

## Basler’s Vision Components Portfolio

Do you need matching vision components from one source for your Computer Vision system? As the market-leading manufacturer of digital industrial cameras, Basler has expanded its portfolio to offer the components required for a Computer Vision system.

In addition to cameras, Basler’s product portfolio features the matching lenses, frame grabbers, lighting solutions, data and trigger cables, PC cards, power adapters, mechanical components and much more.

The components of a vision system must meet high requirements for reliability and maintenance, since they are installed in machines or systems that are designed for long operating periods and must receive the right support throughout their entire lifecycle. This is why Basler applies the same accuracy to this area that its customers already receive with the high-quality industrial cameras.

Basler offers matching vision components from one source for the inexpensive, robust and long-term operation of a vision system.



### High-quality Basler Vision Components

Basler ensures that the vision components fit the cameras. For one, this means that the components provide exactly what is needed, to save unnecessary costs. For another, the components are carefully selected, coordinated and tested, which prevents malfunctions and ensures long operating times.

When it comes to industrial equipment and Computer Vision systems, all components must be absolutely reliable. If a system used in a 24-hour operation fails, this can quickly lead to high costs when inferior or incompatible components are at fault.

The quality awareness and technical know-how underlying the success of Basler’s cameras is also applied to the selection and manufacturing of Basler’s vision components. Quality and reliability are the top priorities.

In addition to ensuring the right coordination and product tests, Basler also provides the required documentation. For users, this simplifies the creation of their own higher-level system documentation and the actual handling of the vision components. The documentation is supported and updated across the product lifecycle.

Not only does this simplify the component selection, it also cuts costs for the users’ own system documentation or potentially needed certifications.

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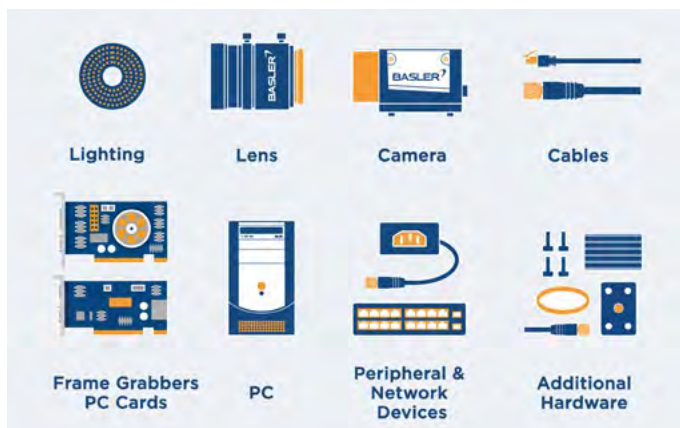
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## Long Deliverability

Basler keeps a close eye on the deliverability. Just like the cameras, our vision components are deliverable for a long time to protect system and equipment manufacturers against system adjustments based on discontinuations as much as possible. The goal is to maintain the deliverability throughout the cameras' entire lifecycle and, if this is ultimately impossible due to unavoidable changes, to offer replacements with the same professional value. This saves Basler's customers time and money.

## Components of a Vision System

We offer the appropriate components for your Computer Vision system. These systems consist of the following vision components:



*Components of a vision system*

## Reduced System Complexity

Industrial equipment and systems have now reached a high level of complexity – not least due to Industry 4.0, digitization and other new technology trends. That's why it is very helpful for system developers and plant manufacturers to be able to rely on the expertise of a Computer Vision provider and focus fully on their own core competences to meet the complex requirements. As a result, more can be achieved in less time.

The time for the selection and procurement of suitable Computer Vision components also decreases when all components can be relied on to interact smoothly and the required material can be obtained from one source.

Despite established standards, even today some products by different component manufacturers may not always function together reliably. With its strategy, Basler has taken steps to prevent this.

## Frame Grabbers

One example of this are the frame grabbers in the Basler portfolio.

Frame grabbers have their own SDKs and the technical complexity of their structures is similar to that of cameras. Basler has started to make sure that these items are integrable and interoperable. In case of problems, this eliminates high expenditures involved in the clarification process with multiple companies, which often arise if the cause can't be clearly recognized.

