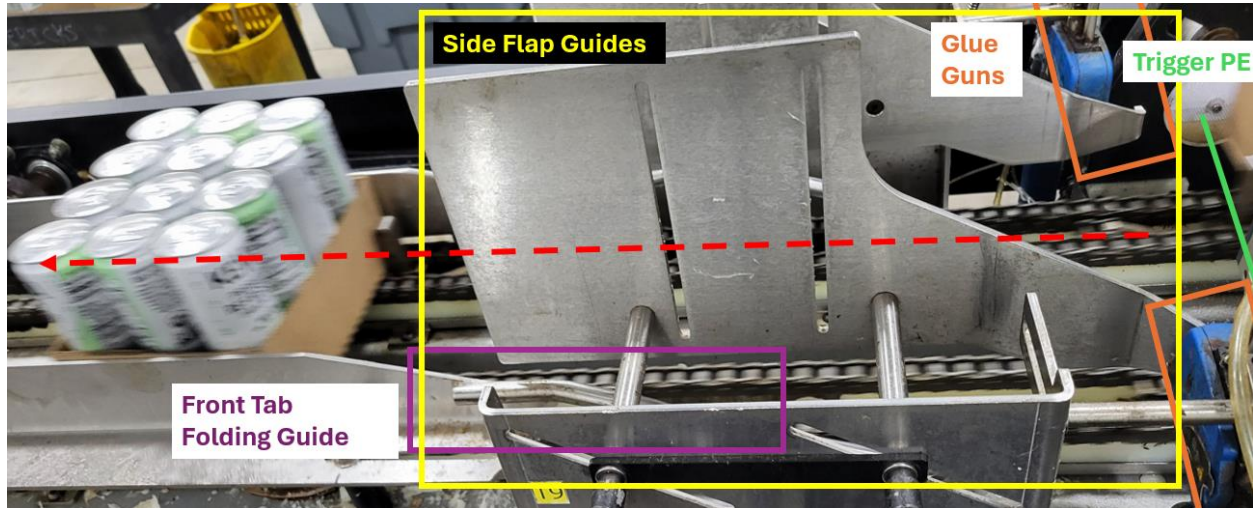


Note that there is a fabricated guide inside the machine (not included with the original machine) on the transition of blanks from the perpendicular entry point to the downstream. Take note of this as it will be discussed later in this report.

2. As both the cans and blanks are transferred downstream, the cans go onto the blanks and both go onto the lug chain.



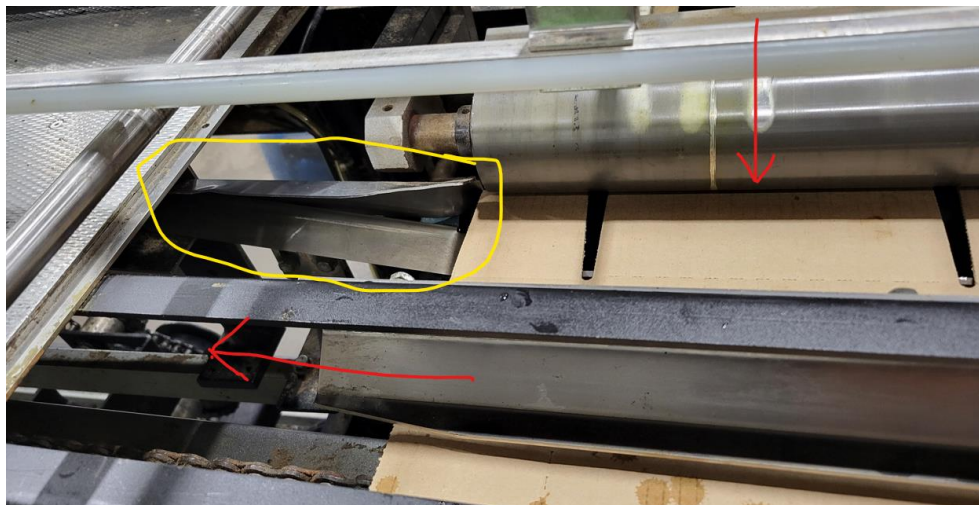
3. The flaps/tabs are folded and glued by going through mechanical guides and glue guns that fire based on a trigger PE (note: rear flap folder not shown below, but this was not an issue).



