

Image Processing in Banknote Printing Applications, Technology and Trends

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Over the last decades, quality systems have become increasingly important in banknote printing applications. Most of these systems use high resolution RGB or multispectral line scan cameras in “inline” and “offline” production process generating high data rates. New MicroTCA-based developments with a heterogeneous computing approach address this challenge. This keynote will introduce the MicroTCA developments at KBA as follows:

- KBA, a short introduction.
- Visible multispectral banknote security features, an overview.
- Quality systems in banknote printing applications were established in the early 1990s. Machine real time was necessary for a successful approach. Advanced banknote printing machines at that time were running up to 10.000 sheets/hour, that means 360ms for image processing of a CCIR 756x581 Pixel 8Bit monochrome image (i.e. Sony XC77-RR-CE). This was too fast for a single processor approach like intel i486, but not too fast for customized hardware or dedicated image processing boards (i.e. Datacube Inc.). VMEbus-based systems were state of the art technology for more than one decade. With the arrival of advanced high resolution RGB or multispectral line scan cameras we had to address a bandwidth gap for standard VMEbus systems, and anew approach had to be found.
- MicroTCA as “low cost” high bandwidth system standard for industrial applications.
- Customizing MicroTCA shelves for image processing applications. Creating an 18 slot MicroTCA.1 shelf for cost-sensitive applications.
- Heterogenous computing approach with FPGA-based image processing boards and off-the-shelf CPU AMCs using real time operating systems, Windows Embedded and AM915 as end point device.
- Introducing 10GE (Vision) as a new camera interface in industrial applications with long distance “copper” capabilities on Cat6a/Cat7 cable.
- Future trends: sensor fusion.

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