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A Guide to Achieving Six Sigma Quality

How AccuWeb's WideArray™ Edge Detector Played a Key Role in One Company's Move Toward Six Sigma

It's a given that converters of flexible packaging want to maximize efficiency, consistency and quality, but most converters do not have a recognized "calling card" touting the quality of their products.

Most companies operate with what is called Four Sigma Quality — a standardized quality level that allows 6,000 defects per million opportunities; far from perfect.

However, a few flexible packaging companies are seeking a sustainable competitive advantage by striving for Six Sigma quality which only allows 3.4 defects per million opportunities — resulting in an extraordinary improvement quality and cost-efficiency.

AccuWeb's High Temperature Ultrasonic Edge Detector provides dynamic compensation at 500 degrees F (260 degrees C).

Recently, AccuWeb Inc.'s WideArray edge detector played a key role as one of the company's global partners certified the edge detectors as meeting Six Sigma standards. This company's experience provides a guide to other equipment manufacturers and converters seeking to attain this same goal.

Eliminate Unproductive Activities

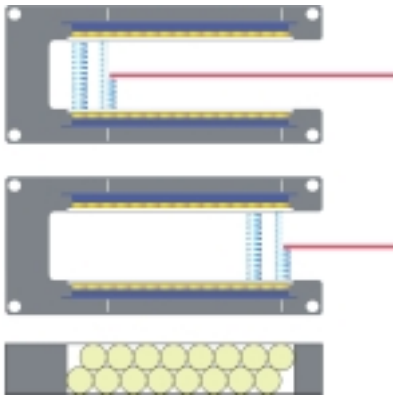
In implementing any Six Sigma process, one of the first steps is called DMAIC (Define, Measure, Analyze, Improve, and Control). This is a very structured, fact -based model that seeks out and eliminates unproductive activities, often applying technology for improvement. While implementing DMAIC, it became very clear that the mechanical auto-edge seeking devices that were required to move web guide edge detectors were a frequent cause of failure, resulting in either downtime or costly maintenance.

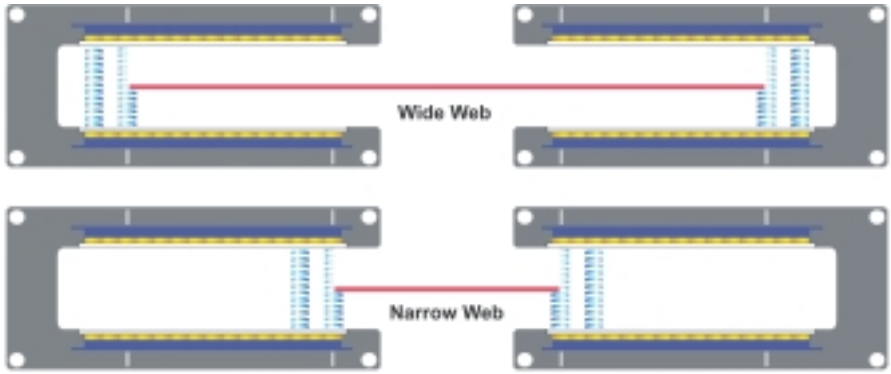
A mechanical auto-edge seeking device is a clever apparatus, with servo motors, limit switches, belts, cables, tracks, and various other moving parts. It has been a practical option when web widths change frequently and edge detectors are mounted overhead or in hard to reach areas. However, each part in the assembly created an opportunity for failure, which when multiplied by a number of converting lines, provided a compelling reason to find a more reliable edge detection technology.

By replacing auto edge seeking

devices with AccuWeb's WideArray edge detectors, virtually every opportunity for failure was eliminated because there were no moving parts to break, burn out, wear out, or jam. This patented digital system employs a series of overlapping emitters and receivers in a seamless array, providing dramatically larger detection ranges.

Since the system was patented in 2001, AccuWeb has developed a series of WideArray edge detectors in ultrasonic and a new, patent-pending infrared format. The WideArray provides up to 18.4 inches (467mm) of detection range. When center line guiding, a pair of WideArrays can accommodate up to 36.8 inches (934mm) of web width change without the need to move the edge detectors.





Creating a Repeatable Setup

Once the WideArray edge detectors were installed, the company quickly realized it could electronically adjust the guide point anywhere within the larger detection range. This provided an opportunity to align an image, spot coating, or laminating adhesive to a precise target position rather than make a mechanical adjustment. Specific settings could be entered through a remote station or a PLC fieldbus and saved for future use. Another mechanical process was eliminated by the WideArray and replaced with a repeatable, defined parameter.

Eliminating Process Variation

The "control" element of the Six Sigma DMAIC process is defined as a state of stability, generating a predictable result. It requires a company to seek out and eliminate the causes of process variation. AccuWeb realized very early that the more advanced and accurate forms of edge detection — specifically ultrasonic and infrared systems — still had weaknesses that could result in process variances. Ultrasonic systems could be affected by changes in temperature, humidity, air turbulence, vapors and gases, and vertical web movement caused by flutter or other web path changes. Infrared edge detectors were easily affected by dust, lint, dirt, coating overspray, ink spatter, and ambient light conditions.

In 1988, the company was awarded a patent for a unique ultrasonic edge detector that dynamically compensates for the process variables that could affect performance. It contained a second ultrasonic beam that is operational at all times, serving as an independent environmental reference. When this reference beam is combined with the separate edge sensing beam, it continuously recalibrates the signal for any environmental changes and process contaminants.

Because the web never blocks the second reference beam, it provides a real-time indication of how the changing environment is affecting guide accuracy. Each pulse of energy also captures the web at its exact location, filtering out the effects of web flutter, curl, and other web motion.

Today, all AccuWeb edge detectors employ this proprietary dynamic compensation technology, including the ultrasonic and infrared WideArrays, and a high temperature ultrasonic edge detector, providing the truest level of accuracy, even under the harshest conditions.

Seeking Six Sigma Success

Six Sigma is a neverending, exhaustive march toward perfection. As much as any manufacturer would love to claim it has a magic "quality" wand, it hasn't been invented yet. Even so, 3.4 defects per million opportunities is an extraordinarily high hurdle, requiring manufacturers to select their tools carefully in order to reach it in the most cost-effective way possible.

As forward-thinking web converting companies begin their own march toward Six Sigma quality, they can take a big step toward this goal by using AccuWeb's dynamically compensated array technology to improve product quality and eliminate many sources of production failure and downtime — and as an extra bonus, reduce cost. ■