VISION
Guided Tour
2024

Electronics & Semiconductors
10 October 2024

VISION
MARKETS

Vision optimized FPGAs

Booth: Hall 8, A56

EFINIX

EFINIX
Harald Werner,
haraldw@efinixinc.com

Targeted end-user applications

Our FPGAs are optimized for vision camera application. Because of our new disruptive architecture, we have less than half of the Die size as comparable FPGAs in the same technology. This gives us the benefit of smaller packages, lower power consumption camera application we offer MIPI interfaces up to 2.5Gb per lane, LVDS interfaces up to 1.5Gbps, Hardwired Quad RISC-V (1GHz) and high-speed serial interfaces like PCI_E, 10GE, ...
 To store frames, we have integrated a LPDDR4/x Memory controller which can run above 3 Gbps

What you will see at our booth:

Low power, high speed Camera solution with high-speed interface (e.g. USB(FX10), Low power Vision AI solution based on RISC-V and acceleration with custom instruction and DMA.
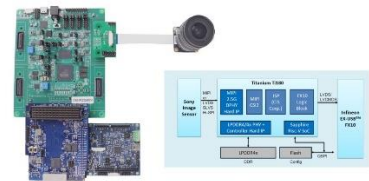
Technological benefits

Low power, small packages, high speed and vision optimized interfaces which results in a very efficient camera solution.

The Innovation

We introduced a new FPGA architecture (Quantum) where we can handle Logic and Routing at the same time. This approach gives us smaller die size, very low power consumption and small packages which efficiently fits into small camera application with high-speed interfaces, we offer as well SERDES for the different interfaces like SLVS-EC, 10GE, and others. The architecture is as well silicon agnostic which gives us a fast runtime thru the silicon fab and which the silicon manufacture prefers us this gave us the possibility as well over the last 3 years to offer our products with a lead time below 20 weeks.

Links:

Efinix, Inc. (efinixinc.com)

Topaz FPGAs | Efinix, Inc. (efinixinc.com)

Titanium FPGAs | Efinix, Inc. (efinixinc.com)

Trion FPGAs | Efinix, Inc. (efinixinc.com)

Development Kits | Efinix, Inc. (efinixinc.com)

Efinity Software | Efinix, Inc. (efinixinc.com) (Free of charge)

Auto DL Vision Inspection:
Precision detection of micro surface defects

Booth: Hall 8, B11

Targeted end-user applications

We provide **deep learning-based vision inspection solutions** to enhance the quality of **electronics, semiconductors, and batteries**. Examples of our inspection cases include:

- **Electronics**: LED panel inspection, detecting bubbles on PCB boards
- **Semiconductors**: Wafer notch detection, surface defect inspection, IC lead inspection
- **Batteries**: Surface inspection of pouch-type batteries, CT/X-RAY battery inspection

NEUROCLE
Neurocle
Eunseo Kim, info@neuro-cle.com

What you will see at our booth:
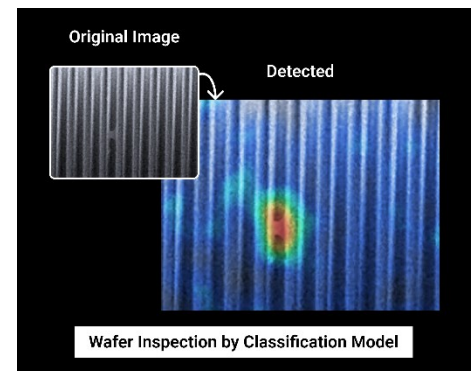
We will **showcase two inspection demos**:

- A **classification model** demo to sort good and defective IC chips.
- A **segmentation model** demo to detect fine scratches or stabs on the surface of pouch-type batteries.

These demos replicate real production line vision inspection systems, where a camera captures real-time images of objects, and the deep learning model analyzes these images to deliver fast and accurate inspection results.

Original Image · Detected · Wafer Inspection by Classification Model

Technological benefits

The key challenges in quality inspection for the electronics and semiconductor industries are detecting very small, irregular defects that are hard to define with specific criteria.

Neurocle solves these problems by:

- **Patch Classification model**: Captures even the tiniest defects during model training.
- **Auto Deep Learning Algorithm**: Ensures high accuracy in identifying irregular defects.

.Neurocle also partners with companies like Applied Materials and Amkor Technology for semiconductor surface inspections, leveraging its deep learning models and industry expertise to lead in semiconductor inspection.

The Innovation

Neurocle's **Patch Classification model** ensures even the smallest defects are detected without being missed. Unlike typical deep learning models that resize images and risk losing defect areas, Neurocle divides high-resolution images into small patches for training, preserving all defect details. Additionally, Neurocle uses an **Auto Deep Learning Algorithm** to automatically generate high-performance models by optimizing architectures and hyperparameters. This results in highly accurate models, even for irregular defects, allowing the system to detect and learn features with flexible judgment, similar to human vision.

Links:

https://www.neuro-cle.com/en

Electronics & Semiconductor Production: High-Speed Inspection Challenges

Booth: Hall8, B30

HIKROBOT

Hikrobot EU Headquarter
Gavan Wang,
wangyanlin13@hikrobotics.com
www.hikrobotics.com/en

Targeted end-user applications

Flawless, Fast Quality Control: Production lines fly, but perfect quality is essential. Vision inspection system needs to capture images of fast-moving objects such as reflective PCBs, uneven solder pads, and delicate wafers.
 Seamless Integration: Adding new inspection shouldn't disrupt existing lines. Space is tight, so new systems need a smooth fit.
 Tracking Miniaturized Parts: Shrinking components demand perfect traceability. Ultra-small code reading and wafer OCR are difficult.
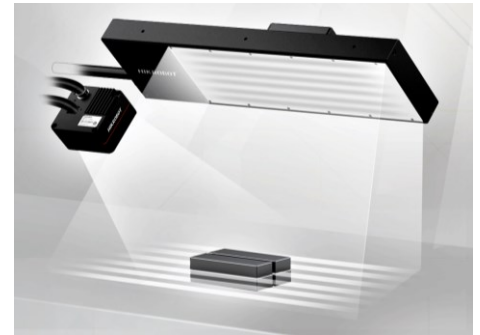
What you will see at our booth:

Demo1: 21MP XoF Area Scan Camera captures images of a high-speed spinning LED fan. Due to the phenomenon of *persistence of vision*, the human eye will see the text displayed on the fan blades. A frame-by-frame slow-motion playback of the fan through the camera reveals a row of light-emitting diodes (LED) on the fan.
 Demo2: 2.5D Vision System realizes defect inspection on lithium battery/aluminum sheet surface
 Demo3: ID5000XM Series Smart Code Reader recognizes DPM codes on metal surface.

