Fiber-Optic Temperature Monitoring in Pulp Production

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Abstract

A fiber-optic temperature sensor system has been developed and implemented in the monitoring of the cooking process in pulp production. The sensor system is based on intensity modulation in mechanical multimode fiber connections caused by the temperature dependent deflection of a bimetal strip. OTDR technology is used for monitoring the changes in optical power at the sensor points in the network, and a computer system takes care of calibration curves and the power-to-temperature conversion. Fiber segments between the sensor points and the control unit are realized with blown fiber.

In this paper, the development and testing of the temperature monitoring system is reported on. Sensor performance, data readout, installation issues and measurement results are discussed. The system is shown to meet the requirements on precision and response time and to be a useful tool for the monitoring of the cooking process.

Keywords: optical fiber; temperature; sensor; monitoring; pulp; paper; industrial.