Troubleshooting Process:

The first priority was to remove all the guides to allow us to see the blank feed without cans running through the system.

- Maintenance disconnected the safety door connectors and put them into the door switch to allow us to run the machine with the safety doors open to see what we were doing.
- They then removed the diamond plate to in order to see the path of the blank as it moves through the machine.
- They then set the blank detect PE window to 0,0 in order to remove the blank detect fault and trigger a blank by flagging a PE.
- Maintenance could then watch the blank go through and see any obstructions.



When we watched the blank go through the feed rollers, hit the end stop, and try to go downstream, we found that case was coming into the machine too hard and not straight, bouncing off the end stop, and then jamming on the fabricated piece which was bent since the last time the machine was taken apart (most likely from a box jam).

The case was coming perpendicularly into the machine too hard and bouncing off the end stop.

- The blank infeed rollers are VFD controlled. The speed was set at 30 Hz. After trying different lower speeds, we settled at a speed of 10Hz (to be verified long-term).
- The speed of the infeed rollers is a recipe setpoint. *After I left site, I looked at the other recipes in the machine, and the speeds were set between 15Hz and 22Hz. I also looked at a previous project that I did (with much larger blanks), the speed was set at 25Hz. A speed of 30Hz was clearly way too high.*

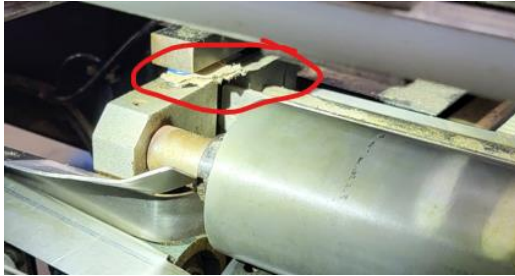
The end stop was missing one of its two handles. Per conversation with maintenance, it is sometimes beneficial when troubleshooting the blank system to loosen up the end stop so that blanks don't bounce off of it too hard. In the past, maintenance has jammed some cardboard in the door for some stability and alignment without making the stop too solid. This reduces bounce-back of the blank.



The rollers have a lot of wear on them which probably isn't helping the situation.



The bottom roller is fixed, and the top is tensioned using a spring on each end. If the tension is different, the blank can twist slightly in the roller. One of the springs is worn and has cardboard jammed into it to try to reduce the problem. We'll need a new spring.



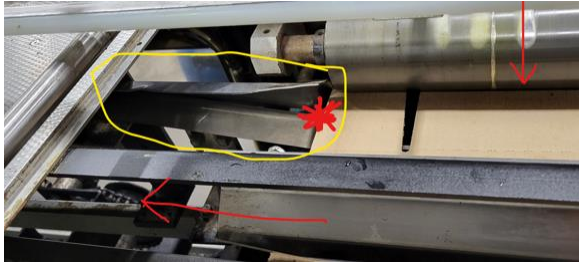
Note that before Calub came to site, Joe re-aligned the feeder bar prior to the roller. The bar had slipped a chain link on one side (which is known to happen occasionally on these machines). This slightly modified the alignment of the case before it went into the feed roller



Below are pictures taken from the bottom of the machine that show the cases before the chain lug tries to push them downstream (not easy/safe pictures to take). The cases are not straight.