The Area of Interest (AOI) setting, for example, can result in a classic error. The AOI usually has to be set for the camera and the frame grabber. It is often forgotten that this must happen on both sides. To avoid these and many other pitfalls, Basler has started integrating both in its pylon SDK through its CXP-12 interface cards, which are technically frame grabbers. If one value is changed, it affects all necessary areas as intended. This lets the developer save time for the implementation and tests.

Computer Vision systems that work with very high resolutions at quick frame rates often put a great strain on the CPUs of the vision PC, which demands the use of frame grabbers. Even here there are differences: simple frame grabbers are used for pure data transmissions, while more complex frame grabbers can additionally handle some tasks involved in the image analysis or pre-processing in real time and thus provide significant relief to the CPUs. Some tasks can even be completed exclusively by applying high-performance frame grabbers in real time, for example when minimal latency periods or real-time capability are a priority.

At high data volumes, frame grabbers even make it possible to handle artificial intelligence applications, not only in real time but often also much more inexpensively than with graphics accelerators. In some product environments, this makes it possible to significantly minimize rejection of materials, compared to traditional solutions.

Keep this in mind for frame grabbers:

- Frame grabbers process even high data volumes in real time
- Image analyses can be performed directly on the frame grabber, which cuts costs
- In some cases, the use of artificial intelligence can be handled much more inexpensively on frame grabbers and runs in real time
- The complexity and maintenance in software development increases with the use of multiple SDKs

## Lenses

Lenses depict the captured light on a camera's sensor. The higher the quality of a lens, the better is the reproduction in the camera and the more precisely can a viewed object be analyzed. Better reproduction performance saves computing time in the downstream image analysis software and in many cases makes the analysis of the finest structures possible in the first place.

Since a high-quality reproduction performance isn't always the top priority, especially if the focus is on low costs due to competitive pressure, Basler offers two product lines in its portfolio. Basler's standard product line stands for the best cost-benefit ratio and offers good basic performance. The premium product line offers optimal image quality without neglecting the cost factor. Basler's lenses in the premium product line offer the highest resolution capacities and excel in cases of distortion and vignetting.

Factors driving the choice of the right lens:

- The image circle of the lens should be equal to or slightly larger than the sensor size.
- The resolution capacity should match the smallest detail to be resolved (inspection task), since the lens quality plays a major role in determining the price.
- When in doubt, the focal length should be smaller, where the detail to be inspected can be reproduced in any event.

### Basler Camera Light Series & Basler SLP Controller

Clever, innovative lighting solutions, such as the Basler Camera Light series, are also part of the components portfolio. Since the camera can continuously regulate the time and light quantity, the light control, synchronization and calibration have become significantly less complex. This eliminates the problems where the light controllers and camera don't function 100 % synchronously or when the synchronization actually malfunctions. Furthermore, LED lighting ages and may have to be readjusted. Here Basler has created the Auto LED Aging Compensation Feature, which automates the readjustment of the light quantity, thus cutting recalibration costs and ensuring that the right amount of light is used.

This must be kept in mind for lighting:

- With traditional solutions, the synchronization of camera and light is complex, takes time and can even diverge in the long run.
- Selecting standard lighting at the beginning of the project phase avoids the high costs of individualized light sources, which are also more difficult to procure during the product lifecycle.
- LED lights age over time and emit a lower light quantity.



*Lighting plays a crucial role in vision systems: It provides the light needed to ensure good image quality in combination with the other image processing components, and helps to hide interfering objects or make objects visible for machine detection.*

## Cables and Interfaces

The complexity of technology should also be limited in other areas.

Interfaces can also pose new technical challenges. For example, once there were many parallel data interfaces, which are now often replaced by serial interfaces. As a result, the transmission frequency for the transfer of higher data volumes must drastically increase. The increased data rates then lead to greater complexity in the data cables and interfaces. It isn't possible to transmit these increased rates over long distances and they can also become costly. To offer customers stable products through smart product designs and interoperability tests, Basler started early on to find the right technical solutions with cable manufacturers. The maximum lengths of Basler's passive USB 3.0 cables could thus be increased to a length of 8 meters, for example – an impressive result for this type of cable.

