Baumer
Passion for Sensors

Technical Report

Saving design engineers time and nerves

Five sophisticated sensor solutions for maximum time gain

On the way from component design-in to machine commissioning one will encounter many time guzzlers. The good news: there are shortcuts. We present five sensor solutions that help design engineers and installation achieve their objectives more quickly.

Figure 1

Figure 1: Business Development Manager Dominik Unger demonstrates one of the smart Baumer tools for design engineers: the digital CAD sensor twin of the OM20 laser distance sensor with beam path.

There is always a little something to improve. Most process steps from conception to installation provide some time saving potential. You only need to know how. In this technical report we present five examples of how engineers can save valuable time with intelligent sensor solutions.

Example 1: Digital CAD sensor twin

To offer users maximum eased usability, the smart sensors of sensor expert Baumer integrate additional digital services that are freely accessible. Engineers should not hesitate to exploit the full potential of smart sensors.

One example are the smart 2D profile sensors from the OX series. These Baumer sensors are among the most compact ones in their class, yet they are high-performant and light. But how do these sensor integrate in a machine? How do blind region, receiver and detection range behave? To designers, these are the important questions. To cope with them, most users still follow the troublesome conventional procedure of collecting dimensions and coverage from data sheets for design-in via CAD. But this is time-consuming and prone to errors.

The Baumer solution is smarter. The company provides a full 3D CAD sensor model with detection area and other relevant information as digital twin. Designers can easily transfer the supplied data to their models and compare it with the machine design. You see the sensor 's dimensions, detection range, blind and receiver

range and this way can identify the ideal position and parameterization already on screen. Thanks to the secondary information of the Baumer CAD sensor twins, users can grasp technical specifications easier and faster. This will speed up mechanical integration and prevents expensive rework during installation and commissioning. This intuitive access to sensor specs will ease conception both to experienced engineers and beginners. This benefit must not be underestimated in view of the increasing skilled labor shortage. The digital CAD sensor twin family constantly keeps on growing: Presently, Baumer provides 3D CAD data for ultrasonic sensors, light barriers, photoelectric proximity sensors, laser distance sensors and profile sensors.

Figure 2

Figure 2: Baumer optical sensors integrate the beam path in their 3D CAD data. This will ease work from design-in to mounting: sensor installation follows the design-in and does not require any precision alignment.

More Information ›

Example 2: Installation turbo feature qTarget

In the field of optical sensors an important installation topic is the alignment of photoelectric sensors or photoelectric proximity switches at the machine. Sensor installation must ensure that the light beam is precisely aligned to the target region. With a retro-reflective sensor, the target region is the reflector on the opposite side. This may sound simple in theory, but takes a lot of time in practice. Quite an effort may be required to ensure the light beam is precisely aligned.

Here, digital CAD sensor twins (see example 1) are a great benefit by saving the effort of manual beam path building thanks to pre-defined alignment to their optical axis - like the Baumer sensors. By design, the light beam of Baumer sensors is precisely aligned to the mounting holes and this way they compensate for any individual component tolerances. As a result,

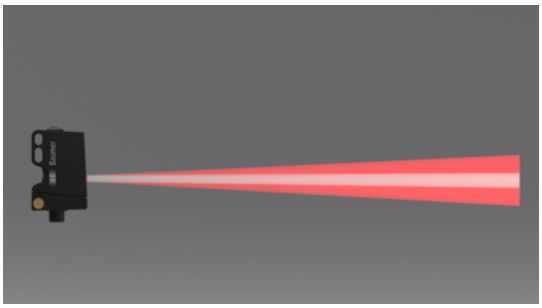

Figure 3

Figure 3: How qTarget works: The optical axis of the sensor is referenced at right angles to the mounting holes. Maximum squint angle α 1 degree, zoom view for better understanding.

consistent light beam alignment is ensured throughout the entre sensor series. This so-called qTarget feature allows for quick and easy installation without precision adjustment and ensures easy sensor exchange. Thanks to qTarget, the beam path of the CAD twin reliably corresponds to reality, which ensures time-saving consistency from the design stage to installation. In a nutshell, sensor installation will be as designed - without the need for additional alignment.

