

## How Fast Is Fast?

A common question heard in our office - "Can the printer go this fast?" This is a fair question and one that must be answered every time we evaluate a continuous motion application.

Speed has two elements – cyclic rate and velocity.

Cyclic rate is the number of times that we need to produce an image within a given time period, usually expressed as cycles per minute. A lot of variables are involved here including image size and type, but in most cases the cyclic rate is not too much of a concern.

On the other hand, velocity is very much a concern – even when a low cyclic rate is required. What is velocity? For our purposes velocity is the speed that the substrate is moving.

Thankfully, determining average velocity (or web speed if you would rather) is pretty simple. All you need to know is the package length and number of packages produced in one minute. Multiply these two numbers together and you have your average web speed. If your package length is in inches you have determined inches per minute (ipm). If millimeters of length were used then millimeters per minute is your result.

Why average velocity? This is the speed that can be determined from this information. In some cases, especially with continuous motion VFFS equipment, the velocity varies widely within each cycle. That can be a concern, especially if the velocity exceeds the maximum or minimum speed range of the printer. With just a few steps, we can see if the average falls within our operating range.

Once you have determined your average web speed you can convert it to a common denominator and compare the package speed to the printer specification. Usually, printer speeds are expressed in meters per minute or millimeters per second. Here are some handy formulas for figuring velocities –

Begin by determining the average velocity:

Package length in inches x packages per minute = inches per minute

Package length in millimeters x packages per minute = millimeters per minute

Now convert average velocity to a denomination common to the printer speed:

Millimeters per minute = inches per minute multiplied by 25.4

Millimeters per second = millimeters per minute divided by 60

Meters per minute = Millimeters per minute divided by 1000

With no more than three of these five formulas you can easily determine if the average speed of a given application falls within the operating range of the printer.

Congratulations! You have answered the question "Can the printer go this fast?"

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Optional way to present math above -

Package length in inches x packages per minute = inches per minute

Package length in millimeters x packages per minute = millimeters per minute

Inches per minute x 25.4 = millimeters per minute

Millimeters per minute ÷ 60 = millimeters per second

Millimeters per minute ÷ 1000 = meters per minute