

## Change-over: Conveyor Technology that Cuts Time

**Packaging Line  
Change-over**



Discover a range of conveyor change-over options with comparisons of price points and change-over man hours.

Roughly defined as the time it takes to adjust or prepare equipment to handle a different type of product or packaging, change-over times are a prominent adversary for streamlining consumer goods manufacturing operations.

They are especially prominent when discussing critical production themes such as:

- Lean manufacturing
- Product expansion
- Equipment investments
- Overall Equipment Effectiveness (OEE)
- Just-In-Time Production

Perhaps nowhere as much as consumer goods packaging does time truly translate into money. In a marketplace where margins are tight, competition is fierce and lower cost options are always eagerly embraced by the consumer, a food processor's ability to shave minutes off production times will immediately correlate to a healthier bottom line.

**A summary excerpt from PMMI's Vision 2015\* report, regarding change-over strategy:**

*"Manufacturers should produce machines that feature flexibility. Such flexibility can be achieved through modular designs, simple adjustment, and tool-less and quick change-over processes. Flexibility enables production capacity to be increased or managed effectively in a 'short-run' environment without corresponding increases in operating costs on new machinery purchases."*

It's the conveyor that plays the crucial role of getting product from location A to location B as efficiently as possible. Literally the lifeline of the plant, there are a number of ways that conveyors can aid processors in reducing change-over times, especially in packaging environments.

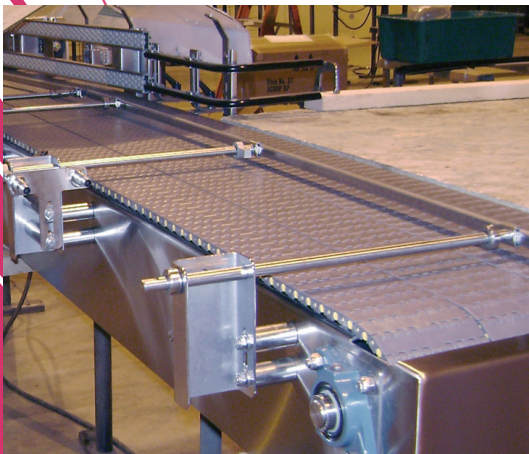


*This change-over system, utilizing a ratchet handle and a bolt-on ruler guide, alleviates measuring on manual guide rail adjustments.*

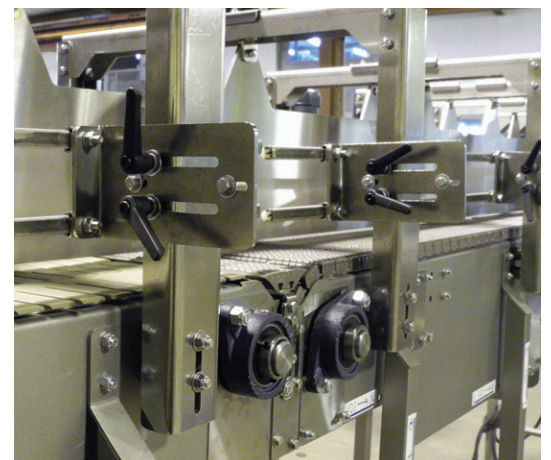
## Tool-less Bracket Assemblies

A low-cost entry level solution for change-over components on conveyor systems is an upgrade to adjustable brackets. Tool-less brackets can be adjusted quickly and simply by a ratchet or hand knob.

Ruler guides can be added to the tool-less bracket assemblies to allow operators to quickly adjust rail openings without having to measure.



*Another set-point (either/or) example, this Min-Max solution allows adjustment of a zone.*



*This set-point adjustment provides an either / or adjustment guide rail position.*

Another variation of tool-less systems involves the use of set-points. These solutions are the least technical to adjust, but are highly accurate. There are minimal engineering and fabrication costs to designing the set-points, but the benefit is that non-technical personnel can make the adjustment.



## Adjustable Zone Systems

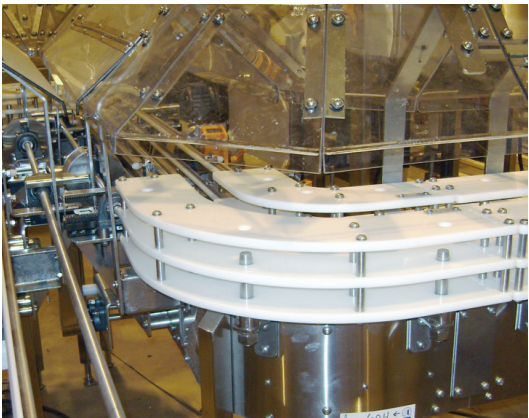
There are nearly as many options in conveyor change-over solutions as there are product sizes. This category includes manually adjustable solutions that use a single location to adjust an entire zone.

