

CASE CONVEYOR SYSTEMS



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Cereal Partners Poland

COMPERE



SYSTEMS LIMITED

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When sales of Breakfast cereals in Poland and Eastern Europe demanded further automation at their Poland factory, Cereal Partners asked Compere Systems Ltd to provide a conveyor system that would convey cases from their new production line to their existing palletiser.

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Case Conveyor Systems

CEREAL PARTNERS POLAND

Compere were chosen to supply a case conveying system that matched the existing conveyors and would be capable of handling 24 cases per minute, 24 hours per day and 7 days per week. Designers at Compere Systems Ltd knew the existing system as they were involved with the original palletising system and had in depth knowledge of the existing multi-line system

Compere's new conveyor system commenced at the exit from a Focke case packer and 24v driven live rollers where used to convey cases through ink jet coding and a sampling station before the cases elevated to a high level mezzanine floor.

To enable a carton to be removed from the line for sample purposes, the conveyor was equipped with a transfer comprising of three zones, transport roller, raise/lower and belt transfer.

The operator can select if a carton is to be removed from the line. With a request to transfer a carton, the next carton detected by the zone present photocell at the transfer is stopped by the PLC. The transfer is raised, the carton is then driven off the transfer and the transfer is lowered ready for the next carton to pass straight through. The PLC controls each zone

independently to transfer a carton off the line. With a carton in the process of being transferred and the next carton arriving at the upstream zone present photocell, the upstream carton is held in the upstream zone while the transfer is completed

A spiral elevator transfers the cases from the production floor level to the multiline conveyor system mounted on a mezzanine floor. The Compere designers had to ensure the new system would accept a future expansion of the Multi-line system so the exit of the Spiral elevator was designed to be high enough to allow conveyors to pass under the new system.



1 - FOCKE CASE PACKER AND 24V DRIVEN LIVE ROLLERS

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An ambaflex “ambaveyor” is used to decline the new conveyor system to match the height of the existing system on the mezzanine floor. This type of conveyor has the advantage of being able to negotiate bends and declines with only one drive. It is used as a transporting conveyor with no case accumulation.

Carton Conveyor Accumulation is used for buffering cartons to maintain throughput and smooth system flow.

Accumulation sections of conveyor are Accuglide live roller conveyor which provides zero pressure accumulation. The intermediate lengths of conveyor are divided into 750mm long zones and each zone can have its drive disengaged to allow cases to sit on the conveyor without any forward pressure.

When the conveyor is ready to feed cases to the Palletiser the drive system is re-engaged and the whole conveyor starts to move cases to the Palletiser at the correct speed to match the System design case rate.

A pneumatically operated divert unit is used to transfer cases from existing line TO2 to line TO3 and this system will only be used when Line TO2 is producing 108 case loads.

For 108 case load patterns, cases will accumulate as normal until the build back photo eye on line TO2 is covered. The position of this eye equates to a minimum of 60 cases. When this photo eye is covered, the Accuglide brake module positioned prior to the curve feeding the divert mechanism is activated to ensure no cases are in the divert area during divert operations.



2 AMBAVEYOR DECLINE CONVEYOR



3 ZERO PRESSURE CONVEYOR

The divert arm is activated and repositioned to provide a route to line TO₃ accumulation conveyor. When the arm is confirmed in position by proximity switch the accuglide brake module is released and cases are routed to the new line TO₃ conveyor. This conveyor has one photo eye located at a position equivalent to a minimum of 50 cases that, when covered generates a load ready signal to the palletiser. A second photo eye is provided to indicate that line TO₃ accumulation lane is full. When this eye is covered the Accuglide brake module positioned prior to the curve feeding the divert mechanism is activated and subsequent cases accumulate upstream of the brake module.

For 108 case loads on line TO₂, the Line TO₂ leg is discharged with a count of 60 cases before the discharge control belt is turned off. Line TO₃ discharge control belt is then turned on and the balance of cases required to make a full load is counted out of the TO₃ accumulation conveyor. As cases are released from line TO₂, additional cases are allowed to run in behind the discharging load and the accumulation cycle is repeated.

If line TO₂ has discharged 60 cases and the line full eye on line TO₃ has not been made, the Accuglide brake module positioned prior to the curve feeding the divert mechanism is activated and the divert arm is repositioned to route cases to line TO₂ as the primary accumulation conveyor.

Complete Pallet loads of cases are accumulated on the conveyor system. The cases are sent to the Palletiser and counted as they leave the accumulation system. This count verifies the correct number will be sent to the palletiser ensure complete loads are produced.



4 CASE DIVERT UNIT



5 STOP SPACER BELT

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To ensure case separation for accurate counting a stop/spacer belt conveyor is used. The first belt is set to run at the correct speed to feed cases to the palletiser. The second belt is set to run 50% faster than the first belt and this guarantees a gap between cases to allow the cases to be counted.

After cases leave the Accumulation conveyors they are conveyed on Vee belt conveyor spurs which merge onto a transit case conveyor system.

This system conveys the cases from the Multi-line Storage system to the Palletiser.

