

When Machines Learn to See – Electronic Image Processing with sercos



Image processing is a key technology, and a majority of systems and machines already come with image processing systems. Image processing makes production faster, more reliable, and more cost effective, and also increases product quality. Industry experts forecast strong further growth in this area. With its new pictor and vicosys image processing systems, the specialist Vision & Control now also provides powerful components that can be used with the sercos automation bus. They can be integrated quickly, easily, and cost-effectively in machines and systems.

For many machine and system designers, sercos is the first choice when it comes to meeting requirements such as high data transmission rates, short cycle times, interference resistance, and the synchronization of all ring participants with low jitter. The sercos automation bus also provides users and developers with a wide range of components, covering axes and axis systems, axis controllers, PLCs and drives, and even sensors and other peripherals.

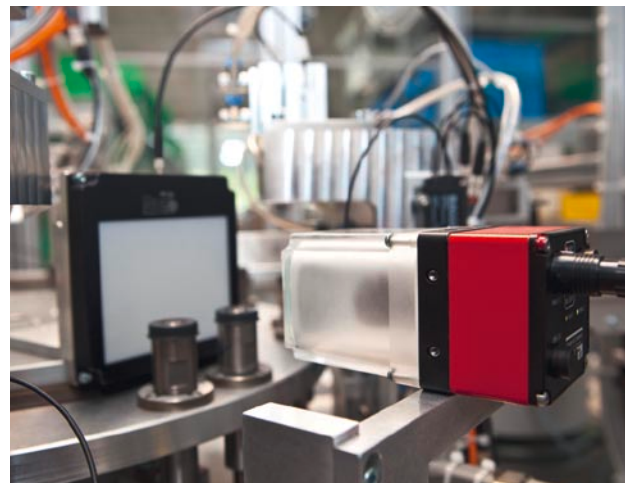
Perfect integration with sercos

Until recently, users had an almost unsolvable problem when it came to image processing. Image processing could only be integrated in systems using workarounds, and many of the advantages of the sercos bus system fell by the wayside. One of the main disadvantages was the substantial effort required for integration, which demanded extensive expertise. Other problem areas included a reduced transmission rate, a lack of real-time behavior, and no synchronization of participants, which resulted in jitter. These problems are now a thing of the past, thanks to the new image processing systems pictor and vicosys from Vision & Control. Using the on-board sercos interface, the image processing systems can be quickly integrated in the machine environment via sercos. This makes a real-time, jitter-free triggering of the image processing system possible. The image processing results are also sent to the master via the automation bus, ensuring a high processing speed and time synchronization.

Solutions for all applications

The image processing systems from Vision & Control come with numerous powerful functions that can be used in a wide variety of industries and applications:

- Object localization
- OCR reading
- Identification
- Color analysis/color classification
- Shape analysis/contour check
- Completeness check
- Counting
- Measurement technology
- Brightness analysis
- Surface analysis



Users have access to two different system classes. Intelligent pictor cameras support all common resolutions from VGA to 5 megapixels, in either black-and-white or color. The cameras have an additional digital I/O interface and come in a protective housing that is compliant with IP67. All of the image processing is done fully independently in the intelligent camera. vicosys multi-camera systems allow you to connect up to 8 cameras with different resolutions, in color or black-and-white, or as a line sensor. The evaluation unit is an embedded industrial PC. The systems also come with a digital I/O interface. Device concepts using individual combinations with optics and lighting from Vision & Control allow you to solve image processing tasks reliably and efficiently.

Flexible parameterization

The image processing systems are parameterized using a Windows GUI. Programs are usually created by the machine manufacturer. However, since parameterization is done via the UCC channel, the end user can also set parameters without influencing the production process. It is also possible to directly trigger a program change via the bus, ensuring fast product changes. As a result, operation is the same for the end user across the entire system. There is also an option to teach-in new product types using sercos.

Selected assembly and handling applications

- Palletizing and depalletizing
 - Traceability
- Track tracing
 - Adhesive bead check
 - Weld seam check
- Completeness check
 - Checking for the presence of production goods
 - Monitoring of assembly and processing steps
- Position check
 - Detection of position and rotation
 - Forwarding of position information directly to the machine or robot control

Selected packaging and filling applications

- Checking the packaging for size, shape, damage, orientation, contamination, foreign objects
- Checking the packaged goods for shape, size, breakage, position, orientation, color
- Fill-level check
- Completeness check
- Check of goods position in the packaging
- Closure check
- Check of labels and printing
- Palletizing
- Traceability

Selected solar and photovoltaic applications

Wafer technology

- Production of the silicon substrate
 - Monitoring of the growth process
- Wafer production
 - Check for contamination, saw grooves, scratches
- Cell production
 - Microcrack check
 - Edge break check
 - Check of the printing on the front and back
 - Color check
 - Finger inspection
- Module production
 - Position determination
 - Monitoring of the string process

Thin-film technology

- Front-end
 - Surface check
 - Track tracing
- Back-end
 - Contact check
 - Position determination



As a technology leader, Vision & Control develops, produces, and markets an optimally attuned modular system worldwide. It ranges from complex image processing systems, such as intelligent pictor cameras and vicosys multi-camera systems, to individual vicolux high-performance LED lighting and vicotar precision optics. Customers from Vision & Control can thus select the right components for their application and combine them individually in their image processing systems. This results in a perfect interplay of components and ensures their reliable performance. Innovative, pioneering products emerge with state-of-the-art technologies. High-performance algorithms and user-friendly operating concepts facilitate component integration, and users can perform initial startups quickly and independently. For highly demanding image processing tasks where standard components reach their limits, Vision & Control offers customized solutions for image recording and processing.

sercos news: *How does your company benefit from using sercos for its automation technology?*

Vision & Control: Our users are the primary beneficiaries. Previously, sercos did not allow them to directly integrate image processing in their systems, and workarounds were required. The further development of our V&C component system for industrial image processing, especially the intelligent camera series pictor and the vicosys multi-camera system, offers users a simple solution to combine the advantages of image processing with those of the sercos automation bus. Extensive integra-

tion activities, which also required considerable expertise, have now been minimized. The on-board sercos interface for our components makes it easy and enjoyable to integrate high-end image processing.

sercos news: *Why are you active in the user association, sercos international e.V.? What are your objectives?*

Vision & Control: As a technology leader, we not only want to be a voice for image processing in the world of automation, but also ensure that automation makes its way into image processing. What we need is a simple, elegant solution for both sides. Industrial image processing and automation technology need to be precisely enmeshed, like the wheels of a clock, and also function reliably. In addition to the numerous advantages, we are impressed by the professional network, as well as the will and dedication of its members to achieve these goals together. ■

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Vision & Control GmbH
Mittelbergstr. 16
98527 Suhl, Germany
Phone +49 3681 7974-0
Fax +49 3681 7974-44
www.vision-control.com