Technological benefits

The 21MP Area Scan Camera adopts XoFLink data protocol with a high bandwidth of up to 100Gbps and supports a high frame rate of up to 540 fps at a full 21MP resolution. In industrial applications where require image processing with fast exposure, such as "fly-shooting" inspections, this camera opens doors to a whole new world of possibilities.
 The 2.5D Vision System uses a high-speed programmable stripe pattern light source, which can capture a wealth of defect information in a single pass. It accurately detects small scratches, shallow bumps, foreign matter, dirt and other defects on the surface of highly reflective/transparent work pieces, such as metal, glass and thin films, etc.
 The compact ID5000XM Series Smart Code Reader features a flexible mount and an OLED display for on-device debugging. Built-in sensors ensure perfect positioning for batch installations, saving you time. Plus, choose from various lighting options for any barcode type.

The Innovation

The XoFLink data interface is a brand-new data interface developed by Hikrobot. X stands for any high-speed interface protocol while Fiber indicates that the interfaces use optical fiber as the transmission medium. The XoFLink maximizes bandwidth and supports flexible typology, offering customers a fluid user experience for high-speed applications.
 The 2.5D Vision System consists of high-speed programmable stripe light sources and controller, line scan camera, frame grabber, client software, etc. It uses photometric stereo/image deflection principles, combined with advanced algorithms, to unearth tiny defects lurking on reflective metals, clear glass, or films. The 2.5D vision system can automatically adjust its light patterns to ensure optimal inspection. Furthermore, it offers two powerful modes: reflection for highly reflective objects and transmission for complete transparency. It supports various line scan camera resolutions and is a perfect fit for a wide range of industries.

Links:

https://www.hikrobotics.com/en/machinevision/

Challenging AI application in consumer electronics and semiconductors

Booth: Hall 8, B50

Aqrose

Yongsheng Wang,
yongsheng.wang@aqrose.com

Targeted end-user applications
AI Review System:
The ARS (AI Review System) is designed for factories equipped with existing rule-based vision systems and equipment. Typically, rule-based inspection systems have a relatively high overkill rate and struggle to classify defect types accurately. ARS enhances these systems by utilizing images from existing equipment to expand the inspection range, reduce overkill rates, and enable precise defect classification. The ARS integrates AI add-on features without disrupting the current production lines. There are numerous successful cases in the PCB, semiconductor, and consumer electronics industries.

What you will see at our booth:
We will be presenting how our ARS system integrates with existing systems. The presentation will be divided into three parts:

1. What does the ARS system do?
2. How does this system work with existing rule-base systems?
3. Successful case studies, including industry microscopes, PCB AOI/AVI, and Keyence CVX & XGX.

Technological benefits
- **AI Inspection Upgrade:** ARS enhances existing systems with AI inspection, expanding detection range, reducing overkill, and enabling accurate defect classification.
- **Cost-Effective:** By using existing images, ARS requires only an AI box/IPC with integrated software, offering a more affordable alternative to new AI inspection equipment.
- **Fast and Stable Deployment:** ARS integrates with minimal changes, allowing the existing system to operate normally during the rollout for quick and stable deployment.

The Innovation
The ARS system leverages image data from existing AOI and measurement equipment to deliver superior AI-based inspection. It enhances defect detection, especially for low-contrast issues, reduces overkill, and ensures precise defect classification. Key innovations include:

- **In-process quality control**: ARS detects defects in real-time, improving decision-making during production.
- **Overkill reduction**: ARS minimizes false positives, boosting productivity and reducing costs.
- **Accurate defect classification**: ARS enables defect classification, making defect tracking, detailed defects settings, and manufacture process improvement possible.

Links: www.aqrose.com/en/

Inspection of circuit boards using AI

Booth: Hall 8, C33

Targeted end-user applications

The intended end-user application involves the inspection of circuit boards using AI combined with rule-based image processing.

Using AI, the desired state of the circuit boards can be easily learned, and missing components are then detected by the AI camera Vision Cam AI.go. Additionally, for further traceability, the serial number in the form of a Data Matrix Code is read using rule-based image processing.

IMAGO Technologies
Anne Krug, anne.krug@imago-technologies.com

What you will see at our booth:

The live demo showcases circuit boards on a turntable to demonstrate speed. This demo is particularly relevant to the industry as it illustrates how such tasks can be easily implemented without extensive vision knowledge.

Technological benefits

The Vision Cam AI.go allows practitioners an easy entry into Deep Learning. Designed in the form factor of a standard camera, this smart image processing system is primarily developed for end users with little or no programming experience. The camera excels in inspecting and sorting test objects with high variability. Without any programming effort and supported by an intuitive web GUI, users can teach the inference camera their specific distinctions by simply uploading images for each class. The Vision Cam AI.go then autonomously learns the new images. Within minutes, the system is ready as a fully functional inspection system. The smart camera connects to the external world via digital interfaces. Additionally, users have full control over their image data. The learning process and image storage take place directly in the camera and can be deleted there if needed.
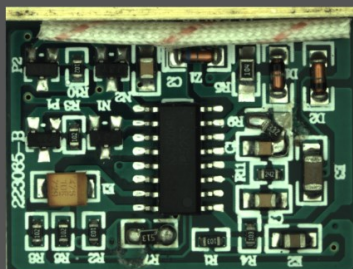

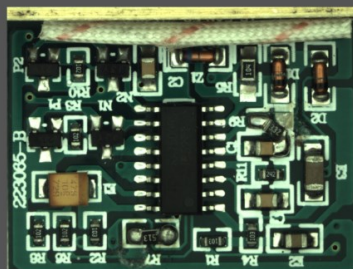Use of AI in electronics manufacturing

Fig. 1: Defect-free circuit board

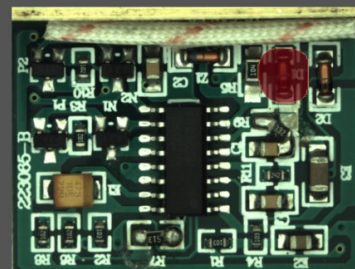Fig. 2: Circuit board with defective diode

Fig. 3: Anomaly detection marks error

The Innovation

With the entry-level camera Vision Cam AI.go, IMAGO Technologies removes the barriers to using AI, allowing even companies without expertise in Deep Learning to benefit from the latest technological advancements.