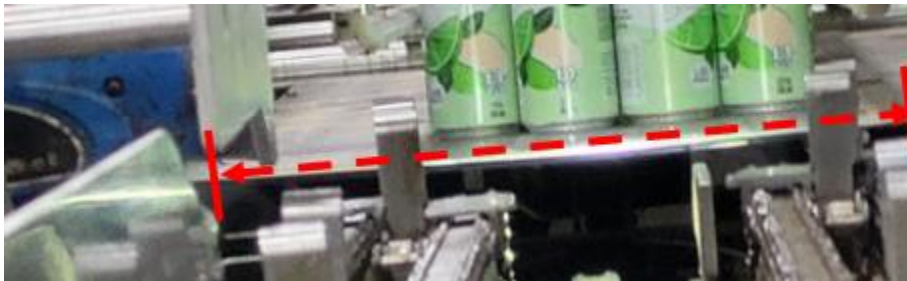


A fabricated guide piece (that clearly did not come with the machine) attempts to guide the blank from the perpendicular transfer to the downstream, but it was bent (it bends easily), and the case was jamming on the upper edge of the lower guide. The fabricated guide is two pieces that are angled and fastened together (and to the machine itself) with a bolt. The mounting and angling of the guide pieces must be correct for the blank transfer to occur smoothly as the case moves downstream on the box blank lug chain. Maintenance took the fabricated guide out and bent the lower guide with some pliers to get the correct orientation. They then put the guide back in the machine in a way that looked to be correct (who knows how long it will stay correct).



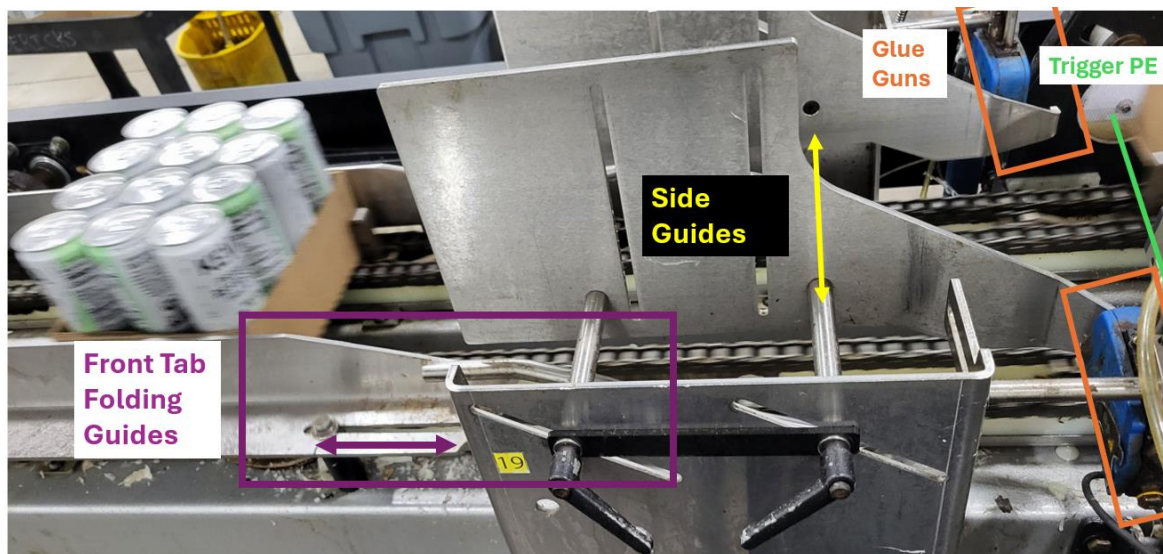
Per discussion with maintenance, they had a downtime event earlier in the week in which the guide plates where angled too tightly and blanks got pinched on the downstream of the guide.

Maintenance noticed that the width setting on the blank feed area of the machine had been set to 96 using the adjustment wheel. It was previously at 105. We increased the setting back to 105 to give the case more play when transferring out of the machine.



We spend a lot of time modifying the items discussed above, reassembling the machine to test, disassembling the machine to monitor/modify and the then reassembling the machine to test again. After several rounds of adjusting the blank roller speed, fabricated guide, end stop, and blank width, maintenance was able to get blanks to feed through the machine, come out of the machine, and receive cans on top of them.

