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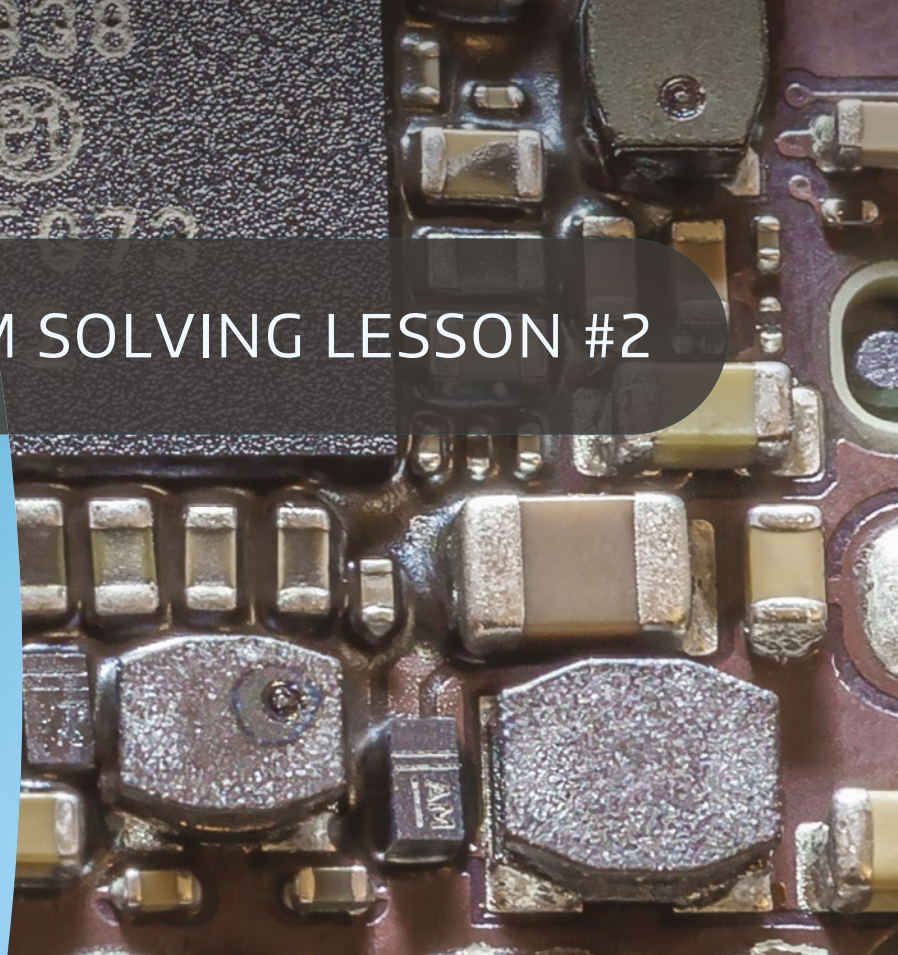
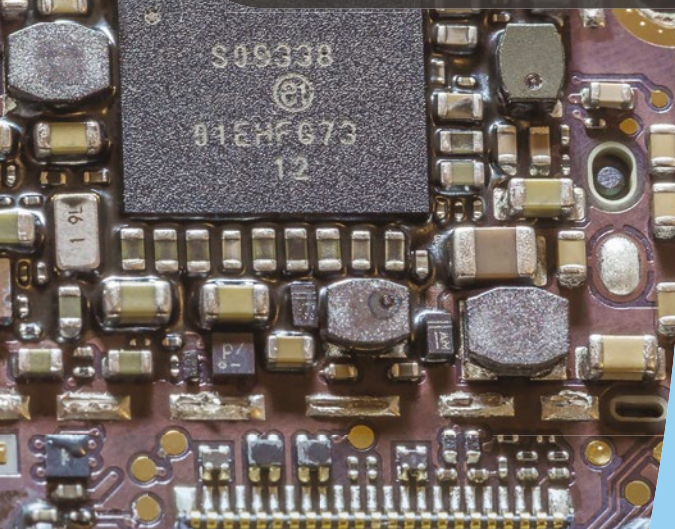
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More than the Sum of Its Parts



Here in your hands you hold the seventh issue of inspect in 2016, which is in fact our international Buyers' Guide. In collaboration with the European Machine Vision Association (EMVA), this English language issue provides an up to date overview of the range of products and services available from the most important companies in the Machine Vision Branch in

the areas of optical measuring and inspection and for several related fields of application.

Dividing the reference guide into the geographical regions "Germany, Austria, Switzerland", "Europe", "North America" and "World" simply serves to provide a structured overview of the range. It is taken from the European angle and would probably be a little different if taken from the global perspective.

One could in fact say that this special issue of inspect could be described as the European Buyers' Guide. Whether this perspective will continue, remains to be seen, as the world, at least from an economic point of view, is steadily coming closer together. In line with this, futurologists have persistently spread the idea that territorial borders will become less important anyway. However the belief in such prognoses have suffered a little this year.

Whatever the case, the international gathering together that occurred this year, at the Vision 2016, was a clearly perceptible phenomenon. There was the definite feeling that the majority of shop talk and presentations on the most important topics and trends were carried out in English and the internationalisation was statistically documented.

When talking statistics, such associations as the EMVA are of course the central points of contact as they collect market data from the companies in the industry. They channel technological trends such as "Embedded Vision" and bring the relevant interest groups together. They contribute significantly to the configuration of technical standards relevant to the branch. Because when components are brought together, operating standards are vital. After all, the whole is expected to give more than just the sum of its individual parts.

At this point it would be easy to bring the conversation round to the political developments of 2016 and the "standards" that are being applied in between times in society's mainstream. Developments which would definitely be in the unfortunate position to have a negative influence on desirable and promising technological trends. But this is not our editorial playground.

We, dear reader, want to help you find the best partners and suppliers for your professional activities and if, by doing this, we are able to contribute in a small way towards the success of your current and future projects we would be satisfied.