What makes the AI industrial Cam AI.go unique is its integration of classification, anomaly detection, and freely programmable HALCON scripts, all executable directly on the smart camera. Moreover, this technology can be extended to other IMAGO products for serial applications. The specific solution depends heavily on customer requirements, including camera resolution and computing performance.

Links:

https://imago-technologies.com/ai-camera/
https://www.youtube.com/watch?v=bpHyV33G8Gw&t=3s

Inline 2D and 3D imaging from Macro to Micro

Booth: Hall 8, C50

Targeted end-user applications

The AIT Austrian Institute of Technology (AIT) presents its latest high-performance technologies for non-contact 2D and 3D quality inspection of electronics and electronic components such as PCBs, BGAs, bonding elements, printed electronics and many more. AIT's smart cameras and intelligent algorithms deliver accurate and robust results in real time, regardless of the material surface and environment.

AUSTRIAN INSTITUTE OF TECHNOLOGY

Iman Kulitz, iman.kulitz@ait.ac.at

What you will see at our booth:

We will present live how our **ici:microscopy** works as the high-performance inline 3D microscope provides simultaneous 2D and 3D data at sampling rates of 700nm for e.g. BGAs, wire bonds, etc. It is based on **ici:inspect,** AIT's Inline Computational Imaging technology, which is a smart single sensor technology for simultaneous 2D and 3D imaging of moving objects. It provides precise 3D reconstruction together with pixel rectified, computationally optimized 2D images, even for objects with challenging surface properties such as PCBs, BGAs, WireBonds, etc.

ICI:MICROSCOPY
Simultaneous 2D & 3D Inline Microscopy

Technological benefits

As Austria's largest institution for applied research, we develop new technologies for the automation of optical quality inspection and process control. We aspire to develop the fastest machine vision solutions that inspect better than the human eye and make things visible that are out of reach.
Our systems are suitable for quality and process control in areas with high throughput rates. Thanks to their fast scanning process, low cycle times can be maintained despite the high optical resolution.

Our partners benefit from collaboration as our vision-based solutions and technologies
- improve the quality of products, making them safe and reliable,
- increase the automation of production facilities and relieve people from strenuous, monotonous tasks,
- avoid faulty production and rejects in industrial processes, thereby reducing the consumption of resources such as energy and materials,
- contribute to the twin transition towards a circular economy based on digitalization.

The Innovation

Our systems are suitable for a broad range of applications. Object structures and surfaces can range from macroscopic to microscopic scales. Our developments are characterized by high inspection speed and resolution. They
- detect complex failure classes on a large variety of surface materials with a combined 2D/3D scanning system with 40 million aligned colour and 3D points
- combine the methods of light field and photometry by using the natural transport motion of the object for simultaneous acquisition under different viewing and illumination directions
- reliable 3D inspect complex geometries and challenging surface features.

In Addition, they dependably provide precise detection results in real time even in challenging environments and they are easy to install and maintain.

Links:

Website: https://www.ait.ac.at/en/research-topics/high-performance-vision-systems/inline-computational-imaging. Youtube: https://youtu.be/BIgd1MZjlzc?feature=shared

Machine vision guarantees high quality in semiconductor manufacturing

Booth: Hall 8, C56

Targeted end-user applications

Our machine vision software targets various end-user applications in semiconductor manufacturing. It supports critical tasks such as precise alignment, defect detection, and accurate measurement throughout the production process.

MVTec Software GmbH
Markus Setzer, events@mvtec.com

What you will see at our booth:

The live demo shown at our booth will demonstrate how machine vision can be used for the optical inspection and detection of complex defects on a 12-inch wafer at very high speeds.
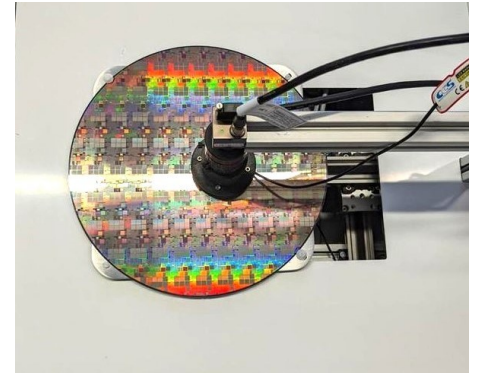
Technological benefits

Machine vision and AI technologies are key enablers in advanced semiconductor manufacturing processes, to improve precision and efficiency while reducing scrap. Applications range from automated quality inspection to alignment, positioning and reading. MVTec is a leading, hardware-independent machine vision software manufacturer and its software is widely deployed by semiconductor equipment manufacturers globally. Throughout the production process, from front-end to back-end, MVTec offers a broad range of technologies and solutions.

The Innovation

Our machine vision software helps semiconductor manufacturers and machine builders reduce costs, avoid rejects and drive new manufacturing technologies and production scenarios. The tool of choice is MVTec HALCON, the comprehensive standard software for industrial image processing with an integrated development environment (HDevelop). In addition to state-of-the-art image processing technologies, such as a comprehensive set of methods for 3D vision and deep learning, the software offers exceptional performance and GPU acceleration. In the area of deep learning, HALCON offers a wide range of operators, functions and methods that are either based on deep learning technologies or enable customers to use deep learning in their own applications. Another major practical advantage is HALCON's library of more than 2,100 operators for a wide variety of tasks: this makes it the most comprehensive image processing library on the market.

Links:

https://www.mvtec.com/application-areas/semiconductors

High-performance for wafer, PCB and LED inspection

Booth: Hall 8, C60

Targeted end-user applications

IDS offers a broad range of 2D and 3D cameras, intelligent cameras with AI-based integrated image processing and image analysis software for among others inspection of wafers, PCBs, and LEDs. As PCBs become more complex with smaller components, the inspection process becomes increasingly important to their longevity.

What you will see at our booth:

- Excels in quality control: Detecting particles in the clean area of a wafer with an Event-based Sensor.
- Check for the smallest of errors: PCB / electronical part inspection with a 10Gbps GigE camera with 45 MP sensor
- Reduce errors in the mring process: AI vision system guides worker step-by-step.