We then had a lot of issues folding the case flaps and front tabs and glueing them shut. Arpac and maintenance started by adjusting the side guides and the front tab folding guide.



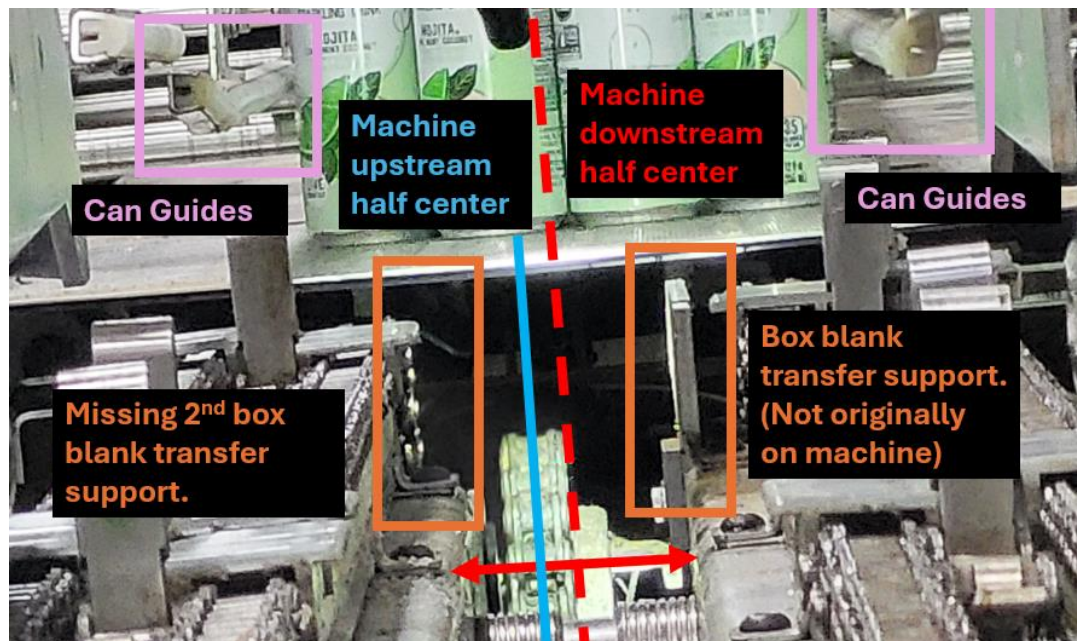


The trays had issues staying glued closed and deforming on the guides. Maintenance increased the pressure on the glue unit and modified the temperature to try to get a wider spray. I'm told that this pressure and temperature get adjusted regularly. Maintenance recommended different glue guns with a wider nozzle. The glue guns on the machine currently are not the ones that came with the machine but rather ones that were taken from somewhere else. We don't know the size of the nozzle since the label has been rubbed off.



The mounting bolts on the glue guns were also loose, and the glue guns were moved. Maintenance re-adjusted them and then set the settings on the HMI again to control the timing between the PE and the glue pulses per the new glue gun position. We had a lot of trouble getting the trays to glue shut and found that the two flap folder guides on each side of the machine were bent differently. Maintenance bent the side that we were having trouble with using a wrench.

The blanks were not coming out of the machine in the center location. Note that the blank/can feed upstream half of the machine is not centered with the downstream lug chain half of the machine.



Re-centering the machine will be a significant task, and it is not feasible to do for this troubleshooting. To account for this, the can guides are adjusted to discharge cans to compensate for this. We had issues with the cases not being centered on the chain lugs as they moved to the flap/tab folding and glue areas creating many folding and gluing issues. Arpac adjusted the centering of the blank guide in the machine to better center the blank.



After centering the blank on the machine, we were able to go back into production after a few minor downstream guide adjustments (as shown above) to compensate for the case centering.