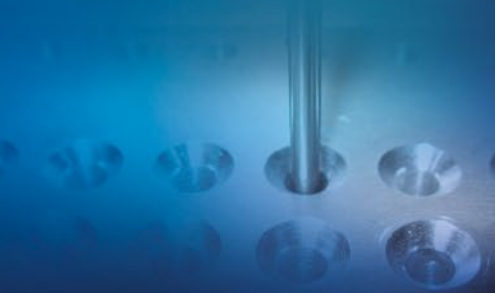
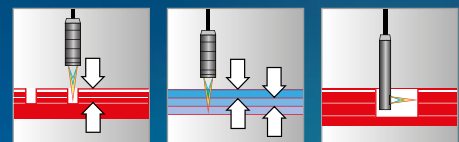
Bernhard Schroth



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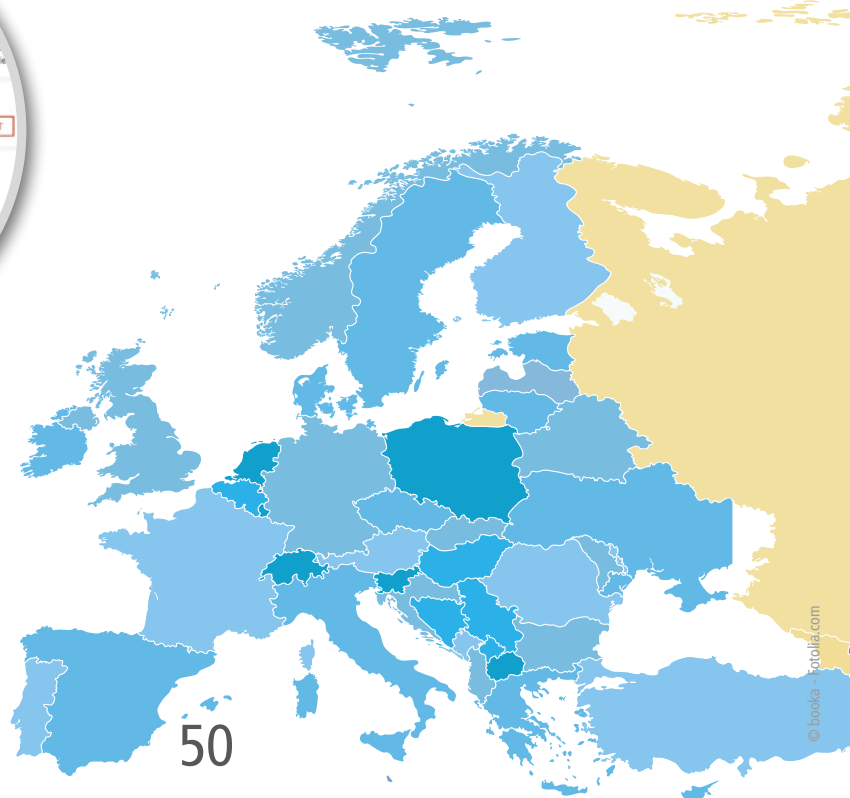
COMPANY CATEGORY PRODUCT RANGE INDUSTRY APPLICATIONS COUNTRY

Association Other
 Consultant Producer
 Distributor Research Facility
 Integrator Solution Provider
 Machine Builder/OEM
 Media

6



17



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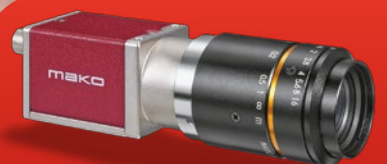
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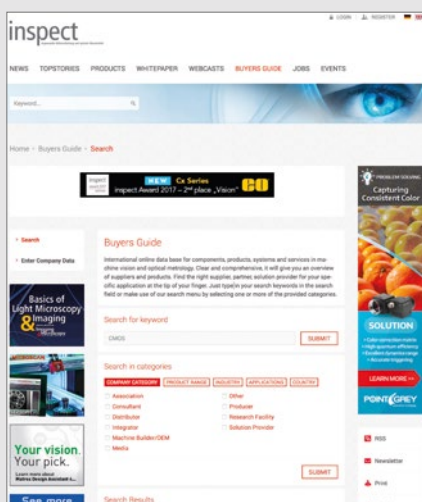
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Machine Vision and Optical Metrology in Europe

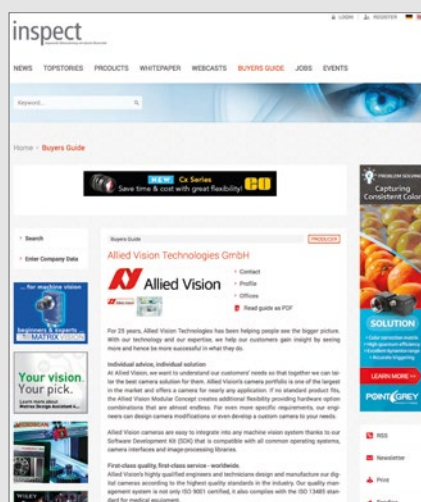
The inspect Buyers Guide 2017



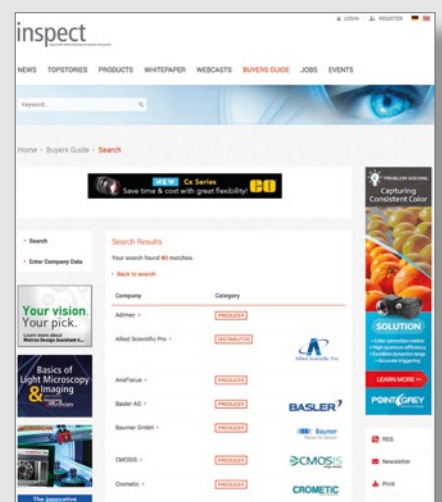
Throughout the year, we aim to provide you with information about new developments, technological trends, groundbreaking applications, new products and leading companies. Throughout the year, we are faced with the recurring challenge: What to select, what to highlight, what to point out. There is never enough room to cover it all. So once a year we seize the opportunity to present to you a comprehensive overview of the machine vision and optical metrology industries.



The Online Buyers Guide provides sophisticated search functions for all listed companies.



Companies providing a full-fledged company profile will be additionally found in multiple categories with the keyword search.



The full text search for "CMOS" yields 40 results: every company having used the word "CMOS" in their description is listed.

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The inspect Buyers Guide is published in its ninth year now, for the eighth time it also serves as the official Buyers Guide of the EMVA, the European Machine Vision Association. The guide contains information about more than 450 companies from over 30 countries. The inspect Buyers Guide has a clear focus on companies doing business in Europe or exporting their goods to Europe. Naturally this comprehends companies and organizations from all over the world.

