

FEATURED SOLUTION | CONVEYORS



As basic as a 2:1 merge may seem, packaging lines often require precision engineered, perfectly timed conveyor systems such as this 2:1 ratio registration merge with powered rail assist. Image courtesy of Multi-Conveyor.

CONVEYORS: MASTERING THE MERGE

FROM ASYNCHRONOUS, FIFO, SERVO AND METER DRIVEN TO BASIC DUAL LANE OR ROLLER BELTING. IT'S ALL UP TO YOU.

By Joseph "Joe" Miller, Operations Manager / Owner, Multi-Conveyor

Merge and combiner technology basically requires taking multiple lanes and dispersing them to a lesser number of lanes, or to a single lane. Options can be simplistic to elaborate based on product flow, speed, cost, footprint and other job-specific application criteria.

Merging products within intricate packaging line configurations requires a customer-centric conveyor concept, common sense design, precision timing and forecasted outcomes. Merges and combiners

should not only meet and exceed current production demands, but must also be optimized for potential future growth.

The most common merge conveyors are designed to transport product from multiple lines into single lane production. Although a 2:1 merge is most common, conveyor merge systems have combined upwards of 6:1 configurations, or multiple input lanes to multiple discharge lanes for higher scale production applications.



Asynchronous 2:1 Merge. Image courtesy of Multi-Conveyor

Perfectly Timed Conveyor Systems

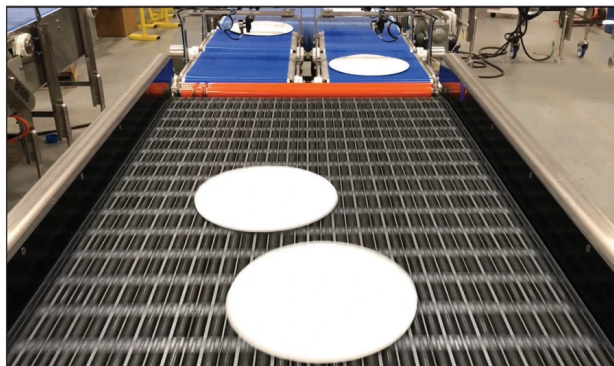
As basic as a 2:1 merge may seem, packaging lines often require precision-engineered, perfectly timed conveyor systems. This includes but is not limited to asynchronous stacked merge; inject merge; first-in-first-out merge (FIFO); transpositor merge; dual lane belt; servo merge; metered and vertical merge designs. Equipment footprint, line speeds, product shapes, sizes and weights, along with input from experienced conveyor engineering teams



2:1 Vertical Stacked Inject Merge. Image courtesy of Multi-Conveyor

and end-users, are all factors in determining which merge technology will be most beneficial for a specific application.

Programmable logic controls and sophisticated servo motors create exceptional bi-level, inject and over-under merge capabilities for seamless blend of product from multiple lanes. A vertical conveyor stack merges product fed from varying elevations that inject product received asynchronously. The engineers may also include vacuum meter belting for better product control; processor-to-servo controller communications; Ethernet/IP, encoders; sensing logic; VFDs; timed release gap inject, or other strategies.



Metered Servo Merge. Image courtesy of Multi-Conveyor

Pneumatically actuated devices, photo eye and proximity sensors, logic controllers and servos may all be critical components for FIFO or metered merge conveyors, demanding merge accuracy without collisions on high line speeds.

FIFO merge solutions alleviate gaps between product while allowing for more consistent spacing. A virtual axis measures product pocket length on the merging conveyor and a pulse is generated in specified inch increments of travel. A product is then released based on the pulse on a FIFO (first in, first out) basis. Whichever one arrives first is released first but timed to the pulse. This FIFO technology



2:1 FIFO Metered Merge. Image courtesy of Multi-Conveyor

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gy allows the customer to have the same merge throughput running at 70% of the conveyor speed required previously, resulting in 30% more merged product at the previous conveyor speed.

Proportional merge systems maintain product registration by calculating speed to length ratios necessary for proper product stagger from two lanes of product, a primary lane and a secondary lane that feeds product into the conventional lane of travel. Even if a system is stopped and restarted, a proportional merge conveyor is designed so that product remains in position for a successful coalesce.

Similarly, an over-under transpositor will transport product on a single overhead lane to the over-under servo merge belts. The servo driven belts on the lower level position product to create gaps for product from the upper level to drop into an opening when the servo actuated reciprocating end of the upper conveyor is retracted. When the transpositor is in the extended position, product will continue at the upper level to the next conveyor. This type of technology can merge product from two levels to a single lane at the lower level or distribute product to both levels using the servo actuation of the reciprocating transpositor.

Multilane Merge Systems

Multiple lane table-top conveyor merge systems can blend up, for instance, six lanes to one lane. Customers considering multiple 2:1 merges may not realize that a 4:1 solution can save both floor space and be more economical in the process.

The multilane table-top solution merges lanes using pneumatically actuated clamping devices and blade stops to control traffic. The clamps and blade stops operate automatically by sensing product back-up in each lane while in production mode, or they can be closed prior to product arrival when a predetermined stoppage in the line is necessary. Electronic sensors are used to determine back-up conditions, detect product presence at the devices and notify when devices are clear for actuation. The sensor feedback dictates sequenced product release and line conditions, creating the perfect merge.

Some conveyor systems employ unique roller belting, both activated or integrated, to control a product merge. Rollers may extend above and below the belt surface and are positioned at an angle in relation to the direction the conveyor belt travels. The rollers can be activated by wear strip or helix rollers below the chain that cause products to move at a vector angle across the chain in the direction of roller orientation combined with the direction of belt travel. Ninety-degree (90°) passive-off and passive-on transfers are also available and do not require any activation.



Servo Belt Case Merge. Image courtesy of Multi-Conveyor

Servos can be combined with roller belting to merge customer product fed from multiple lanes. Photo eyes detect product, case or carton positions to accurately stop and start the conveyors, avoiding collisions. Drives, servos, brake motors and sensors are strategically combined to accomplish the most aggressive merge conditions.

Powered side rails can be instrumental to maintain relative product positioning in the lane that is being plowed across the merge belt, into the gap between products in the adjacent lane that travels straight through the merge.



Powered Side Rail Merge Assist. Image courtesy of Multi-Conveyor

Even the most fundamental merge solution requires a team of mechanical and electrical engineers with proven conveyor experience to ensure even product flow with faultless transition. Established integrators and OEMs can be essential to the process. The conveyor manufacturer electrical teams should be well versed in OEM communications to ensure the machinery “talks” with each other at both the merge and at other conveyor interface points in the system.

No matter how many lanes, how many levels, starts or stops, conveyor merge technology is continually evolving to be smarter, smoother, faster and more cost-effective. Let your trusted conveyor manufacturer determine the most practical, current and future production throughput focused conveyor merge solution. ■

About the Author

For nearly three decades, Joe Miller has been at the helm of Multi-Conveyor, shifting the company's focus from conveying paper products to becoming an industry-leading packaging conveyor systems designer/manufacturer for food, beverage, pharma, sanitary construction, industrial, household, pet, personal care products and much more. Visit Multi-Conveyor at Booth S-3400 at PACK EXPO International, and learn more at: <https://www.multi-conveyor.com>

