USE CASE

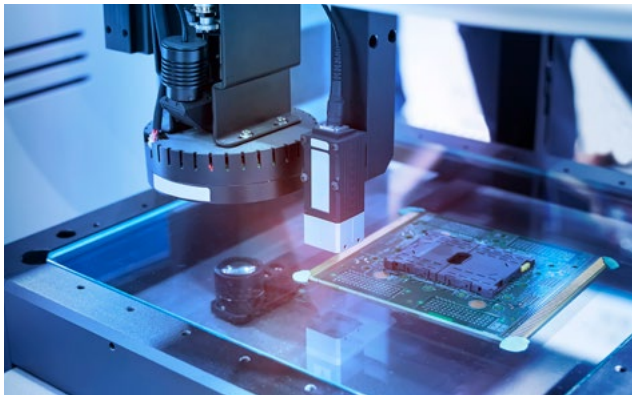
QUALITY IS THE KEY

AI-supported digital inspection systems
ensure higher quality in production

POSSIBILITIES START HERE kontron S&T Group

CONTENTS

Kontron's new KISS V3 4U SKX server supports next generation AI inspection systems for production environments.



// AI-supported digital inspection systems ensure higher quality in production

In their quest for greater quality and productivity at reduced costs, manufacturers across all industry sectors are looking to harness the Internet of Things (IoT) to AI 'machine learning' and 'deep learning' quality inspection applications.

According to a recent survey by Deloitte, machine learning enables as much as 35% increases in quality. Analyzing production lines in real-time using visual inspection processes allows product quality issues to be highlighted and addressed proactively. This is in line with increasingly adopted Zero Defects manufacturing best practices which advocate no waste, thereby eliminating the real costs of defects: inspection and rectification, material wastage, additional labor, lost revenue, and customer dissatisfaction.

NEXT GENERATION VISUAL INSPECTION SYSTEMS

By applying machine learning to digital image processing, inspection systems are therefore playing an increasingly pivotal role in raising the bar on quality. By automatically processing, manipulating and interpreting information received from machine sensors and cameras, powerful software algorithms identify anomalies occurring during the actual production process, triggering alerts when necessary. Apart from being very fast, totally objective and immune to fatigue – unlike laborious, error-prone human visual inspection techniques – these next generation vision inspection systems not only improve quality but also boost productivity and reduce unnecessary materials wastage and costs.

Going even further, especially for production line applications where there are many variables or subtle nuances, 'deep learning' systems based on neuronal networks algorithms are also emerging. From the outset, as part of the training of such algorithms, thousands of images from many different angles and perspectives are used as reference examples. Applied to machine vision systems, these learn to differentiate and decide intuitively between 'normal' and flawed visual images - without human intervention. They are also very flexible, easily adapting between production runs and different products or components. Thus, automated visual inspection systems applying powerful AI technologies are set to become an integral part of many modern industrial-scale production processes, from food to aircraft manufacturing.

FOCUS – PRINTING INDUSTRY

The printing business today is more competitive than ever. Maximum productivity, minimum waste, consistency and high quality are essential with even the smallest defects during print production having the potential to impact the quality of entire print runs. The risk of defects is ever present, caused by a number of factors, from malfunctioning print nozzles on printers to ink splashes, scratches, paper creases, not to mention color and register deviations.

Typical challenges:

- Human error
- Faulty print nozzles
- Paper creases
- Color and register deviations

With so much at stake, the traditional visual inspection of individual sheets by humans has become increasingly unviable in recent years. Not only is this approach highly subjective and laborious, it is expensive in terms of labor. Automated computer vision inspection systems, equipped with innovative image processing technology utilizing line scan cameras or integrated contact image sensors (CIS), are therefore increasingly deployed.

CIS systems can be mounted in printing machinery close to the flat printing surfaces being inspected. Due to their compact design, they take up minimal space in space-constrained printing presses. The line scan cameras, on the other hand, can score with a higher speed as well as with a flexible and overall better resolution than the CIS scanners. Inspection data is processed in real-time, providing comprehensive reporting and alerting on print quality.

Industrial 3D Printing

Visual inspection technologies are equally applicable to industrial 3D printing. In fact they are seen as essential to driving future demand from many manufacturers looking for greater quality control assurances over component strength and reliability. After all, 3D printing may offer huge potential to produce previously impossible designs, but the difference of a few microns in the geometry of a machine or vehicle component could at the very least prove disruptive, at worse, a matter of life and death.

Typical 3D printing challenges:

- Concerns over consistent parts quality
- Monitoring of multiple parameters
- Insufficient computing power