Online ...

The inspect Buyers Guide is a true cross-media product. At www.inspect-online.com/buyers-guide the online database provides sophisticated search functions for all listed companies. Every entry can be searched for with full-text search, and every listed company will be found here based on the individual company description. Additionally, every listed company will be found by name, company category (e.g. producer, integrator, research facility, association, etc.) and country of headquarters.

Companies wanting to provide more information and aiming at even better search results are listed with a company profile, including detailed company data and a listing of products offered, industries served and applications catered to. These, and only these, companies will be found in the respective search categories.

The online Buyers Guide is open for companies within the scope of the inspect all year round. In this way it is always up-to-date.

... and Print

The availability of data online is a clear benefit when presented with clever search functions. However, sometimes you do not want to bother going online, or you don't want to search specifically but rather obtain a quick overview. In these instances a printed version has its unchallenged advantages. Not to mention the ease-of-use when taking notes right next to the provided data. Thus, once a year the inspect Buyers Guide printed edition is provided to you. With this guide we aim to give you a full overview that is still easy-to-use, a complete set of information that is still not too sub-divided into too many categories.

The inspect Buyers Guide 2017 is divided into three main chapters: Topics, company profiles for the main global regions, and company listings for the main product categories. In an industry as innovative and dynamic as ours it will most likely never be possible to provide an overview that is final and complete, but we do our best to come as close as possible.

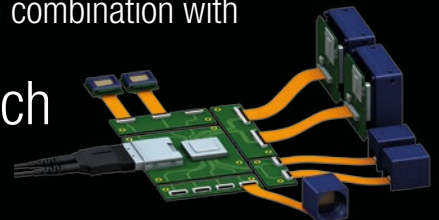
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News EMVA 2017



2nd European Machine Vision Forum 2017

Many conferences target either academic researchers or applied industrial developers. The European Machine Vision Forum fills an important gap where now science meets industry to learn from each other, discuss the latest research results as well as problems from applications, learn about emerging application fields, and discuss research cooperation between industry players and academic institutes.

After its successful debut this year in Heidelberg the second European Machine Vision Forum takes place 6 till 8 September 2017 at AIT Austrian Institute of Technology, Vienna with the focal topic "Next Generation Vision Systems for Industry - Computational Imaging, Machine Learning and More."

"The conference targets scientists, system engineers, hardware designers, software programmers and technology scouts alike and provides a mix of plenary sessions, poster and demo teasers and extended coffee breaks, lunch breaks and two evening sessions," says Prof. Dr. Bernd Jähne, EMVA board member and chair of the European Machine Vision Forum.

The overall objective of the new conference event is to establish a vivid network between industry and academics which serves as a basis to accelerate the transformation of academic achievements into innovative industry practice.

www.emva-forum.org



Embedded Vision Europe – The Brand-New Conference

European Machine Vision Association (EMVA) and the trade show Vision organize the first European conference on Embedded Vision, the Embedded Vision Europe, from 12 till 13 October 2017 at the ICS International Congress Center Stuttgart right next to Stuttgart Airport.

"Worldwide, embedded vision is making inroads. Interest is growing amongst a multitude of industries on what can be realized with these intelligent systems. Be it automotive, automated guided vehicle systems, drones, the medical sector, automation, sports and entertainment or even marketing – embedded vision systems take care that tasks are performed automatically, stand-alone, fast and smart," says EMVA General Secretary Thomas Lübckemeier.

Embedded Vision Europe 2017, the only conference in Europe having the focus exclusively on this disruptive technology, will show the capability of hardware and software platforms; will present applications and markets for embedded vision and will create a platform for the exchange of information. The conference will be held in English language and is organized jointly by the EMVA and Landesmesse Stuttgart which organizes and hosts the biannual international trade show Vision. Amongst the members of the program committee is also the North American Embedded Vision Alliance.

„Being the organizer of the world’s leading trade fair Vision it is exciting to follow the development of industrial and non-industrial applications of embedded technologies. It



is equally exiting to witness the cross-fertilization between newly developed computer vision processing platforms and industry-proven image acquisition devices, image analysis software and application solutions. This is why; together with our partner EMVA in 2017 we will launch this conference on embedded vision targeting developers and users of embedded vision systems. We are looking forward to host this event in Stuttgart next year and promote the dynamic developments with such a high level platform," says Florian Niethammer, Project Manager Vision at Landesmesse Stuttgart.

The first Embedded Vision Europe targets developers and users of embedded (vision) systems from all industries. The conference will be supplemented by an exhibition where all participating companies are invited to show their embedded vision competence through products and applications.

www.embedded-vision-emva.org
www.embedded-vision-europe.com

New EMVA Web Service "Machine Vision Fundamentals"

With the "Machine Vision Fundamentals" the EMVA launches a series of articles on its website www.emva.org intended to serve developers and user alike by providing an introduction to various aspects of Machine Vision. The articles are both an entry point for technology or industry newcomers as well as a refresher on selected topics for experienced practitioners.

"Like other high tech industries the vision industry has a high demand for well-educated and well trained professionals. For the EMVA this is high motivation to support and drive forward educational activities for the benefit of our industry as a whole," explains Gabriele Jansen, EMVA Board member and adds: "The range of topics will include pattern matching, lighting, camera models and calibration, real-time vision, triangulation, radiometry, and others. In addition, explanations are given of fundamental design-rules and procedures for successful machine vision solutions."

"Machine Vision Fundamentals" is a cooperation project between the European Ma-

chine Vision Association, the Optical Engineering and Vision Lab at the University of Applied Sciences Darmstadt, and inspect magazine.

The launch of the "Machine Vision Fundamentals" series was in November 2016 starting with an introductory overview. A regular frequency is planned; publication of new articles will be on the EMVA Website and through announcement via the monthly EMVA newsletter.

Download
White Paper Nov. 2016
"Outline and Principles"



<http://www.emva.org/vision-knowledge/machine-vision-fundamentals/>



Standards Initiative "Embedded Vision"

The advent of smartphones and tablet computers has driven the rapid development of embedded systems with video capture and processing capabilities. The combination of high bandwidth, significant processing power, low energy consumption, and miniaturization makes these technologies particularly interesting to Machine Vision and Factory Automation.