IDS Imaging Development Systems
Sophie Pfalzgraf,
s.pfalzgraf@ids-imaging.de
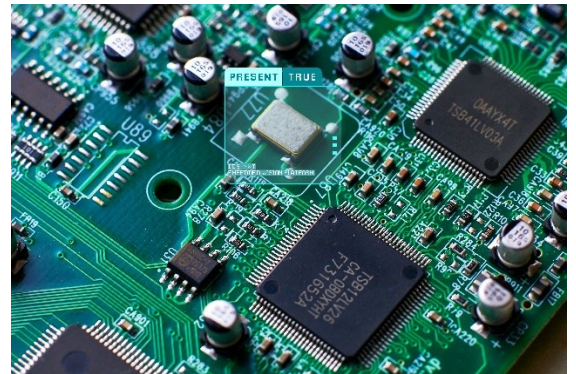
Technological benefits

Whether for 2D, 3D or AI-based tasks, cameras from IDS open up a seemingly endless range of applications. The combination of quality „Made in Germany", long-term availability and exceptional ease of use makes the products unique. Offering a high degree of variety of sensors, interfaces and housing variants. IDS is providing a convenient one-stop-shop experience, offering all accessories like lenses, cables, interface cardeing able to fulfil even highly specialised requests, thanks to more than 25 years of experience in (customized) hard- and software development.

The Innovation

- Huge camera portfolio with USB and GigE interface up to 10 Gpbs and 45 MP; high-speed and/or high resolution imaging with standard interfaces: available everywhere, easy-to-use, cost-effective.
- Cost-free, state-of-the-art Software Development Kit; frequent cost-free firm-/software updates for camera feature extensions, offering unique software features. e.g. line scan mode for area scan cameras
- Increase throughput thanks to ultra-fast, high resolution cameras.
- DENKnet AI software: Use vision technologies to achieve most reliable performance. Needs as little as 15 training images. Excels in anomaly detection e.g. for tasks in quality control.
- 2D camera with Event-based Sensor Sony IMX636 Event-ensor (EVS) e.g. ideal to control dispensing uniformity and coverage

Links:

https://en.ids-imaging.com/vision-2024.html

Nodka Robot Control System - Based on OpenVINO

Booth: Hall 8, D15

Nodka Automation Technology
Dung Tran Nguyen d.tran@nodka.com

Targeted end-user applications

Machine Vision, Food and Pharmaceutical, Industrial Automation, healthcare, Smart Transportation, Hospitality, Retail and Building Automation

What you will see at our booth:

Industrial Robot Control System Solution NP-6122/6132 Integrated supercapacitor UPS/DIO/CAN Bus in one unit

- By using COMLAC modular design, the scalable computing power extends product life cycle
- Integrate with high-speed isolate interface to lower cost
- Equipped with Nodka super capacitor UPS module to prevent hardware damage and data loss caused by power failure
- Supports variouis real-time operation systems with microsecond jitter.

Technological benefits

1. Support for AI Inference with Heterogeneous Computing Power.
2. Core Computing Boards Based on Modular Design
   Facilitate the replacement of core computing boards with different computing powers.
3. Stability and Various I/O Interface options, ensuring the communication of Robot controllers.
4. Compact Size and Efficient Heat Dissipation

The Innovation

Key Features for Nodka NP-6122/6132 Robot Controllers:
1. Modular Design with Replaceable CPUs. Supports 6th - 11th Gen Intel® Core™ i7/i5/i3, Pentium®, Celeron® LGA1151 CPUs
2. High Stability Performance
   EMC anti-interference design exceeds industrial grade three standards, significantly reducing intermittent faults caused by various complex electrical interferences.
3. Flexible Expandability and Modular Design
   MiniPCIe can expand CAN, Wi-Fi, 4G, etc, enhancing product functionality and application.
4. Easy for Industry and Customization
   Various Interfaces options, include USB2.0/3.0, RS232/RSMI, and Intel Gigabit Ethernet cards. These interfaces enable the easy connection to various external devices and sensors.
5. Compact and Robust Design
6. Original Complete Machine Delivery Ensuring Consistency and Quality

Links: https://nodka.com/vision-2024/
https://nodka.com/robotic-machine-vision/

Vision Systems for Battery Production

Booth: Hall 8, D50

Targeted end-user applications

Basler dives into the future of battery cell production. With the growing demand for high-performance and sustainable batteries, innovation in this field is moving at a rapid pace - and that's where we come in.

- Application: Coating Process
- The application requires a uniform, void- and particle-free surface, as well as high inspection speed and yield, which necessitates specific frame rates and resolutions.
- ➔ The high frame rates and resolution of machine vision cameras present a challenge in managing the high bandwidth of image data.

Thomas Karow,
Thomas.Karow@baslerweb.com

What you will see at our booth:

Live demo of a battery production line with foil coating combining Basler hardware and software components.

- Designed for detecting and classifying film defects
- Foil coating scanned by a Basler racer 2 L line scan camera
- Data output: 1.8 GB per second fed into a Basler ImaFlex CXP-12 frame grabber (4 Channel CXP-12), Pre-processing performed using Visual Applets (Visual programming of FPGA) to inspect data and identify potential defects
- AI framework pylon AI vTools classifies defects into five classes
- ➔ Only relevant defect candidates are inspected by pylon AI vTools, resulting in a much smaller amount of data.

Technological benefits of our vision solution

- Switching pre-processing tasks from CPU to the FPGA on the frame grabber
- Vision system engineers can program the FPGA themselves
- pylon AI enables industrial vision system developers to:
  - Collect data & train a model
  - Benchmark it for different hardware platforms and deploy it directly in pylon at the edge
- ➔ Unique solution covering the entire deep learning cycle from data acquisition to production-ready AI deployment.

The Innovation

- Basler Vision Solution offering with new racer 2 L line scan camera; 8k resolution at 200 kHz
- Image pre-processing on the frame grabber
- Reduced amount of data processed ➔ only defect ROIs require further analysis

Get ready for an exciting look into a part of the production process of a battery cell. Offloading resource-intensive image pre-processing to the frame grabber's FPGA frees up computational resources and speeds up image processing for AI-based classification.

Links:

https://www.baslerweb.com/en/
https://www.baslerweb.com/en/industry-applications/electronics/battery-cell-manufacturing/

Theia's motorized lens offers 300lp/mm resolution & switchable NIR filters

Booth: Hall 10, A47

Andrea Van Landingham,
avanlandingham@theiatech.com

Targeted end-user applications:

Theia's TL410 lens allows electronics and semiconductor manufacturers to remotely zoom and focus the lens while covering a wide angle of view from close distances. The TL410 offers 300 lp/mm 12 megapixel resolution suitable for high detail inspection environments in Visible and NIR with variable object recognition requirements as for remote operation and guidance of pick and place automation equipment and robotics tasks.

What you will see at our booth:

Theia will showcase their TL410 lens demonstrating the motorized zoom and focus capabilities as it relates to imaging a production line inspection environment with variable object size requirements. The demonstration will also showcase the lens' 300 lp/mm resolution performance by imaging motor control boards in high detail, as well as switching filters for different NIR wavelengths.

