Reach your inspection goal faster with "Smart Line Scan" camera technology

Line scan sensors offer unique advantages over matrix sensors when it comes to the inspection of moving objects and continuous flow material. A continuous, uninterrupted image can be acquired much more efficiently and line scan sensors offer features such as high detection speeds, high resolution of objects, minimized disturbances to the image quality and simplified lighting options. In addition, the use of line scan sensors in smart cameras makes it possible to find new solutions for inspection applications. The advantages of line scan applications is discussed below in detail, taking into consideration the above mentioned factors, in order to help customers decide which "smart" image processing solution to choose.

Arguments in favor of line scan sensors

- **High resolutions can be achieved at a lower price** - Matrix sensors with a high resolution are considerably more expensive than line scan sensors that can achieve the same (and higher) resolutions. Reason: The vertical resolution of line scan sensors is unlimited and they can, for example, achieve a resolution of 16 megapixels in a line of 4,000 pixels with a total of 4,000 lines.
- **Speed** - Moving objects often require the global shutter method in order to prevent rolling shutter effects such as distortion. Line scan sensors are always read out with a global shutter.
- **Image quality** - As line scan sensors have only one light-sensitive scan line, this minimizes aberrations, inhomogeneous brightness distribution and vignetting effects.
- **Illumination** - A conveyor belt is to be homogeneously illuminated over a width of 1,000 mm. The use of a matrix camera requires an area of one square meter to be illuminated. In contrast, if a line scan sensor is used, only a line approximately 5 or 10 mm wide needs to be illuminated, and modern LED lights enable the shortest possible illumination times due to their intensity.
- **Lens** - If the sensor specifications have been selected according to their practical use, low-priced, high-quality lenses can be used. Both line scan sensors of the CORSIGHT Smart Vision system have 2,048 pixels (7 µm) or 4,096 pixels (3.5 µm) respectively over a length of 14.3 mm. NET offers a wide range of high-quality C-mount lenses for these applications.
- **Smart camera featuring line scan sensor** - The line-by-line transmission of image data in line scan applications involves large data volumes and, as such, usually requires the use of a camera link interface and a frame grabber. With CORSIGHT, users can save on this additional hardware due to the integrated FPGA that works much the same as a PCI Express frame grabber card. A video output is also no longer required. CORSIGHT thus solves the problem of the heavy data transfer and the additional frame grabber card "internally".

Tips for line scan applications

- **Movement** is a mandatory requirement for line scan applications as it is impossible to capture clear images without constant (roll-to-roll material) or continuous (conveyor belt) movement.
- In practice, it is usually more difficult to configure the **basic settings of the camera** compared to matrix cameras as the line-by-line composition of an image does not produce the desired image results without taking into consideration the influence the object speed has on the line frequency.
- The **exposure time setting** or the scan rate depends on the object speed. If the scan rate is not adjusted to changes in the object speed, this results in image distortion. That is why an encoder-trigger combination is often used. In the CORSIGHT, this is already integrated: the encoder is connected directly to the CORSIGHT's digital in- and outputs.

1/ 3

SMART_LINE SCAN _ac_an_rev_1.0

As an all-in-one Smart Vision system, CORSIGHT enables users to monitor everything and control everything via digital I/Os directly right at the working station. Our SynView interface software allows you to view the image via a monitor port or configure parameter settings using a mouse and keyboard.

Decentralized image processing with smart line scan solutions

Sorting systems for food and bulk material

Task: Fully-automated high-speed inspection of the length, diameter and color of French fries

Approach: Each Smart Vision system inspects a partial quantity along the inclined plane, makes decisions, and transmits the data in real-time to the main computer for statistical purposes.

Advantage: Compact all-in-one image processing solution for optimum sorting efficiency at the "inspection station" without additional image transfer.
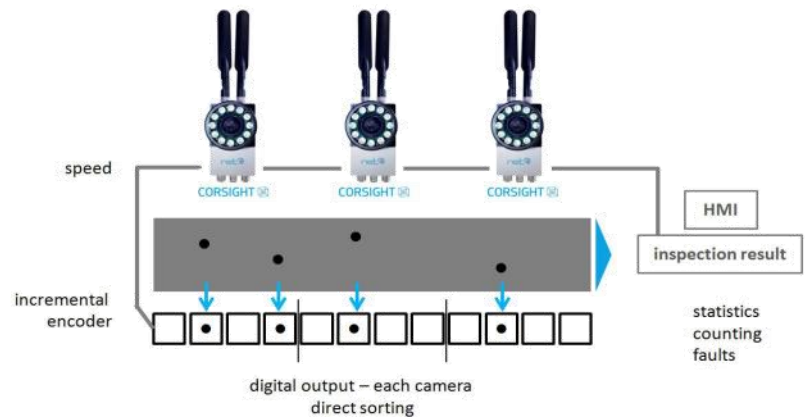

Web guide/ production automation

Task: Continuous measurement and detection of edge positions

Approach: Real-time readjustment is performed without image acquisition. The edge position is transmitted immediately to the control loop. CORSIGHT directly controls the motor unit via digital I/Os or Ethernet.