To facilitate the use of the new technologies, five Machine Vision associations worldwide (EMVA, VDMA, AIA, JIJA and CMVU) have decided to set up an Embedded Vision Study Group (EVSG) to evaluate requirements, to identify technological candidates and to describe possible implementation concepts for machine vision standards for embedded systems.

The study group identified three candidates for standardization:

1) Interface Smart Camera/Vision System to Process Environment

The use of embedded vision technology will allow for more sophisticated smart cameras and compact vision systems. At the same time, future factories (like Industry 4.0) will require intelligent devices working in an autonomous, self-organized production process. This will require that the Smart Camera/Vision System can be directly coupled to interfaces that are in use at the factory floor.

VDMA Machine Vision decided to start a working group that will work on the software standard(s) that are needed for the direct interface between e.g. smart cameras and the process environment.

2) Software API for Smart Cameras

The GenICam standard has resulted in a unified view and access to a machine vision camera, independently from the underlying hardware or video transfer protocol. Until now, the GenICam/GenTL standard has been focusing on the transfer of raw image data.

Embedded smart cameras work differently. Due to their internal image processing they don't output raw images but pre-processed or even fully processed images. Also, processing in an embedded smart camera

can be split into several units, called processing modules. An example is pre-processing by an FPGA, followed by a GPU, and finally by software processing. Those processing modules are entities in the description of a smart camera which must be controlled and configured separately.

The EMVA hosted GenICam group has set up a sub working group that will extend the GenICam standard with the requirements of future Smart Cameras. Over 20 companies already agreed to contribute to this work that will be part of GenICam V4.0.

3) Interface Sensor Board to Processing Module

Many embedded machine vision systems need a simple interface between a PCB holding the image sensor and a PCB with the video processing. Although existing Machine Vision interface standards like Camera Link or USB3 Vision could be used, these standards will add too much overhead to the system (resulting in an increase of size, power, costs and complexity).

Most embedded processors come with one or more MIPI CSI interfaces to connect with camera/sensor modules. The MIPI CSI standard however does not define cables and connectors meeting industrial needs in terms of robustness and cable length. In order to enable the use of the MIPI CSI standard in machine vision applications, a new standard will be made, that will add the missing hardware parts on top of the existing MIPI CSI standard. In addition, GenICam will be extended to version 4.0 in order to supply the missing software parts required by the machine vision market.

EMVA will host this new standard initiative for which 24 companies have indicated their initial interest.

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The European Machine Vision Industry

On Track for Further Success

The machine vision industry in Europe has been showing high growth and record turnover for years. Sales in the industry have more than doubled in the years 2005 through 2015. The reason for the boom: Equipped with machine vision systems, machines and robots are learning to “see.” Within the global race towards greater automation, this key technology is not just in traditional industrial sectors, but is conquering brand new areas too. Improved quality, greater reliability, increased safety and cost-effectiveness are benefits that are just as crucial in non-manufacturing contexts as in the realm of industrial production.

The machine vision industry in Germany and Europe has been reporting high growth numbers and record sales numbers for years. In Germany, the sector will achieve a new record turnover of at least 2.2 billion euros this year. The European machine vision industry will record an 8% increase in turnover in 2016. According to current surveys, VDMA predicts a further dynamic development of the European machine vision industry also in 2017.

Key Component in Global Race towards Automation

The global trend towards automation in diverse fields and the digitalization of industrial manufacturing (Industry 4.0) are the main drivers for the continued growth of machine vision. Companies are creating intelligent factories of the future around the world, and machine vision “made in Europe” has be-

come the key technology for the automation industry worldwide. Equipped with machine vision, machines are learning to “see and comprehend.” This leads not only to greater production quality but also to increased productivity and competitiveness in the context of Industry 4.0. Vision technology paves the way for stable and efficient processes as well as flexibility and intelligence in production. No other component in the production process is able, with the aid of the „vision capability“, to collect so much information and deliver it to systems in the way that machine vision can. Machines that „see“ and „understand“ are not only able to recognise if a part is good or bad, for they can also proceed to handle the situation intelligently. Within networked „smart factories“, this data pool will be used to enable logistics assignments to be issued autonomously, repair jobs to be dispatched automatically,

and human assistance requisitioned when necessary. Data analyses also mean that machine vision can detect levels of wear or manage maintenance cycles. Machine vision is therefore both a trailblazer and the key technology for meeting the challenges of Industry 4.0.

Non-industrial Applications Gaining Ground

Moreover, machine vision is continuously serving new customer industries and expanding into new fields of application. Every year brings new and creative application options: Identification of food products without bar codes at supermarkets, track monitoring at the London Underground, prawn sorting on fishing boats, measuring of wood by 3D cameras – machine vision proves to be a true all-rounder that has already conquered our everyday lives. In 2015, the share of the European machine vision industry in non-indus-

trial sectors already amounted to 24 %; the turnover increased by 14 %, an above-average growth rate. Intelligent traffic systems, medical equipment, as well as security & surveillance were particularly strong growth drivers.

Automotive Industry Still Largest Customer

Broken down into sectors, the automotive industry is still the world's largest customer of the European machine vision industry, with a share of 20 % of the overall turnover. The turnover of machine vision rose by 9 % in 2015. The turnover of the general industry (all industrial sectors except automotive) grew by 8 % compared to the previous year. The electrical/electronics industry – including semi-conductors – was the second largest customer with a share of 12 %, followed by the metal industry as well as the food and beverage sector with a share of 7 % each.

Germany – Main Driver of Growth

For the European machine vision industry, Germany was the major sales market: 33 % of the turnover was generated in Germany, 12 % more than in the previous year. North America generated 14 % and was the second most important export market (11 % increase), followed by China with an 8 % share of the turnover (16 % increase in comparison with 2014).

Record Turnover of Cameras

Leading the pack are cameras with a 30 % share of the overall turnover of the European machine vision industry. The turnover rose by a full 9 %.

With a growth rate of 6.5 %, the turnover of machine vision systems was less dynamic. But speaking frankly: which other sector within the mechanical engineering industry has been reporting such positive figures for years? Let's hope that the European machine vision industry remains on the growth path. VDMA Machine Vision has always supported the industry on its way towards conquering new markets and application fields and will continue to do so.

