



MASC-SPOT SYSTEM FOR THE INSPECTION OF PAPER SURFACES

The image processing system SPOT has been developed for the quality control of paper surfaces. SPOT detects defects in papers and laminations by using digital camera images, classifying them according to geometry, size, and intensity.

Product properties

- online detection of defects
- visualization of defects
- classification of defects according to size, geometry, and intensity (dots, stains, bends/scratches)
- feedback with respect to production by sorting orders or system halts
- flexible adaptation to customer requirements (parameter adaptation, different configurations, extension of production plants)
- defect protocols
- storage of defect images

Service of the Fraunhofer ITWM

- delivery and installation of the control system
- adaptation to customer-based requirements
- evaluation records for the substantiation of production quality
- set-up of the desired defect classes
- communication between control system and production process
- system maintenance
- adaptation to new requirements

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Examples of typical paper defects

- 1 *fold*
- 2 *coating error*
- 3 *spot*

MASC-SPOT: System for the inspection of paper surfaces

Up to now, defects on paper surfaces could only be detected by the human eye. However, this kind of quality control is laborious and time-consuming; furthermore the human eye needs recovery.

Inspection of paper surfaces

The image processing system SPOT provides online quality control which can be integrated into the production process. In the center of the system is a fast image processing algorithm which detects and simultaneously classifies defects, e. g., stains and scratches, on the homogeneous paper surface. Input data of the algorithm are digital images of paper sheets. The results of the image evaluation can be used as sorting orders for the next process steps; a direct feedback with respect to production is also possible (e. g., system halts if defects accumulate). A defect protocol is written automatically and can be retrieved at any time. If necessary, the images on which SPOT has detected defects can be stored and viewed offline.

Image processing

As a first step of the image processing algorithm, the camera image is reduced to the relevant region, i. e. the section of the image showing only the paper sheet. After this recognition of boundaries, defects are detected in the image and marked by so-called ROIs (Regions of Interest). On the basis of the features provided by the ROIs, the algorithm classifies the defects.

Structure of the entire system

The SPOT system is directly integrated into a paper sorting machine. Above the transport belt, several cameras are installed which observe the entire width of the paper sheets. Each of these cameras is connected to one of the clients of the SPOT system. These clients run the image processing algorithms. Each client consists of a double processor system where several image algorithms run simultaneously. This parallelization is finally responsible for the high performance of the SPOT system.

A central server collects all the results of the clients and tells the sorting machine whether a sheet is „good“ or „bad“. Besides, it writes a protocol of all the occurring defects, so that an overall statistics can be provided at the end of an inspection cycle.

SPOT can easily be adapted to customer-based requirements or changing conditions (e. g., lighting differences). The system is flexible with respect to extensions due to the use of PC-based technology.