Application Note 1004

Paper Mill Width and Diameter Gauge

Picture above is a typical Paper Mill. There are three 3000 Series DSP sensors measuring the diameter and width of the paper rolls. The two sensors looking at the ends are measuring the width while the one above measures the diameter.

General Description

By using long range geometric lasers we can easily measure the width and diameter of large paper rolls to a high degree of accuracy. The long measurement range of the sensors allow for permanent placement of the sensors to measure small to large rolls in width and diameter without changing the location of the sensors.

The 3000 Series sensors utilizes CCD Digital Signal Processing (DSP) technology which significantly reduces the laser speckle problem enabling it to easily measure materials ranging in color from black to white without any recalibration. This is a typical requirement of gauging for the measurement of paper. Product color changes are easily handled with this technology.

Because the gauges are designed with a flexible measuring range, they can be placed in different locations in the process. Typically, the width and diameter gauges are placed in the same location. It just depends on the mill as to where it is determined the width and diameter measurements are required in the process.

Features

- High accuracy non contact laser gauges.
- Resolution to 1:60,000 of the measurement range.
- Sensors outputs include analog, RS 232/485, Profibus and Ethernet.
- Individual positional readings from each sensor to determine lateral displacement on width.
- Standard and custom measurement ranges are available.

Benefits

- Provides objective width and diameter results with speed and accuracy.
- Due to the long measuring range of the sensors, no physical setup changes are required for different roll sizes.

- Improves product quality, reduces customer returns and scrap.

Application Brief 1004

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Laser Gauges

Two 3000 Series DSP distance measuring lasers are used to measure the width of the paper rolls. The lasers are mounted on each side of the product for measurement during the process. The 3000 Series DSP lasers operate independently, however they can function in a master-slave mode providing differential width measurements. This feature compensates for lateral shifting of the product as it moves along the rollers in the process. A 3000 Series laser is pictured to the right. In itself, it is a complete measurement system.

Data Manipulation

The 3000 DSP Series offers a variety of connection and output capabilities. The sensors can be connected as stand alone sensors or in master slave mode. In addition they can be networked via RS 485. It is just a matter of the mill's requirement.

For connection to a PLC or PC, a variety of communications are available. The sensor provides both analog and serial measurement data independently. The serial outputs include RS 232, RS 485, Ethernet and Profibus. The analog output is 4 - 20 ma.

Application Software

If a PC is available, our Measure Tracks software can provide an in process measurement of roll diameter and width as well as lateral displacement of the roll. The lateral displacement can cause telescoping of the roll. All data can be viewed in both numerical and graphical form. Results can be stored in a text file and Excel for further analysis. Communication to the plant computer can also be accomplished.

Roll Width Telescoping and or Side Shifting

Profiling the end of the roll is accomplished with a 3000 DSP sensor as well. The sensor can be installed at the same or different location. To make the measurement, the sensor needs to scan across the entire end of the roll. This can be accomplished in two ways. We can use a standard 3000 DSP sensor and move the sensor across the entire end or a two dimensional 3000 DSP sensor which scans across the roll without moving the sensor or the roll. A rotating mirror with optics is installed in the sensor to accomplish the sweeping of the laser beam. The polar coordinates are corrected to provide the distance to the roll.

Depending on the desired location for making the measurement, paper roll positioning and fixturing, the appropriate method can be implemented.

Pictured above is a close up view of the end of a paper roll illustrating the wrinkles due to side shifting. The side shifting of the roll is easily measured with the 3000 DSP sensor. The Measure Tracks software can provide the numerical analysis, acceptable limits along with the graphical analysis.

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