About VDMA Machine Vision

VDMA is the largest industrial association in Europe, and has more than 3,100 member companies in the capital goods industry as well as in machine and plant construction. As part of the VDMA Robotics + Automation association, VDMA Machine Vision has more than 115 members: vendors of machine vision systems and components as well as integrators. The objective behind this industry-driven platform is to support machine vision with a wide range of activities and services. Activities include statistical analyses and the annual market survey of the machine vision industry, marketing and standardisation activities, public relations, trade fair policy, as well as networking events and conferences. More information is available at www.vdma.org/vision.

Continued on page 12



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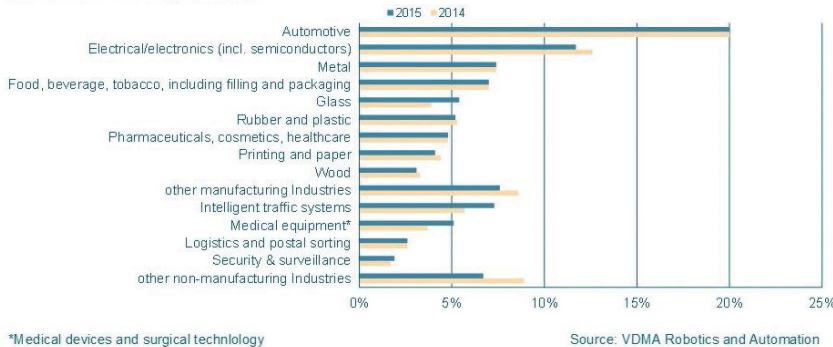


VDMA 2016 Machine Vision Market Survey

VDMA has been conducting its market survey on machine vision every year since 1995. This primary research project directly surveys machine vision companies based in Germany and Europe. Both members and non-members of VDMA are included in order to make the results as representative as possible. In 2015, more than 180 companies participated.

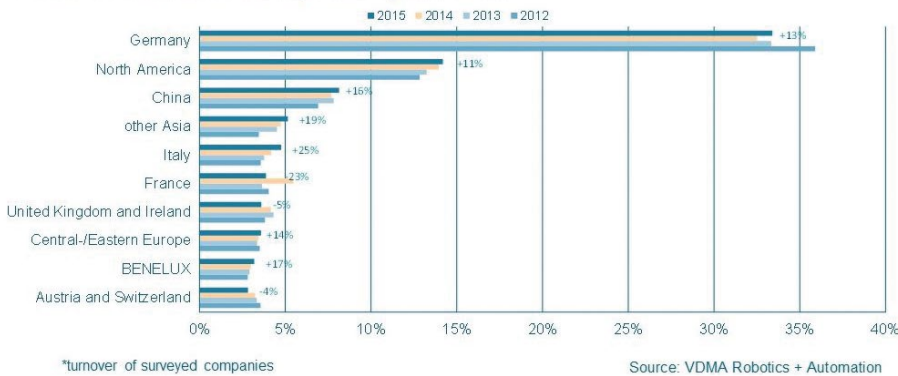
MV Europe: most important customers are automotive and electrical/electronics

Turnover Machine Vision 2014 - 2015 from Europe - share by industries



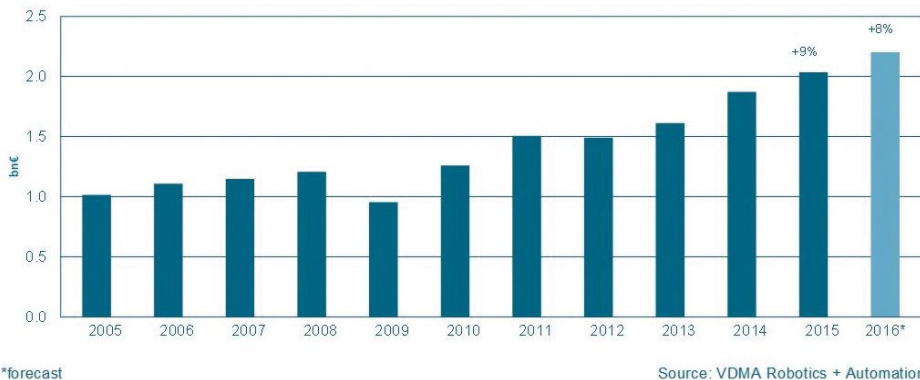
MV Europe: most important market Germany

Turnover* Machine Vision 2015 Europe most important markets



German machine vision industry achieved record sales

Machine Vision Germany total turnover 2005 - 2016*



“Looking towards the future, the European industry anticipates that growth will increase in 2016 by 14% in Asia, by 12% in America and by 5% in Europe.”

Outlook

Looking towards the future, the European industry anticipates that growth will increase in 2016 by 14% in Asia, by 12% in America and by 5% in Europe. While Asia and America are clearly identified as the engines of growth, there is greater caution about developments in Europe. Relevant risks and opportunities include future developments in the price of raw materials, exchange rates, and last but not least, the effects of political crises. With regard to technologies, the industry expects that 3D technologies will be increasingly used. With regard to Embedded Vision technologies, VDMA member companies expect the rise of brand new market opportunities. Due to expected cost reduction, the vision technology will conquer new application markets where the technology was previously far too expensive. New customers, e.g. from the transportation market, from security and surveillance or recycling market, will be looking for image recording and machine vision competence in the machine vision industry.

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Choosing the most suitable camera for a given machine vision application has become a much easier task using the Standard 1288 from the European Machine Vision Association (EMVA). It creates transparency by defining reliable and exact measurement procedures and by comparable data sheets. Version 3 has now been in use since 29 November 2010, version 3.1 release candidate 2 was published on 30 September 2016 and will become the official release by the end of the year if no objections are filed.



Standard EMVA 1288 Release 3.1

Now with Standardized Summary Datasheet for Easy Comparison of Machine Vision Cameras

Version 3 of the standard proved to be a robust and stable release. Therefore the new release contains only a few refinements and additions and its major feature is a standardized summary datasheet making camera comparison even easier. The most important refinement is a better definition of the camera signal non-linearity and the only two other major additions are the total SNR curve including the spatial non-uniformities, and diagrams of horizontal and vertical profiles for a meaningful and well-arranged characterization of the different types of the spatial non-uniformities.

The summary data sheet as shown in this article includes three major elements on a single page. The first is a description of the operating point, the second are the two most useful graphs, and the third a column with all EMVA 1288 performance parameters.