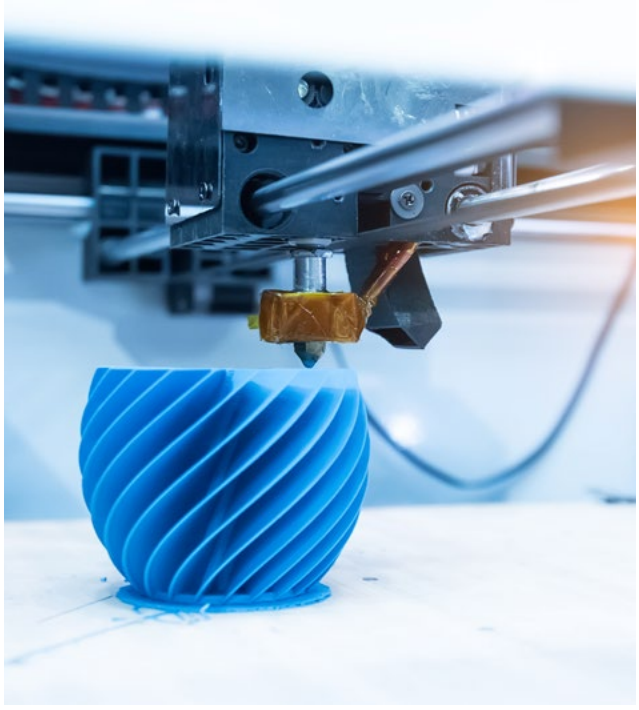
Industrial 3D printing, also known as additive manufacturing (AM), produces objects by layering materials such as metals, composites, or polymers to produce a three-dimensional part. Achieving quality control in AM involves greater command over parameters other than geometry. Among others, these will include laser power, laser scan speed and build chamber temperature. Each contributes to the outcome of a build and even the slightest change could impact final part quality. Therefore, for the avoidance of defects and ultimately to guarantee quality, highly accurate simulations are necessary for creating build plans that adjust input parameters dynamically.

Until recently, specialized, high performance computing resources have been potential limiting factors in the future advancement of quality control for industrial 3D printing. Access to the computing power necessary has been a major obstacle, for handling the unprecedented volume of video data generated during real-time 3D printing process monitoring. However, as demand grows for AM in production environments, purpose-designed simulation software is becoming more widely available. Combined with new AI-enabled 'deep learning' capabilities and the latest powerful computer hardware platforms using high-performance GPUs, many more

manufacturers can gain access to the real-time visual inspection and quality control systems they've been waiting for.

POWERFUL AND RELIABLE SERVER SOLUTION FOR AUTOMATED INSPECTION SYSTEMS

Kontron has recently introduced a new high performance industrial server for meeting the growing real-time processing and storage requirements of AI-enabled monitoring and inspection systems. The KISS V3 4U SKX server is well-suited to demanding production environments and therefore ideal for data- and graphics-intensive image processing and machine learning applications. The KISS V3 4U SKX features Dual Intel® Xeon® SP series processors, allowing real-time compute-intensive processes for analysing large amounts of data. Up to three double width high-end GPU cards (NVIDIA® TESLA® V100, NVIDIA® T-4 GPU) ensure extremely high GPU performance, and for extended storage, up to eight 2.5" storage trays can be installed.



// AI-enabled visual inspection technologies ensure highest quality in industrial 3D printing

Like the company's other KISS server platforms, the super-powerful KISS 4U V3 SKX can be used 24/7 and is based on industry standard components, enabling ease of configuration and ease of maintenance. The flexible, modular design also allows easy adaptation to customer-specific requirements. The consistent use of components with long-term availability (5+ years) ensures systems are well-suited to meeting manufacturers' needs for longevity. The KISS Rackmount Systems optionally support TPM V2.0 encryption for secure cloud connection as well as the Kontron APPROTECT security solution. The integrated security chip from Wibu-Systems in conjunction with a suitable software framework protects IP rights and provides copy and reverse engineering protection.

AT A GLANCE

- Industrial grade for challenging environments: robust, reliable and sustainable
- Maximum performance up to 8th Gen Intel® Core™ i3/5/7 or Dual Intel® Xeon® processors
- Supports up to 3 double width high-end GPU cards for breakthrough 'multi precision performance' (e.g. NVIDIA® TESLA® V100, NVIDIA® T-4 GPU); alternatively 1GB/ 10GB Ethernet cards (e.g. for connection of IP cameras for surveillance systems)
- Powerful power supplies from 800W up to 1200W (sufficient for the operation of 3 high-end graphics cards)
- Extended storage possibilities with up to eight 2.5" storage trays
- NVMe interface for connecting SSDs via PCIe
- Supports Intel® Rapid Storage Technology enterprise Option RAID 0/1/10/5
- Remote Management by AST2500 BMC module
- Low noise level
- Modular and flexible concept for easy customization
- Long-term availability (5+ years)
- Tool-free replacement of fans, filter mats, or hard disk drives in the removable tray
- Microsoft Azure certified, TSN functionality optionally

"For ensuring consistently high quality and cost optimization in 3D printing, Kontron's latest KISS server complements our data-intensive build simulation software by supporting our growing need for high-end computing and storage. The high performance KISS server with high-end GPU cards is well-suited to many systems designers and OEMs developing and deploying AI image processing or machine vision solutions."
Software Designer, Industrial 3D printing systems

For more information about Kontron's KISS rackmount server solutions please visit Kontron:
https://www.kontron.com/products/systems/rack-mount-systems

About Kontron – Member of the S&T Group

Kontron is a global leader in IoT/Embedded Computing Technology (ECT). As a part of technology group S&T, Kontron, together with its sister company S&T Technologies, offers a combined portfolio of secure hardware, middleware and services for Internet of Things (IoT) and Industry 4.0 applications. With its standard products and tailor-made solutions based on highly reliable state-of-the-art embedded technologies, Kontron provides secure and innovative applications for a variety of industries. As a result, customers benefit from accelerated time-to-market, reduced total cost of ownership, product longevity and the best fully integrated applications overall.

For more information, please visit: www.kontron.com

GLOBAL HEADQUARTERS

KONTRON S&T AG

Lise-Meitner-Str. 3-5
86156 Augsburg, Germany
Tel.: + 49 821 4086-0
Fax: + 49 821 4086-111
info@kontron.com

www.kontron.com