A Fiber Optic Sensor For Web Edge Detection

Article

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Abstract

A laser based fiber-optic sensor was proposed in our previous work. The sensor developed was based on the principle of scattering of light and the sensitivity directional property of optical fibers. A beam of light is incident on a surface or an edge, the scattered light is received by a linear array of optical fibers. The lateral position of the web edge is determined based on the intensity of light received by each fiber in the fiber array. Static experiments were conducted to show the feasibility of the sensing strategy. In this work, the performance of the sensor is evaluated on an actual web handling platform. The analysis of static and dynamic (with non-zero web transport velocity) experimental data of the sensor under various realistic operating conditions and disturbances is conducted. A direct comparison of the fiber optic sensor and two existing industrial sensors is presented. The experimental data from the sensors are compared using different web materials and under different operating conditions. The new fiber optic sensor measures more repeatably and the measurements are less noisy. Further, the new sensor overcomes some of the key limitations of existing sensors. The problem of determining the actual position of the web when it is completely outside the sensing window or when it completely covers the sensing windows is resolved; the solution consists of a new configuration. The new configuration also improves the precision of the sensor.

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