Description of operating point (1): Contains a complete description of the settings of the operating point at which the EMVA 1288 measurements have been acquired. Settings not specified are assumed to be in the factory default mode. If, for instance, the binning factor is not given, the camera was measured without binning. This ensures that the measurements can be repeated anytime under the same conditions.

Photon transfer (2a) and SNR curves (2b): The upper graph contains the photon transfer curve (2a), i.e., the variance of the image sensor noise versus the mean value. For an ideal linear camera this curve should be linear. Only if the lower 70% of the curve are linear, the EMVA 1288 performance parameters can be estimated accurately. If a camera

has any type of deficiencies, they can often be first seen in the photon transfer curve. The double-logarithmic SNR curve (2b) is a nice overall graphical representation of all camera performance parameters except for the dark current. The absolute sensitivity threshold is marked as well as the saturation capacity. In addition, the maximum signal-to-noise ratio and the dynamic range can be read from the graph. The total SNR is plotted as a dashed line. It includes both the variances from the temporal noise and the nonuniformities. If this line lies recognizably below the solid line

“**Camera comparison becomes easy and flexible with the new standardized summary datasheet.**”

of the SNR curve, nonuniformities significantly reduce the performance of the camera.

Column with EMVA 1288 performance parameters (3): This column lists all EMVA 1288 performance parameters. Here only some aspects of the three most important are discussed. The quantum efficiency (a) denotes how efficiently a camera converts light into electric charges. Thus, if you have enough light in your application, this parameter is not critical. Be aware that this parameter requires an absolute calibration of the measuring equipment, which is typically not more accurate than 3%. So differences in the quantum efficiencies between different data sheets in the range of a few percent are

not significant and no decision criterion. The absolute sensitivity threshold (b) tells you the lowest light level the camera can detect. It is given in photons and in photons per area unit (μm^2). The latter is important if you compare cameras with different pixel sizes, because in most applications the irradiance (photons per time and area) at the image plane is given. The saturation capacity (c) gives the largest irradiation, the camera can measure. It also determines the best possible signal quality you can get from an image sensor, the maximum signal-to-noise ratio.

The considerations in this section clearly indicate how you can find the best camera for your application. Find out the most critical parameter by asking questions like: Do I have enough light? Do I have to see both dark and bright parts in the image with enough resolution? Do I have to detect slight intensity variations? Then take the corresponding EMVA 1288 parameters and compare.

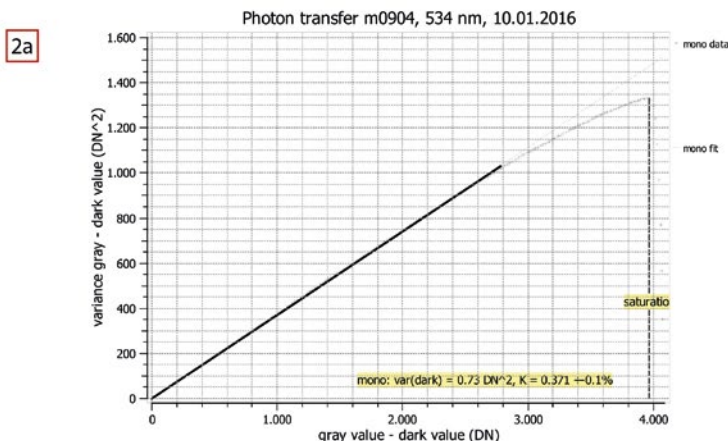
EMVA 1288 courses offered

- December 6-7, 2016, Framos, Munich, Germany (in English language), <https://www.framos.de/news-events/seminartermine/emva-1288/>
- February 8-10, 2017, Aeon, Hanau, Germany (in German language), http://www.aeon.de/en/image_processing_training.html
- Courses are also given by Aphesa, for a detailed schedule, see http://www.aphesa.com/is_consulting.php#courses

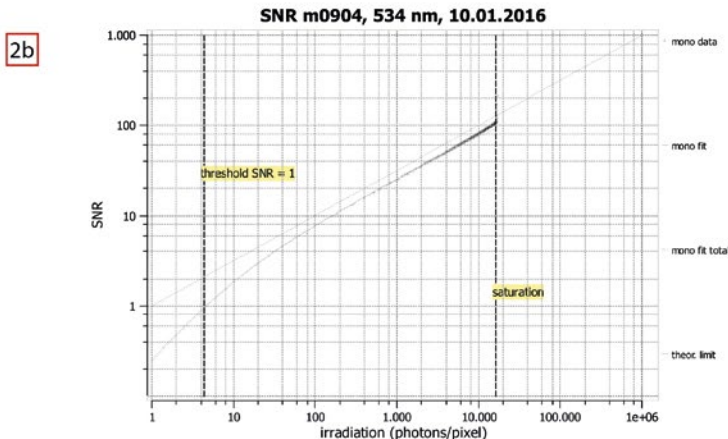
Summary Sheet for Operating Point 1 at a Wavelength of 534 nm

1	Type of data	Single	Gain, black-level	0.0 dB, 0.122
	Exposure control	By irradiance	Environmental temperature	20.2 °C
	Exposure time	1.00 ms	Camera body temperature	30.6 °C
	Frame rate	38.9 Hz	Internal temperature(s)	—
	Data transfer mode	Mono12Packed, Mode 7	Wavelength, centr., FWHM	534 nm, 31.3 nm

Photon Transfer



Signal-to-Noise Ratio



3

Quantum efficiency		a
η	65.2%	
Overall system gain		
K	0.371 DN/e ⁻	
$1/K$	2.692 e ⁻ /DN	
Temporal dark noise		
σ_d	2.17 e ⁻	
$\sigma_{y, \text{dark}}$	0.86 DN	
Signal-to-noise ratio		
SNR_{max}	103	
	40.3 dB	
	6.7 bit	
$1/\text{SNR}_{\text{max}}$	0.97 %	
Absolute sensitivity threshold		b
$\mu_{p, \text{min}}$	4.38 p	
$\mu_{p, \text{min, area}}$	0.368 p/ μm^2	
$\mu_{e, \text{min}}$	2.86 e ⁻	
$\mu_{e, \text{min, area}}$	0.240 e ⁻ / μm^2	
Saturation capacity		c
$\mu_{p, \text{sat}}$	16421 p	
$\mu_{p, \text{sat, area}}$	1380 p/ μm^2	
$\mu_{e, \text{sat}}$	10704 e ⁻	
$\mu_{e, \text{sat, area}}$	899 e ⁻ / μm^2	
Dynamic range		
DR	3746	
	71.5 dB	
	11.9 bit	
Spatial nonuniformities		
DSNU_{1288}	0.76 e ⁻	
	0.28 DN	
PRNU_{1288}	0.48 %	
Linearity error		
LE_{min}	-0.30%	
LE_{max}	0.13%	
Dark current		
$\mu_{c, \text{mean}}$	5.8 e ⁻ /s	
	2.2 DN/s	
$\mu_{c, \text{var}}$	6.0 e ⁻ /s	
T_d	— °C	