Keep this in mind for cables and interfaces:

- Robust data transmission even with high cable lengths
- Immunity of the cables against external disruptions, especially electromagnetic interferences and electrostatic discharge (keyword EMC, ESD)
- Compliance with international regulations, such as CE, RoHS 3, UL and other standards
- Suitability for drag-chain applications and resilience against other mechanical strains
- Optionally angled plugs for applications with limited space

### PC Cards

The different interface technologies show similar improvements. In the past, defective drivers or operating system updates for on-board interfaces like USB 3.0 could pose problems that were difficult to identify. It has paid off to work with dedicated vision components from Basler, which are tested with conventional operating conditions and against operating system updates throughout the product lifecycle. Furthermore, these components are on the market longer than the usual chip sets in common PCs.

Avoidable errors often arise, such as when the PC's host controller is already occupied by an additional peripheral. This results in conflicts on the data bus, leading to data errors or image losses.

These errors can be avoided with dedicated PC cards from Basler.

Keep this in mind for PC cards:

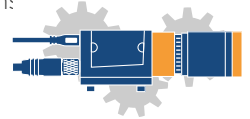
- If the on-board host controller of the PC is already occupied by a peripheral, dedicated PC cards are recommended to avoid malfunctions.
- Tested and approved drivers from the manufacturer should be used.
- Dedicated chipsets on PC cards can save computational power.
- Some PC cards can supply the camera directly with electricity, which eliminates additional cables and possibly power adapters.

## Basler's Online Tools and Basler Support

In addition to our strong [sales and support team](#) we offer comprehensive tools to help you choose the right components for your image processing system.

### Vision System Configurator

Our [Vision System Configurator](#) helps you select the suitable components for your vision system. You receive specific suggestions for additional vision components that match your selected camera model. You can then save and compare your configuration:



### Lens Selector

Our [Lens Selector](#) helps you find the right lens for your Basler area scan camera. Several suitable lenses are suggested to you based on data such as focal length, angle of view, working distance or object size.



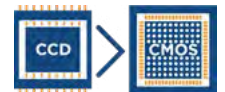
### Interface Advisor

Unsure about which digital camera interface you need? Try our [Interface Advisor](#). It helps you determine which interface best suits your individual requirements.



### CCD Transition Advisor

We're glad to help you switch from CCD to CMOS sensor technology. Select your CCD sensor and we'll show you the best CMOS alternative with our [CCD Transition Advisor](#).



## Components from Basler – Benefits at a Glance

- Cost savings due to reduced complexity
- Outstanding price/performance ratio
- High product quality – with expert standards
- Extensive and qualified product portfolio
- Regular function and interoperability tests
- Perfectly coordinated and carefully selected components
- Professional consultation with Basler Support offering distinctive computer vision know-how.
- One-stop shopping

## Summary

In addition to its cameras, Basler offers the suitable lenses, frame grabbers, lighting solutions, data and trigger cables, interface cards, power adapters, mechanical components and much more. This provides customers with components from one source so they can easily create their vision solution and cut costs. Online tools and Basler Support offer assistance throughout the process.

## Author



As Head of Product Management at Basler AG, Denis Dettmer oversees the portfolio for all vision components. He previously worked in Sales and Marketing for a manufacturer of POS and banking systems and as a product manager for camera-based self-service systems at a large German banking association. He also supervised various customer projects as a certified requirements engineer and project manager for an IT outsourcing company.

In his current position, he and his team ensure that customers can obtain perfectly coordinated vision components from Basler that fit their own cameras, to cut costs while maintaining high quality. He also makes sure that customers can quickly find helpful tools for the selection of the right components for their systems or projects.

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## Basler AG

Basler is an internationally leading manufacturer of high-quality cameras and accessories for applications in factory automation, medicine, traffic and a variety of other markets.

The company's product portfolio encompasses line scan and area scan cameras in compact housing dimensions, camera modules in board-level variants for embedded vision solutions, and 3D cameras. The catalog is rounded off by the user-friendly pylon SDK and a broad spectrum of accessories, including a number developed specially for Basler and optimally designed for the Basler cameras. Basler has 30 years of experience in the area of computer vision. The Basler Group is home to approximately 800 employees at its headquarters in Ahrensburg, Germany, and its additional sites in Europe, Asia and North America.