Hand-wheel adjustment guide rail systems can provide a single sided guide rail position where the product will travel off center. This type of system can also be engineered as a dual side adjustment which keeps the product centered during conveyance.

Digital counters can be added to hand wheel systems to allow for incremental movement of the guide rail for an extremely precise position.

The quick set point method can be engineered for zone systems as well as single point brackets. An extension of the rail, a spacer or a pin-in-place system can be used for a quick set-point zoned solution.

Drop-in rails are another example of a zone solution. Often manufactured from UHMW, these rails are specifically designed for the exact product and change-over application. These systems are designed for simple placement and are best utilized in turns. Non-technical personnel can easily change the rails out with no measurement necessary.



*This guide rail, made from UHMW especially for the application, drops into place for quick change-over.*



*This hinged rail provides off-center product travel and flips out of the way when not required.*

Flip-in rails also provide zone guide rail adjustment. These rail systems are hinged to provide two guide rail positions. They can be used on both floor level conveyors and in overhead lines where a hook is used to flip the rails in and out of position.



*This guide rail system features a hand-wheel and digital counter that provides adjustment of all the lanes from one side of the conveyor system.*

### Cost vs Change-over Time

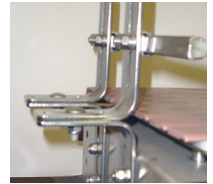
Upgrade Cost	Cost of Man Hours
Baseline: No Upgrade Cost	Over 1 Year <b>\$7,500</b>  Over 10 Years <b>\$75,000</b>
<b>\$1,000</b>	Over 1 Year <b>\$5,625</b>  Over 10 Years <b>\$56,250</b>
<b>\$2,000</b>	Over 1 Year <b>\$3,750</b>  Over 10 Years <b>\$37,500</b>
<b>\$1,000</b>	Over 1 Year <b>\$1,875</b>  Over 10 Years <b>\$18,750</b>
<b>\$22,500</b>	Over 1 Year <b>\$625</b>  Over 10 Years <b>\$6,250</b>
<b>\$27,500</b>	Over 1 Year <b>\$125</b>  Over 10 Years <b>\$1,250</b>

### Change-over Comparison of 5 Graduated Solutions *Continued page 5*

#### Base Line

Slotted Brackets with:

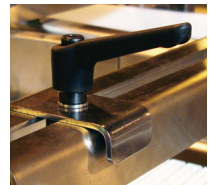
- Carriage Bolt
- Tools Required



#### Level 1

Upgrade to:

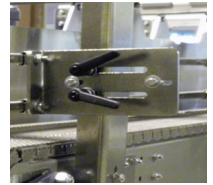
- Ratchet Handles
- No Tools Required



#### Level 2

Ratchet Handles with:

- Pre-Set Positions
- No Tools
- No Measuring



#### Level 3

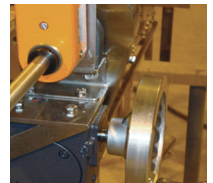
Ratchet Handles with:

- Pre-Set Positions
- No Tools
- No Measuring
- One Side of the Conveyor



#### Level 4

- Hand Wheel Adjustment
- Dial Indicator System
- One Side of the Conveyor



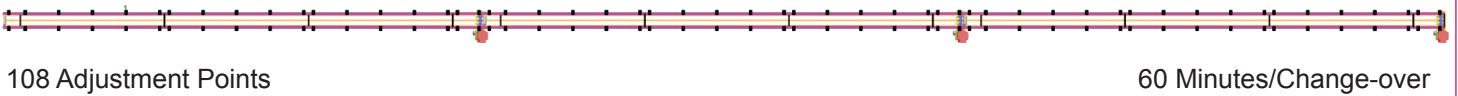
#### Level 5

- Fully Automated System
- Operator Push Button Station

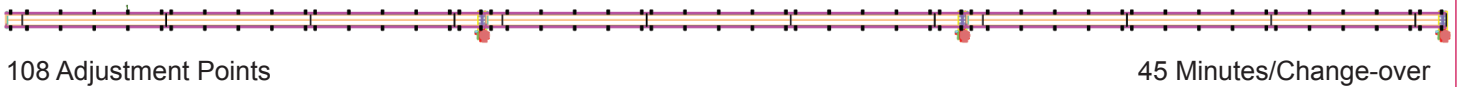


## Change-over Comparison of 5 Graduated Solutions

### Base Line



### Level 1



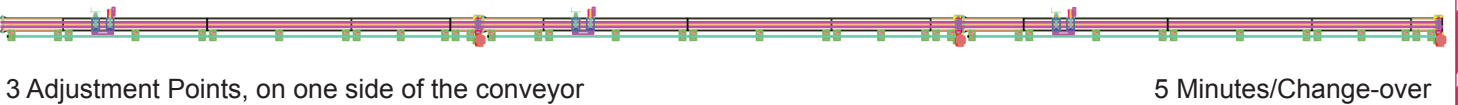
### Level 2



### Level 3



### Level 4



### Level 5



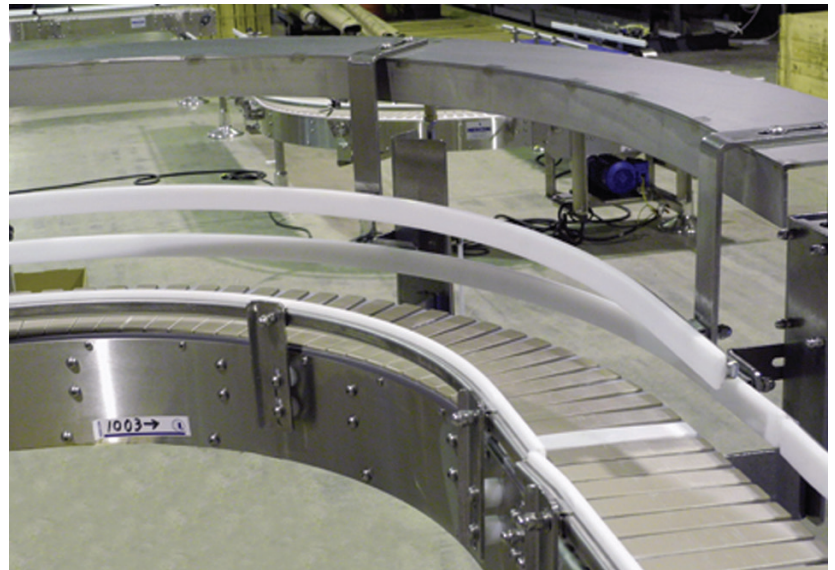
*This comparison assumes a 100 ft. straight conveyor section, a \$30/hour man hour rate and 250 change-over occurrences per year.*



## Automatic Guide Rail Solutions

Automatic guide rail solutions allow packaging manufacturers to fully realize how innovative automation solutions convert to lower operational costs. Automatic change-over solutions are geared toward technologically savvy production environments that leverage operational complexity for greater change-over efficiency and improving OEE (overall equipment effectiveness) marks.

Automatic guide rail systems can be controlled by air or electricity. Pneumatic (air operated) rails are suited for high volume production lines. They are often utilized in overhead conveyor systems to reduce manpower and to promote safer change-over methods. Pneumatic systems involve a section of rail lifting and lowering or pushing into position. The cylinders can be set for two positions. If multiple positions are needed for the application, additional cylinders are required.



*Automatic pneumatic drop-in rail system.*

Electric actuated cylinders are also used in automatic guide rail systems. This solution allows for a range of variable product widths. This purchase cost for this system is among the highest in the change-over conveyor solutions, but it is the fastest, most versatile and most accurate solution.

Both of these automatic rail adjustment systems are highly controlled, utilizing HMI (Human Machine Interface) technologies. The added process control allows hundreds of feet of guide rail adjustment to the desired width in seconds.



*Dual lane system utilizing electric actuated cylinders.*

## Purchasing Considerations

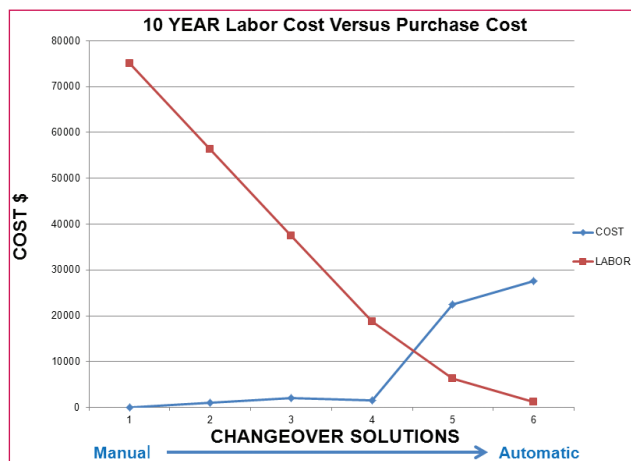
There are a number of factors that impact line change-overs that need to be considered during the purchasing process. Many of these factors have an impact on the operational business goals of the manufacturer.