Standardized EMVA
1288 summary sheet

If You Want to Learn More

More information on the standard and licensing documents are available at www.standard1288.org. The complete standard can be downloaded free of charge. The working group is open for all manufacturers, system integrators and distributors of cameras and image sensors. Institutes carrying out research in this field are also welcome to join. A collection of publicly accessible data sheets can be found here: <https://zenodo.org/communities/emva1288>

Companies providing services/equipment for the EMVA 1288 standard

(in alphabetical order)

- Aeon, Hanau, Germany: http://www.aeon.de/en/emva_1288.html
- Aphesa, Harzé, Belgium: www.aphesa.com/
- Image Engineering, Cologne, Germany: <http://www.image-engineering.de/>

Author

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10 Years Vision Standard "GenICam"

GenICam was founded 10 years ago and is now the accepted basis of all machine vision interface standards such as GigE Vision, USB Vision, CoaXPress, and Camera Link HS. Camera Link, which is older than GenICam, is about to be retro-fitted in its version 3.0. The benefit of using GenICam as programming interface is that users can easily switch between interfaces and vendors can re-use a lot of their code and know-how when implementing new interface standards in their products.

GenICam which is hosted by the EMVA has a very lively community, which maintains a common reference implementation for the interpretation of the XML files. Even after 10 years the standard committee is steadily sprouting new features and modules and is also constantly adding new members: As of today approximately 160 companies are enlisted.

Last year the version 3.0 of the reference implementation was released boosting the performance of the software while at the same time shrinking its footprint so the code now also easily fits embedded processors.

Providing even better support for embedded processors will be the key goal for the next version 4.0 of GenICam. Here's why: Up to now Moore's Law ensured that one's image processing software would become faster every year just by using the latest CPU hardware. This trend however is about to come to a halt: The MHz race has already stopped and Intel announced that the number of transistors per chip will also come to a limit in the next years. The speed race is taken over by embedded processors, which become faster every year. The mechanism however is totally different: While the classic CPU sped up by employing more MHz and more transistors embedded processors speed up by offloading parts to the software to hardware accelerators such as GPUs, compression engines or else.

This has several side effects. One is that software needs to be written differently to fit the structure of the hardware accelerators. Several attempts like for example OpenCL and OpenVX attempt to do this while maintaining software portability. Another side



Plugfest during the Machine Vision Standards Meeting in Kyoto 2016

“ Providing even better support for embedded processors will be the key goal for the next version 4.0 of GenICam. “

effect is that new ways become available to interface or even build cameras. Most embedded processors have one or more MIPI CSI-2 interfaces on board which originally were designed to interface MIPI aware sensors in mobile phones. These interfaces consist of an I2C bus for configuration and up to four high speed serial lanes for video data transfer delivering roughly the same bandwidth as USB 3.0. Since these interfaces are designed to directly connect MIPI aware sensors embedded processors normally also contain an image signal pipeline (ISP), which can perform the de-Bayering and other image pre-processing tasks. This means that in contrast to classical cameras the firmware controlling the sensor and the ISP can move from the camera to the embedded processor.

Note that the MIPI CSI-2 interface can also be used to interface classical cameras with firmware on board in which case the ISP in the processor is just bypassed.

In order to support these new ways of building and interfacing cameras GenICam needs to be extended. The user will enjoy the same programming interface for classic as well as new style cameras; however for cameras where the firmware runs on the host the register layer and thus the XML files is not required anymore.

Another challenge with embedded processors is that video data is not always delivered to the processor's RAM but more often to a hardware accelerator like a GPU or a H.264 compressor. This must also be reflected in the GenICam interfaces.

So GenICam 4.0 is ready to support the new trend for embedded vision. A survey from the standardization meetings this year yielded 24 companies in total being ready to support the development of GenICam 4.0 and the accompanying enterprise to standardize the cables and connectors for MIPI CSI.

www.emva.org
www.genicam.org

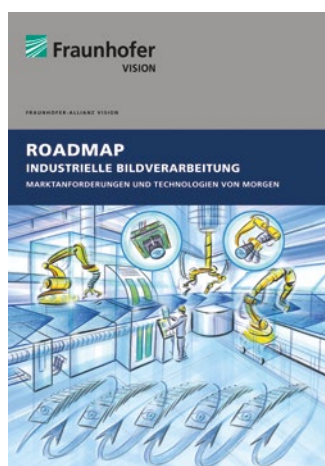
Roadmap "Industrial Image Processing"

Fraunhofer Vision Alliance has recently developed a roadmap concerning industrial image processing, which is now available as a booklet. Market requirements and corresponding technology potentials that will essentially influence and shape industrial image processing solutions in the following years were identified and analyzed in a forecast process. Aspects such as automated system design, inline measurement and inspection technology, cost-efficient inspection of small series as well as standardization requirements are considered. Furthermore, suggestions for innovation support are derived for eight fields of action. These suggestions are intended to assist potential funding authorities in planning their future funding priorities and programs.

Key Technology "Industrial Image Processing" and Foresight on Future Developments

Considering the growing importance of image processing and contact-free measuring and testing techniques, the members of the Fraunhofer Vision Alliance initiated a foresight process with regard to future developments of industrial image processing. Accompanied by selected representatives of relevant industrial sectors and users of key industries, market demands and corresponding technology potentials that will most likely influence industrial image processing and create solutions for it in the next years were sketched within a roadmap. Since many future developments and achievements are already structurally predestinated nowadays, reasonable assumptions about the future and assessments concerning future developments are possible. Discernible trends and future options thus can be used as a basis for well-founded middle- and long-term strategical planning.