Technological benefits:

Theia's versatile TL410 motorized zoom and focus lens has a 4-10mm varifocal range replacing up to 4 prime lenses, allowing precise adjustment of the HFOV from 44 - 112 degrees on a 1/1.7" sensor. The flexible lens offers a working distance of 10cm to infinity to image products with variable sizes & heights or from different distances that would be on an inspection line or in a pick and place environment.

Made for a 1.55μ size pixel, the lens provides 300 lp/mm resolution in visible and NIR light suitable for imaging high detail components. With NIR correction from 435 – 940nm it enables excellent image quality in multi-spectral applications. At F/1.4 the lens provides superior light gathering ability in challenging light conditions.

Its motorized zoom, focus, and iris enable remote operation to minimize manual intervention and costly line downtime. The Precise iris (P-iris) version uses a stepper motor to select the F/# and optimize the depth of field and image quality.

The Innovation:

The motorized TL410 comes with optional integrated Near IR cut, bandpass or long pass filters in a variety of wavelengths for muti-spectral applications not available with other comparable performance motorized lenses. Currently available are models in 850 and 940nm; other wavelengths are also possible.

The lenses are compact and lightweight at only 52mm from the mounting plane (<64mm TTL) to fit into tight envelopes. While the lens weighs only 78 grams, it can withstand shock up to 50G in each of the ±Z axes as well as vibration up to 200Hz at 10G.

Theia also offers a separate motor control board accessory with software application, user interface and USB connection to easily integrate into the imaging system and control the lens. In addition to USB, i2C and UART communication protocols are also available. The modular lens & board system allow flexible configuration inside the hardware envelope.
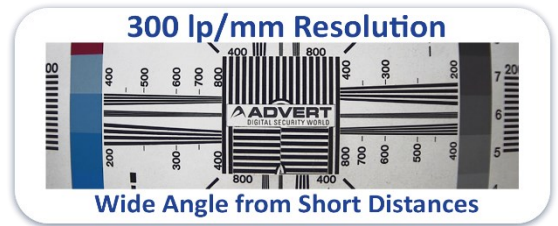
Links:

www.theiatech.com/tl410

Photometric Stereo Line Scan Solution

Booth: Hall 10, B38

Targeted end-user applications

Our Photometric Stereo line scan solution is aimed at both system integrators and end users who need to seamlessly inspect large areas of challenging surfaces. The current demand is mainly for electromobility applications such as lithium-ion batteries (...) and fuel cells. Due to increasing 3D integration and substrate size, we also see many applications in electronics manufacturing and the semiconductor industry.

MST Vision

info@mstvision.de
www.mstvision.de

What you will see at our booth:

We present our new modular, pre-configured and fully integrated Photometric Stereo Line Scan Solution, which enables the acquisition of one or more line scan cameras and the calculation of photometric stereo images in the FPGA.

In order to take full advantage of our proven and high-speed FPGA processing, we have developed an oblique beam illumination, that is significantly brighter than comparable products. We are now presenting this Photometric Stereo line light for the first time.
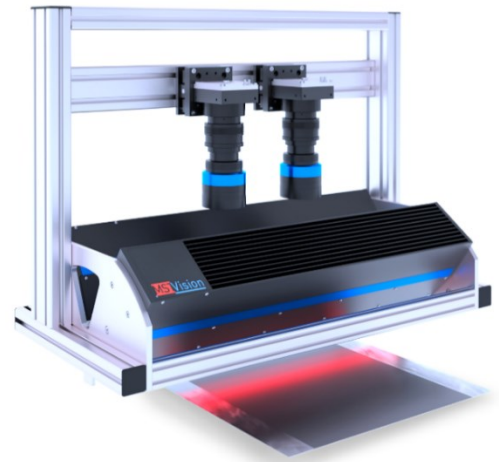
Technological benefits

- <u>High speed</u>: Enabled by the high illumination intensity and fast trigger frequencies of the illumination combined with the high data rates of the FPGA image processing
- <u>Easy integration</u>: Low space requirement due to the compact design of the Photometric Stereo line light
- <u>Standard interface</u>: All settings available through GenICam interface
- <u>Flexible</u>: Can be combined with other illumination approaches such as backlight, darkfield, reflection and multispectral imaging

The Innovation

Our solution offers a unique combination of performance (3.6 GB/s raw data), scalability, flexibility, and total cost of ownership.

In addition, we will also demonstrate our new alternative approach of performing the photometric stereo calculation with GPUs. While the throughput is lower, compared to the FPGA approach, it provides the additional capability to compute the height map and has the side effect of being less dependent on the FPGA frame grabber hardware.

Links:

www.mstvision.de/mst-psl

PCB inspection with Liquid Focus Lenses and Line Scan Lenses

Booth: Hall 10, C26

Targeted end-user applications
PCB and further Inspection with both, high-resolution Line-Scan Lenses and Liquid Focus Lenses.

Schneider-Kreuznach
Magnus Greger
Lead Business Unit Industry
gregerm@schneiderkreuznach.com

What you will see at our booth:
Our Liquid Lenses demo gives visitors the chance to discover the possibilities of the lenses first-hand at the Schneider-Kreuznach booth. It is especially shown how fast and precise the focus switches between different objects.

Technological benefits
The use of Liquid Focus Lenses is a new technology in the inspection process of printed circuit boards (PCBs). Liquid lenses offer significant advantages in PCB inspection. They allow instant focus adjustments in milliseconds, dramatically incection speed. Their versatility allows for easy adaptation to different PCB components, ensuring optimal clarity and quality. In addition, their durable and reliable design with no moving parts provides long life and minimal maintenance. This solution improves efficiency and quality, resulting in significant long-term savings. In addition, liquid lenses can be easily integrated into existing inspection systems, ensuring a smooth transition and improved inspection processes. We will also be showing our renowned high-magnification, high-resolution line scan lenses, which are currently the state of the art for inspection applications.

The Innovation
The use of Liquid Focus Lenses is an alternative technology in the inspection process of printed circuit boards (PCBs). We are one of few suppliers for high-end Liquid Focus Lenses. Our demo illustrates the use of those lenses. We also have and experience with Line-Scan lenses for inspection applications.

Links:
www.schneiderkreuznach.com

NEST Modular Robotic Workstations with AI-Integrated Vision Systems

Booth: Hall 10, D10

Targeted end-user applications

NEST Modular Robotic Workstations with AI-Integrated Vision Systems represent a breakthrough solution in the electronics industry. They enable not only increased precision and reliability of production processes but also the flexibility needed to quickly respond to changing market demands. With advanced technologies such as AI neural networks and patent pending vision system, our robotic workstations can meet the highest quality standards while minimizing costs and downtime.

