STARVING PACKER

Engineers believe they have an problematic code problem with a laner

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INTRODUCTION

Engineers at a large consumer packaging company believe they have an problematic code problem with a laner. Unbalanced lanes at a downstream packer are causing big problems for a large packaging line. The photo eye is getting tripped, shutting down the upstream wrapper, but the packer is starved. Plant engineers have been focused on the code for the laner and have sent waves of programmers to fix the problem.

Nothing seems to work.

Is the laner the problem or are logic changes needed further up the line? Engineers look at four possible scenarios to solve the riddle:

1. *Change PLC code for laner*
2. *Add buffer after laner*
3. *Add buffer before laner*
4. *Change slug size*

OFF-BALANCE

Plant engineers are looking for approximately 200 pieces per minute from each of their two lanes on a downstream packer. However, the minute-by-minute numbers are all over the map for both lanes, which are clearly unbalanced. Infeed from upstream unit operations are running at a consistent rate, but averages continue to languish at around 80 percent. So, where is the problem?

Plant engineers have long suspected logic problems to the laner and, over several months, they have brought in different teams to reprogram the laner. Still, the unbalanced lanes problem persists.

A team from Polytron is called in to work with plant engineers to develop several different scenarios to simulate and emulate variables and the effect on the line.

BUG HUNT

The team hasn't given up on the possibility that the logic in the laner is the culprit. The Polytron creates scaled visual representations of the line through its PolySim[SM] tools to test and debug programming in the line's Programmable Logic Controller (PLC).

PolySim models the working packaging line in a real-time environment and sends a series of variables to the laner. However, only negligible improvements are seen.

The team starts to think logic changes may be needed further up the line.

Among the options tried was adding buffer after the laner. However, there was nothing to fill up. Engineers were already "starving" the case packer so adding a buffer would provide no benefit.

Another option considered was changing slug lengths – varying lengths between each lane.

Because PolySim allows for the recreation of a three-dimensional scaled visual of the line and with defined package dimensions of the product and production variables such as motor speed, sensor placements, and control device logic to resolve problems in the line design or programming, changing slug lengths can be done relatively easily. Such an attempt would typically yield dramatic data changes. While the team realized some benefit after making all of these changes, it wasn't enough to balance line operations.

THE EYES HAVE IT

The photo eye is getting tripped, shutting down the upstream wrapper. What if the photo eye is moved upstream? This action would mimic adding a buffer upstream. Obviously, moving a photo eye is not very involved or expensive. However, physical limitations of the conveyor layout would require more significant mechanical and electrical changes to allow the accumulation of product upstream.

Using PolySim, the team can emulate the effect of product design variables on the working line, so system changes can be created and tested without impacting production. The team decides to emulate the movement of the photo eye upstream to emulate adding buffer before the laner.

The emulation provided significant improvements to the line: a 19% jump in average throughput of the laner – and no shutdowns of the wrapper.

CONCLUSION

Confirming that additional buffer would smooth out operations of the line, the team now had a solution to implement. Again, physical limitations to the existing layout would require significant funding and time to allow the additional buffer. But the team now had a sound justification for the project and could write it up with confidence.

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