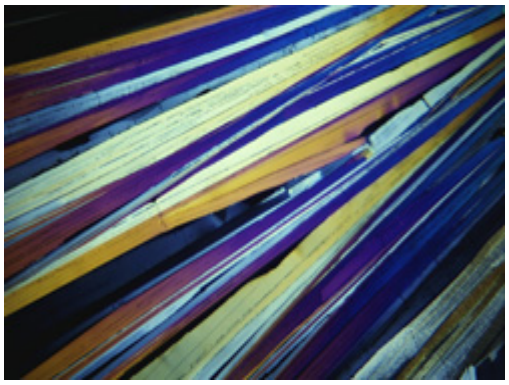
Automatic quality control for industrial printing

Results in Brief

Enhancing quality in the multi-ink printing process

Aided by production and knowledge management technologies, the MONOTONE project set a flexible software framework for modularisation of the multi-ink printing process.

INDUSTRIAL TECHNOLOGIES



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Although the introduction of automation in production lines should result in the minimisation of tests for product validation, quality control is still exhaustive. Moreover, defective products exist, and once found, they may not be recovered or easily repaired, leading to a huge number of scrap rates.

Challenged by this, work on the MONOTONE project focused on developing suitable tools and methodologies for an accurate prediction of the final product from its design. Based on knowledge of production line limits and their tolerances, appropriate image and signal processing techniques, and knowledge-based control tools were developed. These have already been applied in the ceramic tile and textile industry sectors.

Within this context, a robust, flexible software framework for modularisation of a halftone printing process involving more than one printing levels was generated. The

developed system has many steps with setup and training being the initial procedure. On the basis of efficient machine learning techniques, the prediction algorithm provides an approximation of the final colour appearance with the aid of arbitrary input parameters for each stage.

The software features meta-induction potentialities, which entails running the prediction phase backwards to obtain the best set of adjustments to get the desired output. While slight environmental changes can be easily introduced without retraining, system adjustment to substantial changes requires a new batch-adaptivity for models retraining.

One of the system's novelties is a theoretical half-tone model for all colour computations, offering an accurate approximation of the hue shift that often occurs in intermediate printed halftones. In addition, integrated diagnostic algorithms have increased capabilities to enable optimisation of the sequence of ink applications and half-tone patterns so as to achieve the desired appearance of the product.

The software involves suitable process models and algorithms for prediction, diagnosis, setting of best adjustments and optimisation of production processes. Most importantly, it is very flexible and ready to be incorporated in existing or under development automatic control systems. This innovative software framework can find useful applications in the industrial tile sector and other half-tone printing fields.

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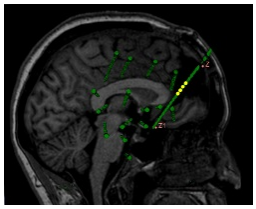

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Project Information

MONOTONE

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