More information ›

Example 3: Baumer Sensor Suite for IO-Link devices

Baumer supports sensor engineering with additional freely available tools. A particularly popular tool is the software Baumer Sensor Suite (BSS). Following the motto "The smartest way to use IO-Link devices", this intuitive software will significantly simplify evaluation, parameterization and use of sensors and actuators.

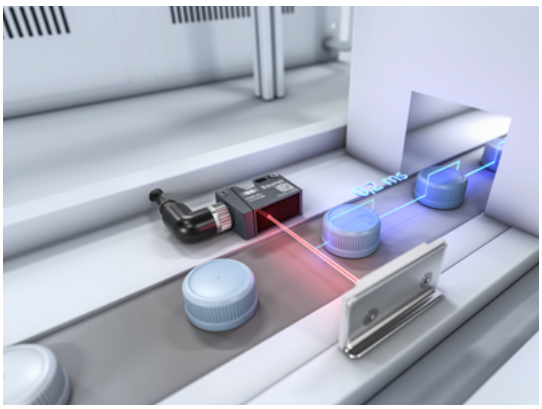

Figure 4

Figure 4: Another benefit of qTarget: Appropriate design eliminates the need for specialized, expensive machine holders.

On screen, users can see what the sensor is seeing. Such immediate visual feedback allows the engineer efficient, precise and quick parameterization of IO-Link devices. One example is SSC setting (Switching Signal Channel) of measuring sensors or sonic lobe definition

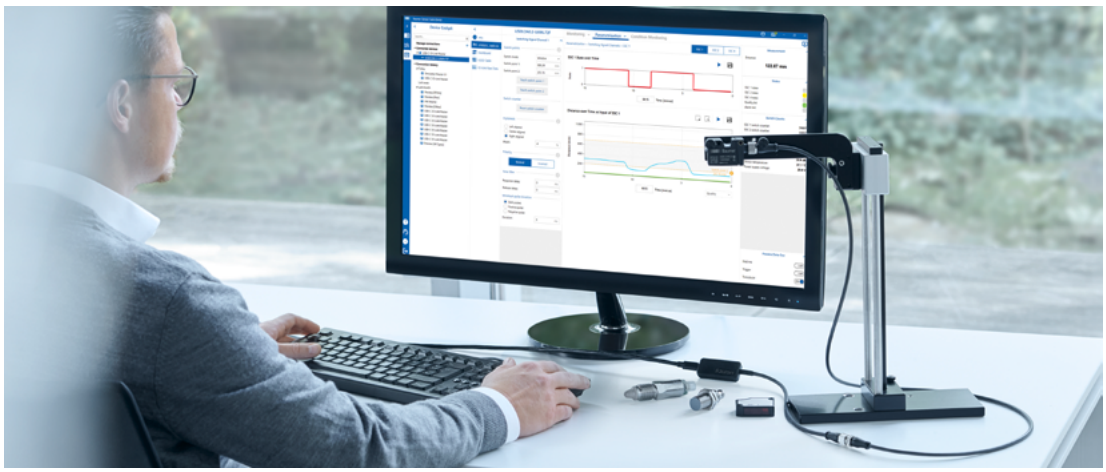

Figure 5

Figure 5: See what the sensor is seeing. The Baumer Sensor Suite (BSS) is a user-friendly PC software for evaluation, selection and parameterization of IO-Link devices. The handy USB-C master from Baumer will connect sensors quickly and without external supply to a PC, for example tests made straight from the desk.

at ultrasonic sensors. This way, BSS is a key tool in application development as it communicates with all available IO-Link devices via IO-Link masters - even including those from third-party manufacturers. Thanks to its future-oriented and modern architecture, the BSS is the ideal framework for further customized apps and digital services. Baumer also offers a USB-C IO-Link master that fits into any pocket. No needing any extra power supply, it is the ideal interface between sensor and the PC: on the desk, during machine commissioning or in the event of service.