- Purchase cost
- Change-over Man Hours
- Change-over Occurrence
- Product widths
- Accessibility
- Adaptability

It is important to examine the investment and the man hours that the solution will save. Refer to the center spread of this publication to compare the purchase price and change-over man hours in a graduated range of solutions. In a high change-over production environment, it is obvious that automated solutions solve for high-level business goals such as lowering overall operating costs. There are, however, many other considerations that lead buying teams to non-automated technologies or a combination of technologies that best fits their production situation.

The number of change-over times has a direct correlation to calculating the man hours in a given time frame. A simple calculation of adjustment time X set points X occurrence will provide the total man hours for a specified time frame. An occurrence of 250 change-overs per year is not uncommon, and in the change-over comparison would save 41 hours of lost production. Less frequent change-over or the inability to plan for product sizes would more likely benefit from manual zone solutions.

### Purchase Cost vs Labor Cost



The cost of labor is greatly reduced when automated solutions are used in frequent change-over production environments. These systems provide a fast-track payback in frequent change-over, high volume packaging facilities.

### Lost Production Time Calculation

$$\begin{aligned}
 &\text{Time per Adjustment} \\
 &\quad \times \\
 &\text{Number of Adjustment Points} \\
 &\quad \times \\
 &\text{Number of Change-overs per Year} \\
 &\quad = \\
 &\text{Lost Production Time in One Year}
 \end{aligned}$$

## Purchasing Considerations *Continued*

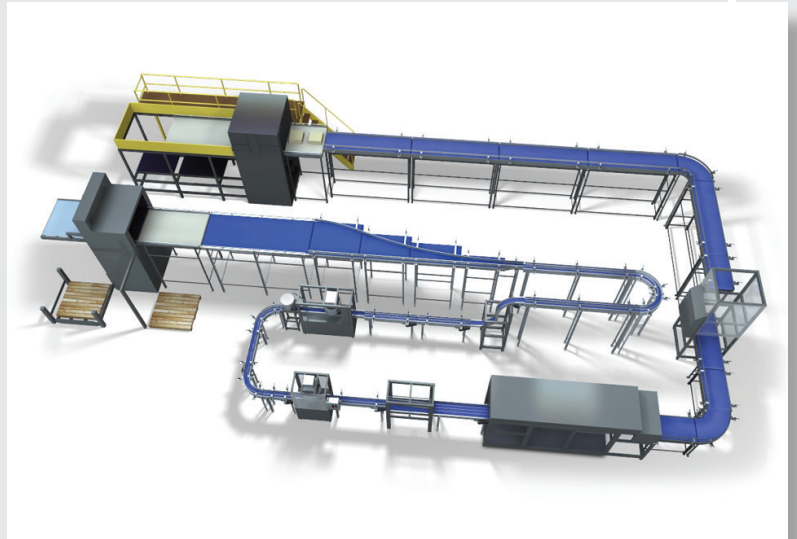
Depending on the type of package, a change-over solution may only require two set points. Some products require critical and exact guide rail support and other products do not require a set guide rail. In a previously mentioned example, ten case sizes were accommodated with two guide rail positions.

Accessibility may be a defining factor for selecting change-over options. If access is difficult on one side of a conveyor section, then a dual side guide rail system would be beneficial. If change-over is required in overhead conveying lines, automatic systems are the preferred choice

While tool-less brackets are associated with the highest adjustment times, they are an extremely flexible and adaptable solution. A past survey in Food Manufacturing magazine documented that 62% of private labelers surveyed, handle 10 or more unique labels in the course of a month. A private label manufacturer who can't plan for different product types or sizes in their pipeline might choose tool-less bracket solutions because it fits their budget and is very adaptable.

In a high-volume packaging lines with constantly changing packages sizes, the electric operated automated guide rail solutions allow for the most guide rail positions that are easily programmed for future product renditions.

*Nercon provides specially engineered change-over solutions to food and consumer goods manufacturers by examining current change-over times and processes, production goals, capabilities of the various packaging machines on the lines and the number of SKUs and package sizes that will be run.*



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