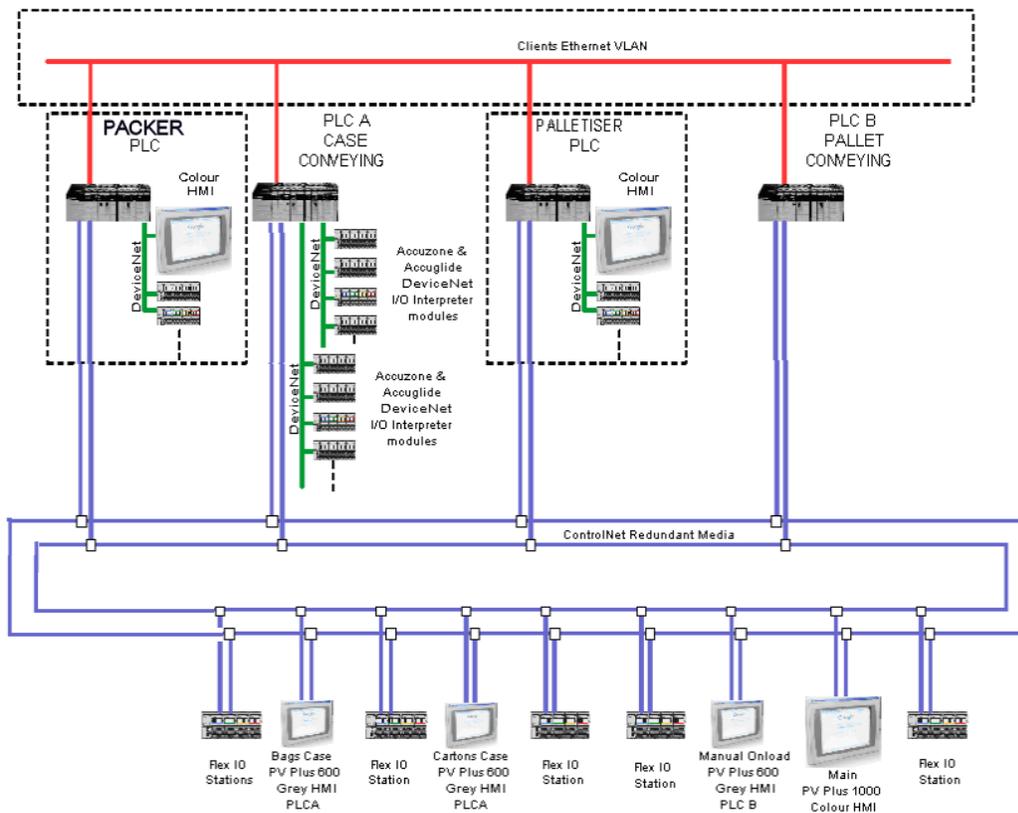
When a complete pallet load of cases has been released to the High Speed Palletiser the stop spacer belt stops and the accumulation recommences until the next full pallet load is completes.



6 POWERED ROLLER CURVE

PLC Networks

The diagram below shows the existing PLC network architecture with additional packer and devicenet .



DeviceNet Network

A new DeviceNet network is used on the Carton Conveyor PLC to communicate to the new Accuglide and Accuzone conveyor controllers. The existing network remained unchanged.

Operator interfaces – HMIs

Compre Systems Ltd. provided one new Allen Bradley HMI unit and modified the existing HMI's to show the new system

Alarms

Faults generated within the conveyor control system are displayed as an alarm message on the HMI. Where the fault has tripped a controlled zone, the zone does not restart automatically upon rectification of the fault. When the fault is rectified, the system is reset via the pushbutton on the conveyor control panel.

Emergency Stop

When an emergency stop is activated an alarm is set. The alarm is displayed as “[ID-number] + emergency stop active”. The activated emergency stop turns red on the HMI.

To recover, the activated emergency stop is released and the emergency stop circuit reset at the conveyor control panel then system reset.

Air Pressure Low

The alarm “Air pressure low” indicates a problem with the main air supply. When the alarm occurs the system goes into a controlled stop.

PLC node fault

The status of the ControlNet nodes and DeviceNet nodes are monitored within the conveyor PLC. When a node fault occurs an alarm is set and displayed as “[Position number] + [Type] +node fault”.

Motor Isolator Switched Off

The alarm indicates that there is a manual intervention by an operator, a motor isolator has been switched off. The alarm is displayed as “[position number] + motor isolator switch off”. With the isolator switched on the alarm will clear.

Circuit Breaker and Thermal Overload Faults

Circuit breaker and thermal overload faults relate to control circuit breaks, motor rated circuit breakers and thermal overloads mounted within the conveyor control panel. Switching off or tripping one of these monitored devices sets the fault. The alarm is displayed as “[ID-number] + [Description] + fault”.

Inverter Fault

The inverter fault is driven by a signal from the inverter which controls the motor speed of a conveyor. The alarm is displayed as “[Position number] + inverter fault”.

Conveyor Section Jam

The jam alarm identifies a blockage at a merge or divert on the carton conveyor and occurs when the photocells arranged remains activated. The alarm is displayed as “[position number] + section jam”.