

Technical Report

# Sensors with built-in time benefits

The path from design-in of components to plant commissioning should be as simple as possible. Because, every step saved in the process flow will save valuable time. Also in sensing technology, development engineers and installation staff will reach their goals faster with smart solutions. Optical sensors, for example, which eliminate the need for precision adjustment after mounting.

The more time pressure, the more valuable is any manpower saved. This is particularly true in mechanical engineering, where often the lead times are very tight. This is one reason because to both project managers and designers the search for time-saving solutions is essential. What are the most time-consuming activities from design to commissioning of a plant or installation? Where can smart solutions eliminate potential error sources, cut down on effort and save valuable time? Virtually every step from first design concept to mounting provides saving potential. In this technical article, we show examples of how intelligent sensor solutions help avoid time-consuming errors and frustration and accelerate projects.

## Error source constructive beam path

In object detection, engineers prefer photoelectric sensors or photoelectric proximity switches. These ensure non-contact and precise detection in machines and systems at short response time. To make sure it will work as planned, meaning the sensor's light beam will hit the target region, designers can be confronted with obstacles they need to overcome:

1. In the engineering stage, the sensor beam path is constructed and mapped in CAD. Doing so requires the engineer to collect, interpret and consider squint angles or tolerances.
2. Sensor mounting reveals whether design follows reality. Besides interpretation and transmission errors, production-specific tolerances or missing data can also result in errors. The better data matches reality, the more unlikely is the need for any later sensor alignment.
3. Next is sensor alignment at the machine. The sensor installation must ensure the light beam precisely hitting the target region. With a retro-reflective sen-

sor, 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.

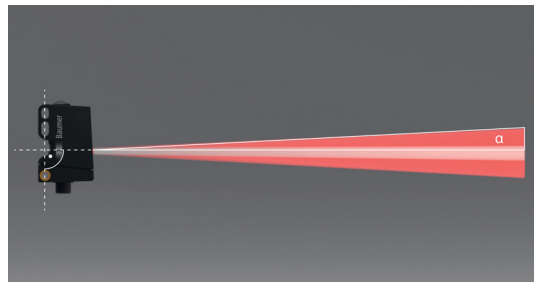


Figure 1: How qTarget works: The sensor's optical axis is aligned at a right angle towards the mounting bores. Max. squint angle of 1 degree, enlarged for better illustration. Illustrations: Baumer

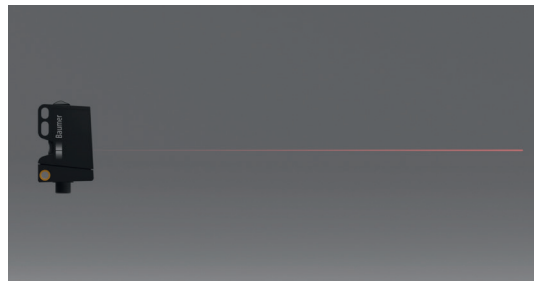


Figure 2: Optimally aligned light beam. The true squint angle of max 1 degree of O300 photoelectric proximity switch.

## Sensor mount without precision adjustment

No manual adjustment of the beam path is required thanks to alignment by a pre-defined optical sensor axis as featured in Baumer sensors will significantly reduce such effort. Thanks to the Baumer sensor design, the light beam is precisely aligned to the mounting holes to compensate for any individual component tolerances. As a result, consistent light beam alignment is ensured throughout the entire sensor series. The so-called qTarget feature allows for quick and easy mounting without precision adjustment and ensures easy sensor exchange.

The pre-defined alignment of the optical axis saves time already at design stage. That's special, the Baumer optical sensors O200, O300, O500, OT300 and OT500 come with 3D CAD data and integrated beam path. Engineers no longer have to take the effort of tracking the beam path from data sheets. They just have to transfer the supplied data - beam exit, blind region, detection area including maximum misalignment, reception area - into their CAD model. This will eliminate error at source and reduce the time required. Thanks to qTarget, the CAD model beam paths reliably follow 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.

### Saving time in mounting and exchange

An example from practice demonstrates the time savings of the smart Baumer solution: A customer in the intralogistics industry is installing 14,000 optical sensors on automated picking modules. The qTarget feature for aligned optical axis makes sensor alignment superfluous, saving approx. 5 minutes of installation time with each sensor. This multiplied by the number of sensors installed equals an enormous time saving up to 1166 working hours. This corresponds to 145 man-days. To the customer, this was the key criterion for deciding on the O300 retro-reflective sensor. All the more since qTarget pays off not only in initial installation but also in ongoing operation. Also in the event of defective sensor exchange there will be no need for precision alignment of the replacement sensor. By the way: Analogue to the integrated beam path for optical sensors, Baumer also provides 3D CAD data with the sonic cone for ultrasonic sensors.

Conclusion: With 3D CAD data integrating the beam path and the qTarget feature for predefined alignment of the optical axis, Baumer provides a smart sensor solution for efficient design-in, manufacture and operation of machines and systems. The Baumer OneBox concept provides maximum flexibility. The same sensor design for every functional principle and light source is available in three different types: plastic, hygiene, washdown.

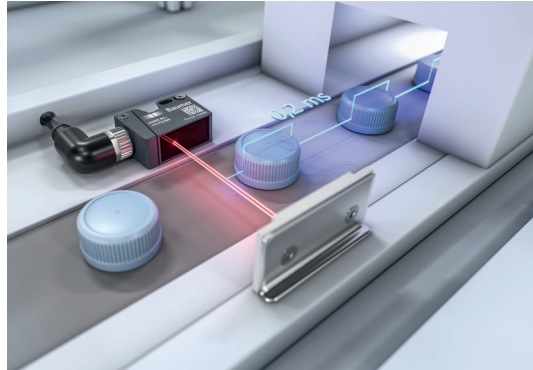


Figure 3: Another benefit of qTarget: Appropriate machine design eliminates the need for specialized, expensive supports.

### Benefits of qTarget and integrated beam path

- Time savings in sensor selection
- No errors in beam path interpretation
- Time savings right at design-in: 3D CAD data with integrated beam path eliminate the need for sensor alignment by the user.
- On demand CAD format, no conversion errors
- Time saving in installation and exchange: no sensor alignment required
- 3D CAD data integrating additional information



Figure 4: 3D CAD data integrating the beam path. Eased work from design-in to installation: sensor installation follows design-in and does not require any precision alignment.

### Useful secondary data

Besides qTarget, extended MCAD data Baumer will further ease work to designers. In a first step, data can undergo easy visual inspection in the form of a 3D preview. All Baumer CAD models are available in the conventional 2D and 3D formats for import into various CAD systems. Resource-optimized models are of particular benefit by reduced data size (factor 20-100) and loading times sped up by factor 3-6. Furthermore, the models integrate auxiliary geometries such as integrated beam path or ERP data like part number, manufacturer name, etc. The MCAD models are not only accessible on the Baumer website, but additionally on the Cadenas platforms 3Dfindit and PartSolutions.



Figure 5: For optical sensors such as O200, OT300/500 and O300/500, Baumer provides CAD data with an integrated beam path. Engineers do not have to manually redraw the beam path from data sheets.

Further information:  
[www.baumer.com/c/279](http://www.baumer.com/c/279)



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