AiRob Vision Systems
Cezary Zamorski-Wojdyla,
cezary.zamorski-wojdyla@airob.com

What you will see at our booth:

At our booth, we will demo the NEST modular robotic workstation in a production-like environment. This demo features AI-integrated vision systems for the electronics industry, showcasing real-time adaptive position tracking, precise object picking, and efficient tray stack management. The NEST workstation ensures precision, flexibility, and scalability in production, addressing complex production processes and stringent quality standards in the electronics sector.

Technological benefits

All NEST stations are interconnected in an intelligent ecosystem, enabling real-time exchange of algorithms, programs & procedures, product specifications and categories, visual metrics, and software updates.

Each new NEST robot added to the ecosystem can immediately absorb the necessary knowledge required for efficient operation on the production floor. AI neural networks trained on one station can be shared with others via knowledge repository, creating a sort of "AiRob University". Installing a new NEST station or reprogramming it for a different product takes only a few minutes thanks to data download capabilities from the cloud or factory server.

In a new location, the robot initiates a procedure to locate itself in space using cameras mounted on the gripper relearns the layout, checking that all modules are in the correct places and establishing the entire 3D workspace, enabling continued operation. This advanced integration significantly reduces setup times and operational costs.

The Innovation

Modular robotic workstation NEST, is innovative due to its advanced vision systems integrated with AI, specifically designed for the electronics industry. Its uniqueness lies in the modularity of interchangeable: robot, transport and other modules which allow for rapid reconfiguration flexible production lines and adaptation to changing market conditions. The AI-driven vision systems enable precise object picking and placing through dual camera configurations on the robot gripper. These systems employ adaptive position tracking and high-speed image processing, ensuring accuracy and efficiency. Innovative tray stack management, supported by AI, efficiently handles product positioning, even on misaligned stacks. The 3D space mapping via wide-angle camera ensures precise spatial orientation, enhancing flexibility and scalability. This combination of AI and vision systems addresses the electronics sector's challenges, ensuring high quality and optimizing complex production processes.

Links: https://youtu.be/nye98ornOo8?si=h1u7qANxEIb-nrwF

Euresys - Very fast High resolution image acquisition

Booth: Hall 10, D24

Targeted end-user applications
PCB or electronic components inspection in the production line

Euresys,
Sandrine Deleersnijder,
sandrine.deleersnijder@euresys.com

What you will see at our booth:
High-speed and high-resolution image acquisition based on the latest Euresys CoaXPress 4 links CXP-12 frame grabber.

The Coaxlink Quad CXP-12 frame grabber acquires high resolution images of fast moving electronic components.

Technological benefits
The CoaXPress technology guarantees the fastest delivery of high-resolution images into the pc memory to start the image processing as soon as possible.

The CoaXPress CXP-12 standard and its scalability give the possibility to deal with a camera bandwidth of 5 GB/s which means very high image acquisition and transfer capabilities which is critical for semiconductor applications.

The Innovation
The Euresys Coaxlink Quad CXP-12 frame grabbers support the fastest and highest resolution cameras available in the Machine Vision market.

The Euresys CoaXPress frame grabbers users benefit from the unique event logging tool Memento. Memento records events related to the camera, the frame grabber and its, as well as the host application to help users with applications debugging and profiling.

Links:
https://www.euresys.com/en/Products/Frame-Grabbers/Coaxlink-series/Coaxlink-Quad-CXP-12-(1)
https://www.euresys.com/en/Products/Machine-Vision-Software/Open-eVision-Libraries/EasyGauge

Machine Vision at its best with onsemi

Booth: Hall10, G30

Targeted end-user applications

The onsemi CMOS Image sensor portfolio targets a wide variety to applications, ranging from barcode scanners up to Flat Panel Display inspection with each sensor optimised for its specific market segment. Furthermore, low power options, high dynamic range modes, various resolutions and pixel sizes enable challenging applications such as ITS, PCB/Semiconductor and even food inspection.

onsemi

Danny Scheffer
Product Line Director
Industrial and Commercial Sensing
Division
Danny.scheffer@onsemi.com

What you will see at our booth:

At the onsemi booth we will show 6 live demonstrations of devices aimed at the Machine Vision market segment, including a number of high quality rolling and global shutter sensors, and our latest technologies supporting depth sensing, SWIR and very high resolution devices. All demos are targeted for a specific application and will demonstrate clearly the added value of that specific product for that specific application.

Technological benefits

The onsemi product portfolio is the broadest portfolio offered by anone for the Machine Vision market, and regardless of the complexity of your application, most likely a sensor meeting those challenging requirements is available from this. Sensors offered include devices having small pixels (with a small optical format) combined with a low or high resolution, up to larger pixel devices while still featuring a high resolution. We combine the latest technologies in our most recent products, including BSI, stacking and the latest design techniques to further optimise the performance. Special low power modes (such as Wake on Motion), Smart Regions of Interest read out and high accuray depth sensiing techniques complete the technology advantages of the onsemi image sensor portfolio.

The Innovation

The variety of sensors offered featuring various shutter types, pixel sizes and resolutions, and the family approach having full pin compatibility within a specific family, demonstrate the innovative aspect of the onsemi sensor offerings. It is the versatility and ease of use which makes the onsemi image sensors stand out and unique to the Machine Vision market segment.

Links:

Machine Vision (onsemi.com)
https://www.onsemi.com/solutions/industrial/industrial-automation/machine-vision

Accurate Measurement and Reliable Inspection for Electronics & Semiconductor

Booth: Hall 10, E20

Targeted end-user applications

SmartRay offers 3D sensors for exact measurements and reliable inspection in the manufacturing of electronics and semiconductors. Based on the principle of laser triangulation we already solve a wide range of applications in consumer electronics like phone housing inspection, glass inspection for phones and watches, sealant inspection. In the semiconductor industry we are solving challenging inspection applications like wafer or BGA, as well as positioning & packaging on PCB's.

SmartRay
Isabel Maier,
isabel.maier@smartray.com

What you will see at our booth:

The ECCO X 025 Dual-Head will be scanning a BGA, shadow free scanning at extraordinary speeds of up to 40 kHz!

We will showcase scanning different injection needles showing a high-res image of the tip of the needle scanned by the new ECCO X 012. The highly reflective metal needles are comparable to wires in wire bonding applications.

A second application will show gap measurement with two ECCO X 100 sensors enabling shadow free scanning using multi sensor registration.