Advantage: The production process can then be controlled for a low set-up cost and both the product quality and the process itself can be optimized at machine speed.
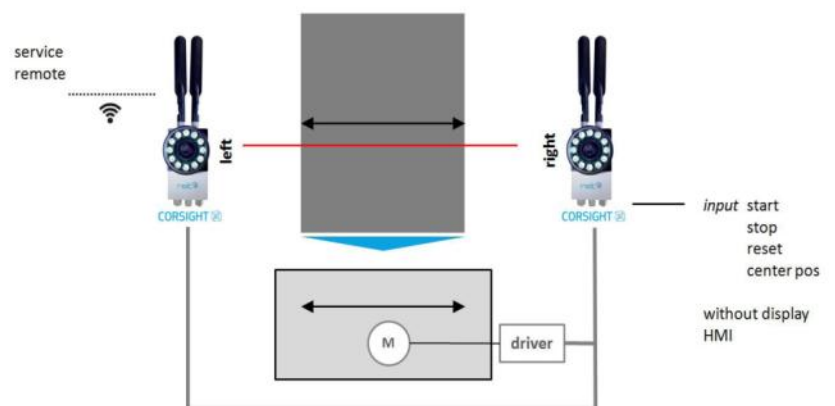
Automotive/Pick & Place

Task: Real-time inspection of assembly parts for completeness and dimensional accuracy

Approach: The position detected by the Smart Vision system and the rotation angle of the object are transmitted directly to the downstream robots, e.g. via Ethernet. CORSIGHT decides whether or not the part to be assembled is complete and dimensionally accurate.

Advantage: Compact all-in-one image processing solution for decentralized decision and control, enabling the robot to precisely capture the image of the part being inspected.
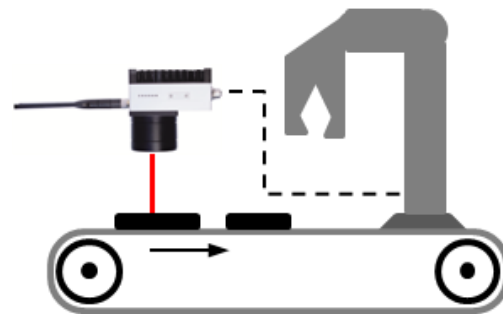
Practical advantages of the smart line scan - CORSIGHT

- CORSIGHT is currently the only Smart Vision system featuring a line scan function that is compatible with established operating systems and popular image processing software. The all-in-one system combines camera, computer, lighting and image processing in a single housing.
- With line scan applications, customers can further optimize their image processing system: there is no need for a frame grabber (between camera and computer) or other additional cables.
- Existing machinery can be modified quickly, easily and at low cost. All you have to do is add a test bench – there is no need to alter a central system for this. Each test bench operates independently, but they can all be easily interlinked by means of a standard network or a central system.
- CORSIGHT runs under Windows or Linux and is compatible with all conventional image processing software. The support of conventional image processing software enables image acquisition to be internally controlled via the popular standard GenICam. This means that every GenICam / GenTL-compliant software package or open-source package, such as OpenCV, can be used without any additional time and effort spent on integration.

Integration tip: Software interface SynView

SynView offers an interface environment for all types of GenTL/GenIcam-compatible cameras and supports a wide range of operating systems (Win XP/Vista/7, Linux, 32/64bit). New applications developed by the customer on the basis of SynView generally work not only with any other camera that complies with these standards, but also with cameras for which a unique SynView software interface has been developed. A complete list of object-oriented languages (C, C++, C# and Visual Basic.NET) are supported. The integrated Explorer has a so-called Feature Tree, with which users are able to configure all of the settings without having to familiarize themselves with the camera. With just a few mouse clicks, program code examples can be generated with the code generator and these functions can be implemented into the program without any programming effort. The time-consuming search through developer documentation is a thing of the past. You can find more information at www.net-gmbh.com.

Featured properties as a camera for image processing

- **Compact all-in-one image processing system**
  Combines all the components of an image processing system in one single housing

- **Wide range of image sensors**
  The proper image sensor - CCD or CMOS - for every application, from VGA to 5 megapixels, 2K and 4K for line scan applications.

- **Dust- and splash-proof**
  in accordance with IP67

Featured properties as a computer for image processing

- **Embedded computer**
  Based on standard CPU architecture (X86) and SSD-based hard-disk

- **On-board FPGA**
  CPU load-free image editing featuring programmable logic, low-cost real-time image processing, and high-performance image processing for industrial applications with a high rate of transmission data

- **Standard interfaces**
  USB2, Gigabit Ethernet, RS232, VGA, digital in- and outputs, and wireless (Bluetooth)

Featured properties of algorithms and software

- **Windows or Linux**
  The system software already run by the company can be used

- **Supports SynView, NET GmbH's cross-camera software interface**
  An application for all GenICam / GenTL-compliant cameras

- **Directly supports commercially available software packages**
  GenTL-compliant software packages such as Adaptive Vision Studio, HALCON, LabView and OpenCV

White paper >
Find out more about CORSIGHT & SynView

SynView - free download >
(after registration)

NET New Electronic Technology GmbH
info@net-gmbh.com
www.net-gmbh.com

NET Italia S.r.l.
info@net-italia.it
www.net-italia.it

NET France
info@net-france-sas.fr
www.net-france-sas.fr

NET USA, Inc.
info@net-usa-inc.com
www.net-usa-inc.com

NET Japan Co., Ltd.
info@net-japan.com
www.net-japan.com