Web Guiding Fundamentals - Web Guiding Performance

Blog Post

We have reviewed all the major components of a web guiding system, sensor, web guide mechanism, actuator and controller. However, the question still remains what is a good web guiding system? For this we have to address web guiding performance

> **Speaking of web guiding performance, how accurately can you guide a web? Well, it depends...**

Web guiding accuracy depends on many parameters that affect such accuracy.

Errors

Steady State Error

If we are dealing with a steady state error, we can expect an error within +/- 0.5mm with a perfect machine and perfect material. Steady state error is the difference between the desired value and the actual value of a system. It is possible to achieve a better performance, such as is required for flexible printed electronics (this will be discussed in a future post, or you can contact us for an in person discussion), but for a typical converting operation with ideal conditions of machine and material the afore mentioned error is expected.

Transient Error

Most web guides are going to experience transient errors. Transient errors are based on disturbances that may be caused by web material properties or other environmental conditions in the converting process. When correcting transient errors you have to consider the magnitude and frequency of the error. Additionally, transient errors can propagate downstream of the sensor. Even though the error is corrected at the sensor, you don't know the angle at which the web is approaching and that can cause waves downstream.



Wrinkles, edge curl and flutter, and plane change

Also, you won't have good guiding performance if you have wrinkles on the web. A wrinkling web will cause the edge to move back and forth. Edge curl or flutter, and web plane change will also affect guiding performance.

Magnitude errors

If you are facing large magnitude errors and the stroke of your actuator is limited, or the correction of the web guide can provide is limited then you can't expect good web guiding performance if the actuator is topping out on either side of its stroke.

High Frequency Errors

Guiding performance is also negatively impacted it you are using a lower bandwidth actuator and you are facing higher frequency error. As the frequency increases beyond the bandwidth of the actuator, the performance declines.

Sensor Accuracy

If the sensor accuracy or the gain change is poor you can't expect appropriate guiding performance. The correction of the web position basically starts with knowing where the web is in the first place

Improper installation

Error can be amplified by an improperly installed web guide system. In previous post we presented how departure from the 90^{o} wrap around the guiding rollers, or improper location of the sensor can have negative effects on the web guiding performance of a system.

INstallation Mistakes

Factors affecting web guiding

The factors affecting web guiding can be summarized in four areas: Machine related, involving web guide installation; process related, involving traction and tension, and magnitude of error with respect to the stroke of the actuator; material related, wrinkle and curl, and bagginess; and web guide related, rate of error with respect to actuator speed, acceleration and thrust, sensor deadband and actuator backlash, correction and stroke limits

Guiding system design requirements

A good web guiding system design relies on good parameter information. Basically, you need to have knowledge of the web speed, limitations in location and installation, web properties such as web thickness and stiffness, environment in which the system will operate, tension and loading on the web, desired response and accuracy, desired correction and stroke length and expected error magnitude and rate. This is information that we try to obtain from our customers when we are helping them determine the appropriate web guiding application for their converting line.

> **Web guiding performance can be improved with good knowledge of the process, materials and machine**

Our blog series on web guiding fundamentals will wrap up in our next blog post with a summary of web guiding fundamentals. As always, we invite you to contact us if you have any question regarding web guiding and web monitoring.

Sign up for our monthly emails with information on applications, technology and new developments in our field.