For absence/ presence, gap measurements, coplanarity inspection, surface detection see how ECCO sensors provide the best possible point cloud for reliable measurements and accurate, repeatable inspection in fast production lines.

Technological benefits

SmartRay offers 3D inspection with an extraordinary scan speed of up to 40 kHz, delivering 4096 points per 3D profile, enabling inspection with 3D laser triangulation sensor where they weren't a viable solution before challenging other types of inspection methods which are slower and/ or more expensive. The ECCO X sensor series is a true game changer in this segment.

The Innovation

All models mentioned above are new to the market. The ECCO X scan speed paired with high resolution in a compact housing provides a real Inline Metrology solution.

Links: For more information visit www.smartray.com

Vieworks_Electronics & Semiconductors

Booth: Hall 10, E30

Vieworks
Julie Rha, julierha@vieworks.com

Targeted end-user applications

An industry leader in high resolution and high speed cameras, Vieworks' cameras are ideal for electronics & semiconductors industries. We target wafer inspection, PCB inspection, SPI (solder paste inspection), AOI (automated optical inspection), and solar panel inspection.

Our cameras provide detailed imaging for defect detection and ensure high speed inspection to maintain high throghput. Our cameras enhance precision, ensure product quality, and increase production efficiency.

What you will see at our booth:

First, we have an exclusive demo featuring 288 megapixel camera. This camera boasts the highest resolution among existing global shutters, making it ideal for inspecting large-area displays.

We are also showcasing our TDI line scan camera with Gpixel 9k sensor. This camera achieves up to 543 kHz line rate. Offering good sensitivity not only in the visible spectrum but also in the UV range, the 9k camera is suitable for wafer inspection.

Technological benefits

Vieworks is renowned for its high speed and high resolution cameras, perfect for high-end applications. For area scan applications, we offer cameras with resolutions exceeding 100 megapixels. The 127M and 151M sensors put together with cutting-edge technology from Vieworks, we deliver high resolution cameras with exceptional performance. Our unique thermoelectric cooling technology ensures precise noise control, providing outstanding SNR and high dynamic range.

Vieworks' proprietary TDI technology combines the benefits of CCD and CMOS sensors. We offer TDI cameras using Vieworks' developed BSI sensors in 4k and 16k models, alongside the Gpixel 9k sensor models. BSI (back-side Illumination sensors), provide superior sensitivity compared to FSI (front-side illuminated) sensors. They perform exceptionally well in low-light conditions and are sensitive across both visible and UV.

The Innovation

Our cameras feature a variety of interfaces including GigE, USB, and CXP, as well as the latest CoaXPress-Over-Fiber (CoF) interface. Unlike other interfaces, CoF supports cable lengths up to 100 meters and delivers 40 Gbps bandwidth. With this technology, our 21 megapixel area scan camera achieves 460 fps, and our 9k TDI cameras achieves 543 kHz. Few manufacturers offer such advanced CoF technology in their lineup.

The exceptional 288 megapixel camera—exclusive to Vieworks—features the world's largest global shutter sensor, fully developed and in mass production. Additionally, with our pixel shifting technology, we can enlarge the resolution up to 1152 megapixels. Vieworks leads the machine vision technology field across all areas.
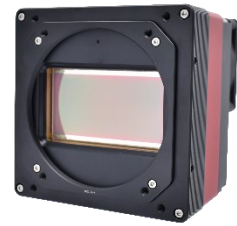
Links:

vision.vieworks.com

Integrated Hyperspectral Vision solutions for industrial inspection

Booth: Hall 10, E70.1

Targeted end-user applications

DIVE imaging systems empowers manufacturers with end-to-end Hyperspectral Vision solutions and services for the inspection of thin layers and surfaces. We ensure quality, functionality, and cost-efficiency in industrial processes. DIVE technology inspects 100% of surfaces - fast, comprehensively and non-destructively with in-house developed hard- and software. E.g., wafers, bipolar plates, and PCBs can be inspected for layer thickness, defects, surface cleanliness and homogeneity. Inspection insights are available within milliseconds.

DIVE imaging systems GmbH
Dr. Wulf Grählert,
wulf.graehlert@dive.eu

What you will see at our booth:

Visitors to the DIVE booth will be able to experience our technology at first hand. Using the VEpioneer system as an example, the easy handling and the fast, comprehensive and non-destructive measurement process will be demonstrated. With the help of the VEsolve software, all steps from data acquisition to data screening and data exploration can be carried out in a user-centered interface.

Technological benefits

DIVE's user-centric solutions are fast, non-destructive and comprehensive. Wafer-sized samples can be scanned within 20 seconds and predefined machine learning enables full data analysis within milliseconds.

The Innovation

Instead of random inspections for quality control purposes, the entire surface can be evaluated. Time-consuming and subjective manual visual inspections are replaced by a fast, objective and automatable inspection. Quality parameters that were previously not inspected due to a lack of suitable inspection technologies and resources are now easily accessible.

Links:

https://dive.eu
https://hyperspectral-vision.eu

TKH Vision: Cutting-edge vision solutions for Electronics & Semiconductors

Booth: Hall 10, F30

TKH Vision
Dr. Yvan Eilers
yvan.eilers@tkhvision.com

Targeted end-user applications

The manufacturing process chain from a bare wafer to a finished electronic product is complex and includes multiple production steps where automated optical inspection offers great value. We focus on demos for the following end-user applications:

- Die and Packaged IC Inspection
- 2D and 3D AOI of PCB boards
- Prismatic battery cells inspection,
- Electronic products, i.e. USB sticks
- Display Inspection

What you will see at our booth

- Die inspection using high resolution and high bandwidth SWIR camera technology
- Bare PCB board inspection with high resolution line scan cameras, suitable lenses and multi light geometries
- Prismatic Battery Cell Inspection, 3D laser triangulation and 3D confocal technology
- Anomaly detection in Electronic Products powered by AI
- Display Inspection using a newly released super high-resolution camera

Technological benefits

- Smart 2D & 3D laser triangulation and 3D confocal sensors with high-performance functionality for 100% quality control of parts and assemblies traveling at speed
- High-Resolution area and linescan cameras with optimized image quality and precise sensor alignment to reliably detect small defects or anomalies in large fields of views
- Temperature stabilized camera technology (TEC) for enhanced and reproducible image quality
- Increased throughput with high-bandwidth cameras
- Optimally coordinated machine vision components. Including frame grabbers allowing significant performance improvements and that ensure stable single or multi-camera operation
- Performant image analysis software including feature optimized 2D, 3D and deep learning functionality for performant, cost-effective image analysis
- Integrated Smart Vision System for vision-based decision-making and process control
- Real time image processing enabling high-performance neural networks and conventional algorithms to be used more efficiently

The Innovation

We address the challenges of rising inspection requirements in the semiconductor and electronics industry by offering a comprehensive and optimized range of innovative 2D and 3D vision components and solutions. Our extensive expertise across multiple imaging technologies, enables us to provide not only products, but also fully integrated and highly adaptable vision solutions that push the industry forward.