Figure 6

Figure 6: Quality control in the filling line. The IO-Link inductive sensors detect bloated lids which is an indication of spoiled content. During the test runs, the Baumer Sensor Suite (BSS) takes effort off the developer since he does not have to adjust the PC.

More information ›

Example 4: IO-Link simplifies measurement tasks that require maximum precision

Inductive sensors from Baumer with all-integrated electronics reliably measure distance with micrometer precision. This opens up completely new application areas. For example, they are a cost-effective solution to measure force and strain at machines, systems and tools.

Likewise, such high-precision measurements require accurate and stable transmission of measurement signals. Most often, this is done via analog interface (current- or voltage-based). Conventional analog outputs present other challenges: Due to their sensitivity (few V/mm or mA/mm) operation is often within the mV or µA range. Noise emitted by near electromagnetic fields or even a simple cable impact may significantly impair the measuring signal quality. Consequently, this calls for more expensive shielded cables while in parallel the cable length should be kept to a minimum. Furthermore, controllers require high-resolution analog converters which will reflect in the calculation of total cost.

Figure 7

Figure 7: IO-Link, the better analog interface? The IO-Link digital interface provides numerous benefits, including reduced costs and noise-free digital signals.

Further to variants with analog interface, the Baumer inductive sensors with IO-Link interface are available in most varied designs. When it comes to distance

measurements with micrometer precision, this digital interface is an interesting alternative at reduced effort and costs. IO-Link provides numerous benefits:

- Easily connected to controllers via IO-Link master – at less cost compared to high-resolution AD converter cards
- Easy integration via IODDs (IO Device Description)
- Up to 20 m length, no shielded cable required
- Noise-free digital transmission without additional conversions

Easy sensor parameterization via IO-Link. With the appropriate filter settings, the optimally harmonized response time and resolution can be identified. The freeware Baumer Sensor Suite as an intuitive tool is a good option for doing so (see example 3).

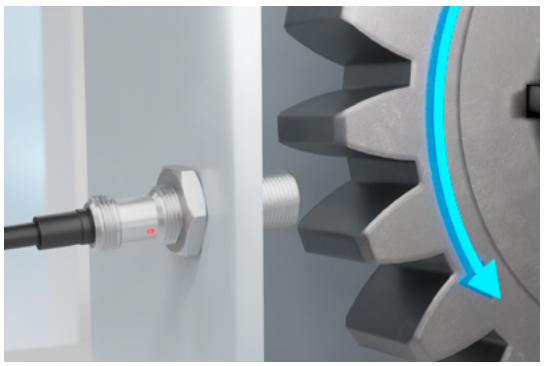

Figure 8

More information ›

Example 5: IDC multicode reader – easy and quickly ready to use

The most recent example of a particularly user-friendly product is compact IDC multicode reader.

Figure 9

It characterizes by user-friendliness with easy installation, integration and commissioning. Using the USB-C port, the multicode reader can be easily connected to a computer and put into operation via web interface. Thanks to Auto-setup, just one click will suffice for reading several different codes. The space-saving housing, matching accessories, Ethernet and USB-C interfaces as well as TCP/IP, Profinet and DIO protocols ensure easy code reader integration. Thanks to freely configurable data telegrams, IDC easily integrates into existing systems.

The list of examples that can be extended to many other Baumer products and features, clearly shows: Each step from the design idea to installation provides time saving potential. You only need to know how.

More information ›

Further information: www.baumer.com

Figure 9: Compact, fast and easy to use: The IDC multicode reader from Baumer speeds up engineering thanks to auto-setup and intuitive web interface.

Figure 8: Smart application: IO-Link inductive sensors like IR12 can also act as a speed monitor - or to signalize early on any wear at gearwheels.

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