

STANDARD: PACK LOOP OPTIMIZATION

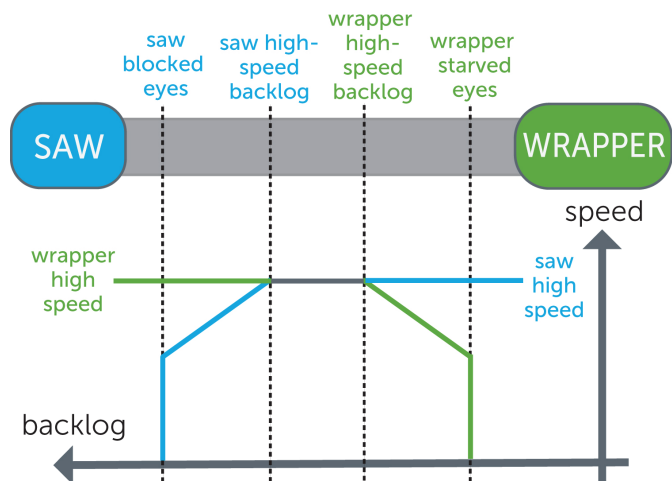
In the standard mode Conductor adds a layer of communication between all of the unit ops in a pack loop, from saw through palletizer. Removing the reliance on simple photoeyes, this layer of communication gathers information from each unit, and using a central processor, commands the speed of each unit for smooth, consistent operation. Using PCMC's supply-demand-based speed control, machines only need to be set for their maximum and minimum speeds and backlog levels, then Conductor does the rest. Contrary to other systems, Conductor will always balance backlog levels automatically by adjusting speeds based on current running conditions, so operators never have to go speed up one unit if another goes down or change speeds at all units if one is changed. This method removes operator interaction and balances the pack loop for continuous, smooth operation by reducing the starts and stops that would result on less integrated solutions relying only on traditional photoeyes.

ADVANCED: FULL LINE CONTROL

In the advanced mode Conductor's main purpose is to maximize rewinder run time, slowing down when necessary, and stopping only as a last resort. It does this by taking all of the benefits of the standard pack loop optimization and adding full converting line control. This mode targets a specific accumulator level and using the speed setpoint of the rewinder controls the rest of the pack loop to maintain that accumulator level. As a part of the advanced control in Conductor the mean time to recovery (MTTR) of the faults in the pack loop are collected. Furthermore, the time until the accumulator fills up is always monitored, so if a fault occurs that the Conductor knows will take longer than the fill time of the accumulator the rewinder can be proactively slowed down to prevent a full accumulator and result in the best converting uptime. Again, all of this is done without the interaction from an operator, freeing up resources to focus on other value added tasks on the line.

WHAT IS PCMC'S SUPPLY-DEMAND BASED SPEED CONTROL?

PCMC's Supply-Demand speed control algorithm is a method of controlling the speed of a machine in an analog fashion based on a real-time calculation of the backlog before and after the machine. This method eliminates discreet speed levels, which can cause fault inducing jerky or start-stop operation, and results in smooth speed operation.



WHY CONDUCTOR: VERIFIED IMPROVEMENTS THROUGH SIMULATION

To test Conductor’s algorithm and any given converting layout PCMC is able to simulate the system to identify choke points, production improvements, and layout suggestions before ever cutting steel. Take the example simulation below where five tests were run to compare overall production on a two-leg system.

| Simulation | Control method | Downtime occurrences enabled | Cut roll conveyor length | Cases produced (% ideal) | Rewinder blockages |
|----------------------------------|----------------|------------------------------|--------------------------|--------------------------|--------------------|
| Ideal (base) Optimal conveyor | Photoeyes | No | 159 & 177 ft. | 7,575 (100%) | 0 |
| Optimal conveyor | Photoeyes | Yes | 159 & 177 ft. | 6,994 (92.3%) | 20 |
| Optimal conveyor | Conductor | Yes | 159 & 177 ft. | 7,548 (99.6%) | 2 |
| Short conveyor | Photoeyes | Yes | 60 & 45 ft. | 6,818 (90%) | 21 |
| Short conveyor | Conductor | Yes | 60 & 45 ft. | 7,434 (98.1%) | 4 |

FREE UP OPERATORS FOR OTHER TASKS

Because PCMC understands the need to staff a converting line as efficiently as possible Conductor automatically balances the line and machine speeds around the clock without interaction from an operator.