SICK AG

www.sick.com

SICK is the specialist for industrial sensor solutions – from factory automation to logistics and process automation. With sensor intelligence and application solutions, the technology and market leader based in Waldkirch is creating the basis for safe and efficient process control, accident prevention and environmental damage prevention. Founded in 1946, the company has a global presence with more than 50 subsidiaries and holdings as well as many agencies.

INDUSTRY	NUMBER OF EMPLOYEES	LOCATION
Sensor solutions for factory, logistics and process automation	10,000	Waldkirch (Germany)

TRUMPF PRODUCTS

- ViP (VCSEL with integrated photodiode)

APPLICATIONS

- 3D sensor system, contactless laser measuring

Challenges

Up until now, the tactile measuring of speed, position and length in production systems using measuring wheel encoders was the state of the art. A wheel rolls over the passing goods and components and calculates their dimensions and speed. This is good, but it can be better. Because even the tried and tested measuring wheel has its downsides: with thin, sensitive materials, the wheels leave unwanted marks or don't get enough grip to provide accurate measurements. The alternative is optical measuring. However, this is considered too expensive: "Time and time again I was told that the benefits of contactless measuring would generally not outweigh the higher purchase price," says Heiko Krebs. This is because sensor solutions using laser light to scan parts use complicated technology and follow-up costs are to be expected: they require high laser power and are therefore in laser class 3, meaning structural safety precautions and special training are necessary.

"We receive many requests for applications that we didn't even have in mind during development. With SPEETEC, these customers can now solve measuring tasks for which there were previously no suitable sensor systems."

HEIKO KREBS
SENIOR VICE PRESIDENT PRODUCT MANAGEMENT, SICK AG

Solutions

VCSEL diodes and the development partnership with TRUMPF Photonic Components made the breakthrough possible. Ralph Gudde, VP Marketing and Sales at TRUMPF Photonic Components, presented Heiko Krebs with the small diodes with fully integrated laser sensors for consumer devices. This solved the problem of laser class 3. Gudde recollects: "We also proposed a different measuring procedure to SICK. This is because with VCSEL we can make use of "self-mixing" interference technology, or SMI for short. This has been used in millions of products for about twenty years and has proven itself again and again." The process works like this: a VCSEL casts an infrared laser beam onto the surface of a passing part. A resonator recaptures the reflection of the laser beam and mixes it with the light in the resonator. A photodiode then measures the interference and the system calculates the speed of movement from the difference in frequency. The direction can be inferred from the modulation of the wavelength. The laser sensor thus directly detects speed and direction and indirectly detects the position and expansion of the part.

Implementation

A revolutionary idea, but one that is anything but easy to implement. And both development partners benefit from each other's expertise. Together, TRUMPF and SICK are launching the SPEETEC sensors. They are based on a process algorithm that quickly and ultra-precisely evaluates the signal quality on the FPGA. At object speeds of ten meters per second, this algorithm achieves a resolution of four micrometers and a measuring accuracy of 0.1 percent - even with demanding materials such as insulation wool. "And all that at a price much more similar to prices of tactile solutions than anything available on the market so far," says Krebs with satisfaction.

Forecast

Both partners are proud of not only the results of their collaboration, but also of the path they took to get there. Krebs recollects: "With both project partners oriented towards the fast-moving consumer market and with us focusing on industry specifications, two worlds collided. We first had to find a common language, a common way of thinking about certain things. There were times when the strategy of the team at TRUMPF Photonic Components helped us out of a dead end." And Gudde adds: "At the time, we had little insight into the requirements an integrated industrial sensor needed to fulfill. We

didn't know what kind of markets and specializations were out there in the industry. We have learned a lot from SICK in this regard."

Krebs is particularly pleased that they are now even receiving requests for their optical sensor that he never would have expected during development. "With SPEETEC, these customers can now solve measuring tasks for which there were previously no suitable sensor systems."