

# Cycle Time for Print-and-Apply Labeling Automation

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## INTRODUCTION

When considering print-and-apply label automation systems for a top-applied label in shipping or e-Commerce operations, speed is obviously a critical component. Manufacturers of these systems are often asked to qualify their “cycle time” – the process by which the system prints a label, stages it for application, applies it to an item, and then returns to repeat the process, ad infinitum.

But how is the manufacturer’s system cycle time being qualified, or how is its speed being promoted?

In direct relation to this, how will the label be applied to your items? There are two common methods of label application during the cycle time process – **direct contact** (the label applicator contacts the item to apply the label) and **passive contact** (the label is blown onto the item via compressed air without the applicator contacting the item). Both are effective methods to apply a label, but there are pros and cons to each approach in a shipping and e-Commerce environment. This document will discuss both application methods and any key aspects as they relate to cycle process time. Furthermore, the **direct contact** application method is assumed to be an all-electric solution, whereas the **passive contact** application method utilizes both electricity and compressed air.

## CYCLE TIME STAGES

Understanding the stages of overall cycle time in conjunction with the two aforementioned methods of label application can provide you with knowledge to make an informed decision regarding which system you will want to integrate into your operations.

The four basic stages that comprise the cycle time of a labeling automation system are as follows:

1. Print/Feed
2. Applicator Stroke
3. Application of Label
4. Applicator Return

The subsequent pages of this document will expand on the occurrences within each stage of cycle time, as well as include any relevant information related to the two label application methods mentioned above.

## DATA TRANSMISSION AND PROCESSING

It is important to note that prior to (or concurrent within) those four stages of cycle time, data is being transmitted to the print engine of the labeling automation system. This data is then processed within the print engine prior to printing the information on the label that is to be applied.

During this process, there are variables: how this data is transmitted (from a local host or outside source), the type of data that is needed to be processed (image, text, or a combination of both), the processing speed of the print engine, and when this data transmission/processing occurs.

While these data transmission and processing steps do not require any significant time (they’re completed in milliseconds), and are a small fraction of the overall cycle time process, these variables are typically out of the direct control of the labeling automation system manufacturer, so we’re excluding these steps from within the overall cycle time process.

## **CYCLE TIME STAGE 1 – PRINT/FEED**

The Print/Feed stage sees the print engine of the labeling automation system (manufactured by a third-party provider and integrated into the labeling system) taking the data that has been presented/processed and printing a label. Once this label is printed, it is then fed onto the label applicator. The printed label is now staged and ready for application to an item.

### **Direct Contact Labeling**

Once a label is printed and fed to the applicator, the staging time for this type of labeling automation system is essentially zero. The label simply resides on the applicator and awaits application.

#### (+) Pros

Label fed to applicator is stationary, staged, and ready for application.

#### (-) Cons

Label has to travel a larger distance at the exact time the applicator is triggered to apply the label.

### **Passive Contact Labeling**

Once the label is printed and fed to the applicator, the applicator physically moves into a staging position prior to applying the label. This requires time for that staging movement to occur.

#### (+) Pros

The applicator is closer to the item before it arrives, therefore reducing the distance the label travels at the time the applicator is triggered to apply the label.

#### (-) Cons

Movement and stoppage of applicator prior to application of the label introduces an opportunity for label movement or repositioning.

Compressed air is required to keep the label in place on the applicator until it is triggered to apply the label.

The extended applicator is vulnerable to contact by an errant item. This may require a collision sensor on the applicator, adding variables to the process.

## **CYCLE TIME STAGE 2 – APPLICATOR STROKE**

The label applicator accelerates towards the item being labeled. Some labeling automation system manufacturers view this stage as part of their Print/Feed process, thereby creating differences when an end user is comparing times of “applicator speed.”

An important clarification is that *any* label applicator system accelerates/extends to the item being labeled. Whether that occurs in advance of the application of the label or during the actual label application process is irrelevant – the applicator needs to approach the item in order to apply the label.

### **Direct Contact Labeling**

Movement of the label applicator is initiated at the exact time the label needs to be applied to the item. The applicator accelerates towards the item, then decelerates just prior to application of the label so it is applied with a soft touch.

#### (+) Pros

The applicator extends at the time the label is to be applied.

For operations with items of varying heights in motion, spacing between items may be tighter, Increasing overall throughput.

#### (-) Cons

The applicator stroke is triggered later in the cycle time process compared to a passive contact approach. Items are further upstream when triggered, creating a “point of no return”. Any slowing or stoppage of the conveyor may see the applicator missing the intended label placement position, or the item altogether.

### **Passive Contact Labeling**

Movement of the label applicator is initiated immediately after the Print/Feed stage, positioning the applicator slightly above the height of the item receiving the label. It then waits for item to be in position apply the label.

To accomplish this, a scanner is likely used to look upstream to verify the height of the item that is approaching, and that the applicator is in the correct position above it.

#### **(+) Pros**

The applicator is already in place above the item at the time it is to be triggered and the label is applied to the item.

#### **(-) Cons**

Additional verification controls are required to verify the applicator is at the correct height above the anticipated item to be labeled.

Operations with items of varying heights in motion must account for the applicator extending prior to the label application process. This may require additional space between items, thereby reducing overall throughput.

### **CYCLE TIME STAGE 3 – APPLICATION OF LABEL**

This stage is simply that – the label is applied to the item presented. This can be handled through direct contact with the item or by passively contacting it (typically, the label is blown on to the item).

### **Direct Contact Labeling**

This process occurs at the exact transition between the Applicator Stroke and Applicator Return stages. The applicator accelerates to the item, applies the label during contact with the item, and then retracts.

#### **(+) Pros**

Conceivably faster application time, as it occurs at the transition point between the stroke and return stages (essentially zero time).

#### **(-) Cons**

Label applicator makes physical contact with the item to be labeled.

Only requires electricity (no compressed air).

### **Passive Contact Labeling**

When triggered, the label is typically blown onto the item with compressed air.

#### **(+) Pros**

No contact between label applicator and item.

Applicator is closer to item prior to the time it is triggered to apply the label.

#### **(-) Cons**

Labeling application system requires both electricity and air to apply the label.

System requires more parts for utilizing both electrical and pneumatic functions of the applicator.

Label requires spatial travel between the applicator and the item.

#### **CYCLE TIME STAGE 4 – APPLICATOR RETURN**

Lastly, the Applicator Return stage occurs to complete the cycle time process. Since the label has been applied to the item, the applicator returns to the home position to repeat the process.

##### **Direct Contact Labeling**

The applicator returns to the original Print/Feed position to repeat the process.

##### (+) Pros

Faster return speed from applicator stroke.

##### (-) Cons

None.

##### **Passive Contact Labeling**

The applicator returns to the original Print/Feed position to repeat the process.

##### (+) Pros

None.

##### (-) Cons

None.

#### **SUMMARY**

When evaluating the stated times and benefits of various print-and-apply labeling automation systems, every manufacturer's cycle time is comprised of these four stages. However, the times and metrics communicated can be confusing or incomparable depending on how each manufacturer qualifies what occurs (and when) during those stages.

By understanding these basic components, an end user can evaluate holistically and make a more informed decision on which solution is best suited for integration into their own operations.