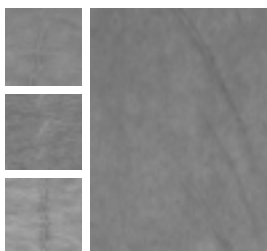


Subtle Defect Imaging



Executive Summary

Soft wrinkles, ruptures and subtle calender cuts are all low visual contrast defects that can be extremely critical in subsequent processing stages like calendering, re-reeling or winding. They can easily cause web breaks at the supercalender or through the unwinding processes. Coating skips and low contrast markings on the web cause printing problems and returned product. Compounding the severity of these defects is the fact that since they are so subtle, the cause of the problem could stay unidentified for a long time, but could harm the roll good supplier's reputation severely. Printing houses carefully monitor the runnability of their each supplier's rolls and keep detailed records comparing all of their suppliers' runnability and quality. Superior runnability and quality promotes long term customer relationships and in many cases a premium price.

ABB is now offering an indispensable tool for papermakers to identify these hard to find flaws before the final end users do. The ULMA NT*i*'s new Subtle Defect Imaging engine uses advanced signal processing algorithms in concert with the basic system's high resolution capabilities to capture these extremely low contrast flaws on-line before they interrupt your or your customer's processes.

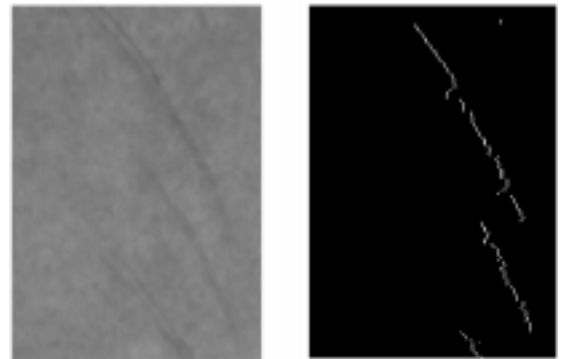
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The ULMA NT*i* Imaging platform provides an architecture that future software product developments can be easily added to. These advanced products will increase system functionality, thereby securing the customer's Web Inspection System investment.

Description

data to capture extremely low optical contrast flaws. It processes this signal data parallel to other defect processing which enables real time identification without the need for time delays normally found in more traditional software only approaches.

The raw digital signal is enhanced and analyzed through multiple stages of digital clarification prior to detection and classification. Dedicated signal processing HW secures the real time performance.



This new technology opens up an unprecedented new dimension for web inspection technology that has never been addressed before in the past. Papermakers finally have a tool to catch these subtle yet highly important defects in real time. Operators now have the ability to recognize and resolve process problems without having to wait several hours or even days to find out about them.

Detection of Soft Wrinkles

Soft wrinkles are serious defects that easily can cause web breaks in subsequent unwinding processes. They are weak in contrast and are quite often diagonal in direction and have been problematic or even impossible to classify properly in the past.

Detection of Subtle Defects

The SDI software can also be optimized to detect subtle "spots" e.g. coating skips (reflection measurement), formation flocks, weak ruptures etc.

Improved Process Feed Back

Real time detection of subtle defects gives the operator immediate feed back related to special process situations. Operators are able to make immediate corrections to the production line in order to minimize the impact of process irregularities.

Improved Product Quality

All preventive and corrective actions incrementally help to improve quality and minimize off spec product. Therefore, the papermaker is able to continuously improve customer satisfaction, increase production efficiency and maximize profitability.

Improved runnability at winders, calenders, off machine coaters

Critical, low contrast defects can be identified immediately before they create down time at winders, coaters etc. or damage to your calenders or supercalenders. Down time and machine damage can be very costly to you so the savings available through this additional detection capability easily justifies the investment.

System Architecture

Subtle Defect Imaging is an optional, integrated hardware and software package for ULMA NT*i* systems already equipped with basic defect imaging. If included as part of a new system, the hardware and software will be pre-installed and configured. Imaging ready ULMA NT*i* systems can be upgraded through a simple hardware and software update

Features

Subtle Defect Imaging

Detected defects are reported to the operator along with an actual digital photo of the defect in grey scale format.

Light and Dark Wrinkles

Based on the contrast change of the wrinkle, the detection result is directed to either the light or dark wrinkle class both of which include multiple size categories.

Light and Dark Subtle Defects

Based on the contrast change of the defect, the detection result is directed to either the light or dark defect class both of which include multiple size categories.

Wrinkle Bursts

Wrinkles often occur as a burst of wrinkles. If desired only an alarm of the burst is reported when wrinkles start to appear and thus individual wrinkles are not reported.

Edge Wrinkles

If special attention is desired for wrinkles at the web edges, they can be reported separately in an edge defect category with easy parameter set up.

ULMA *i* Web Analyzer Product Family

These new features have been developed to give our customers additional value for their ULMA NT Web Inspection System investment. New advanced features are being continuously developed to create additional value for our ULMA NT Web Inspection System users. Future features will add functionality to the ULMA system and thus will give the customer possibilities to increase system performance without abandoning their initial investment. As requirements for quality inspection increase in the future, ABB's goal is to continuously develop new feature upgrades for the ULMA NT base platform to meet those demands.

ULMA **Subtle Defect Imaging** is a complementary feature to Defect Imaging. ULMA NT Defect Imaging is a prerequisite for more advanced features like SDI.

ULMA Web Analyzer package includes: *Defect Imaging, Web Imaging and SDI (Subtle Defect Imaging)*. Each feature is described in separate data sheets.