Links: *www.tkhvision.com*
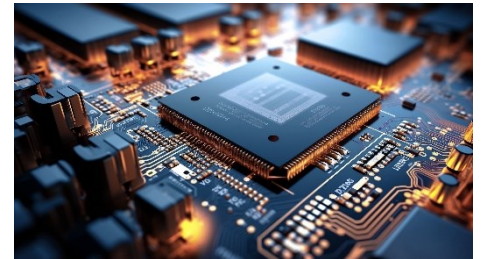
XCS Series: Xtreme Speed & Precision 3D Sensors for Electronics & Semicon

Booth: Hall 10, F54

Targeted end-user applications

Inspection of electronic components such as Ball Grid Arrays (BGA), Pin Grid Arrays (PGA), Land Grid Arrays (LGA), Inspection of Lead Frame and other semiconductors backend applications.
 3D Automated Optical Inspection (AOI) of PCBs
 Solder Paste Inspection (SPI)
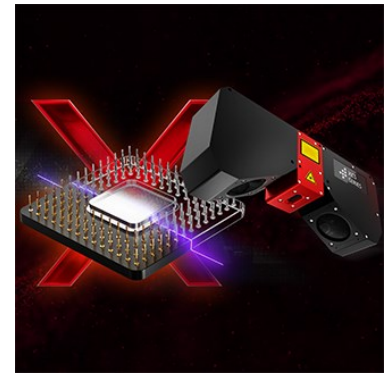 Inspection of solder pins
 Inspection of connector pins

AT Sensors
Nina Claaßen, nina.claassen@at-sensors.com

What you will see at our booth:

-World's fastest sensors for electronic components
-Live demo of high-speed and high-resolution pin inspection without occlusion

Technological benefits

-Unique 3D scan results without occlusion due to dual-head option and extremely high speed
-High precision and detection of the smallest surface details thanks to high-quality laser line projection
-Unrivaled precision for electronics inspection (BGA inspection) with a resolution of 0,42 μm
-Highest inspection speed of 140 kHz possible with the 3070 WARP sensor

The Innovation

Worldwide fastest speed for laser triangulation, high precision, high repeatability, occlusion-free scans

Links:

www.at-sensors.com

SOCIAL MEDIA
LinkedIn: https://www.linkedin.com/company/at-automation-technology/
Facebook: https://www.facebook.com/at.automationtechnology
Instagram: https://www.instagram.com/at_automation_technology/
YouTube: https://www.youtube.com/@AT-AutomationTechnology
XING: https://www.xing.com/pages/at-automationtechnologygmbh

China Machine Vision Pavilion

Booth: HALL 10, G72

Targeted end-user applications

China Machine Vision Pavilion consisted of the manufacturers of components, like camera, lens, Illumination, laser, machine vision system integrator, and software manufacture. We offer a variety of products used in electronics and semiconductors

China Machine Vision Industry Union
Una He, hm@china-image.cn

What you will see at our booth:

LUSTER 150 Million Pixel Area Scan Camera: High-Speed Solution for Screen, Semiconductor, and PCB Inspection.

Imalligent area-scanning Structured Light 3D camera.

LR-LINK network card from 1G to 200G, PCIe, OCP, frame grabber and FPGA cards.

CST industrial led lighting and lighting controllers.

8k-link's Active Optical Cable, and other optical cables

Technological benefits

Luster at booth 10G72.1, 150 MP Area Scan Camera: A High-Resolution, High-Speed Solution for Screen, Semiconductor, and PCB Inspection.

Imalligent at booth 10G72.2, offers area-scanning Structured Light 3D Camera, with scanning rate up to 11.6 frames/sec, repeatability accuracy up to 0.6μm in Z-axis direction.

LR-LINK at booth 10G72.5 deeply involves network cards from 1G to 200G, PCIe, OCP, frame grabbers, and FPGA cards.

CST at booth 10G72.4 offers a parallel series light source that adopts a glass lens, has a wide band compatibility range, a slightly divergent angle, and is suitable for high-precision inspection projects.

8k-link@booth 10G72.3 can provide a full range of technical support and solutions to help customers solve technical problems in practical machine vision applications

The Innovation

High-quality, upgraded machine vision products from China, including system solution, component manufacturers:

LUSTER Lightech Co., Ltd;   Imalligent Technology (Shanghai) Co.,Ltd.
Linkreal Co., Ltd. ;   Shenzhen 8k-link Optoehnology Co., Ltd ;
Dongguan CST Automation Technology Co., Ltd;

Links:

https://www.china-vision.org/product.html

Work Inspection Camera RICOH SC-20

Booth: Hall 10, H57

Daitron (Netherlands) B.V.
Janne van de Sande,
janne.s@daitron.nl

Targeted end-user applications

At the Vision Exhibition in Stuttgart, we introduce the work inspection camera RICOH SC-20. It is ideal for applications in automotive parts manufacturing and electronic equipment manufacturing, EMS (Electronics Manufacturing Service), medical device manufacturing, etc. The SC-20 offers high-resolution imaging and advanced features that enhance precision and efficiency.

What you will see at our booth

Experience live demos of the SC-20 in action, showcasing its real-time inspection, image recognition, and seamless integration with work instructions. No PC is required, and the camera, image recognition, and application are integrated to provide accurate detection and traceability in a variety of work environments.

Technological benefits

1. **Enhanced Accuracy:** High-resolution imaging for precise object detection and classification.
2. **Low Cost:** Affordable digital transformation without high installation expenses.
3. **Easy Installation:** Integrated camera, image recognition, and software with simple setup.
4. **High scalability:** AI screw check function has already been added. New functions will be added in the future.

The Innovation

The SC-20 features a 1/1.8-inch 4K (QFHD) progressive color CMOS sensor and a resolution of approximately 8 megapixels, enabling detailed detection of assembly errors and defects. Advanced image recognition automates inspection, reducing errors and boosting efficiency. The camera is versatile with interchangeable lenses and optical features like barcode scanning and optical character recognition (OCR) available. Its user-friendly design requires no PC, ensuring quick, space-saving deployment.

Links:

Linkedin: [Daitron (Netherlands) B.V. | LinkedIn](#)
Website: [Daitron Global](#)