Thus, within the roadmap, important fields of action were recognized as targets of future requirements from the market's perspective, and accompanying technological challenges were derived. Aspects such as automated system design, inline measurement and inspection technology, cost-efficient inspection of small batches,



Cover „Roadmap Industrial Image Processing“

Source: Fraunhofer Vision Alliance

comprehensive information and quality management as well as standardization requirements are considered. To exemplify possible answers to these challenges, various solution approaches developed within and in the surroundings of Fraunhofer are presented. These contributions have been developed and pushed forward during the last years by the institutes and partners of the Fraunhofer Vision Alliance or are prospective future developments.

Stimulus for Research Funding

In order to actively and sustainably design the implementation of the necessary innovations in a global competition, efficient basic research and development for applications as well as mastering and continuous expansion of interbranch driver-technologies with strategical values, such as industrial image processing, are required.

With this roadmap, Fraunhofer Vision Alliance wants to provide concrete recommendations for actions for innovation impulses to strengthen industrial image processing at the industrial locations Germany and Europe and to align the national research and development strategy in time towards highly innovative technologies and developments of the future.

The roadmap "Industrial Image Processing" can be purchased directly at shop.vision.fraunhofer.de.
www.vision.fraunhofer.de

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Prototypical inspection of the surface of a Blisk with two cameras and several illuminations

A major component in today's aircraft engines are the so called Blisks. Due to the strict quality requirements, Blisks are now examined for defects for several hours by well-trained specialists, who then measure the defects to obtain a quantitative description of the defects.

Fraunhofer ITWM, in collaboration with partners Hexagon Metrology and Hexagon Technology Center developed an integrated, fully automated solution for the surface inspection and measurement of Blisks. The project was part of "Clean Sky", an EU Framework Program for research and innovation.

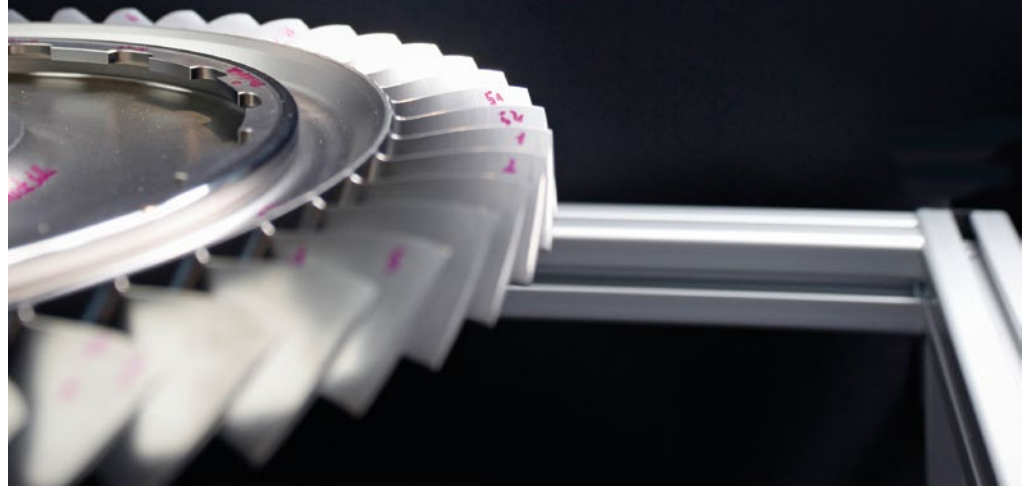
The first work step accomplishes the geometric measurement of the components using a coordinate measurement machine (CMM). In combination with a CAD model of a Blisk, this step provides all information about the form and geometry of a Blisk and any deviations from defined set values.

The task of Fraunhofer ITWM was to develop a solution for the second inspection step: several cameras are used to perform a 100% scan of the BLISK and examine it for surface defects. The data for the location and type (e.g., cracks, impact points, etc.) of potential surface errors is stored. The task contains a number of challenges: One of these

„In the course of the project, it has been shown that only the combination of all this algorithms and classes of algorithms makes stable defect detection possible.“

Innovation for a Clean Sky

Inspection and Measurement of Blade-Integrated Disks (Blisk)



is the development of a lighting system that effectively shows all types of defect on the Blisk. Because of the variety of defect types, multiple illumination methods are needed. Also, because the geometry of the component is complex, it is difficult to position the camera and the lighting in such a way that the entire surface can be gradually scanned. Additionally, the cameras and parts of the lighting system have to be so small and lightweight that they can be moved through the CMM. Lastly, complex algorithms for surface inspection have to be developed that are able to automatically identify all potential defects without the benefit of having much sample data.

A third step performs a precise classification of the defects and determines their correct geometry. This required the development of a new sensor for the defect mea-

surement and classification. The basis for this is the defect position data determined in the second step (the surface inspection). Using the results from the surface inspection, a second CMM automatically generates a measurement program for all defects. These measurements then result in a quantitative description (like depth or size) of the possible defects. In cases, where a defect is questionable, the inspection has to be reviewed by an expert.

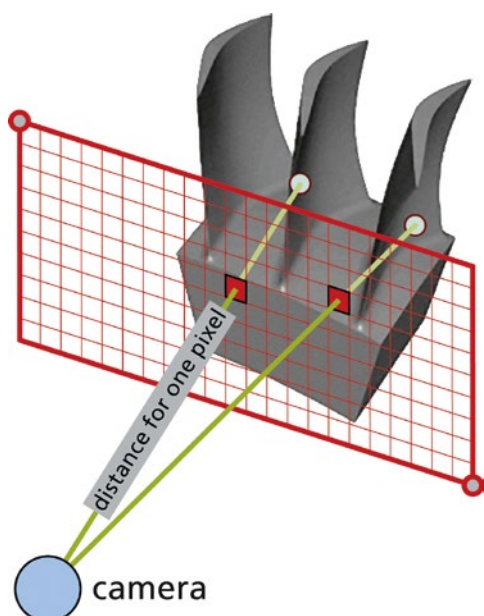
The Optical Surface Inspection

Since Blisks are rotationally symmetrical components, a turntable is used for the inspection. After the geometric measurement of the Blisk (step 1) the tactile sensor is replaced with a camera sensor. In principle, the CMM acts from then on like a robot with a camera sensor.

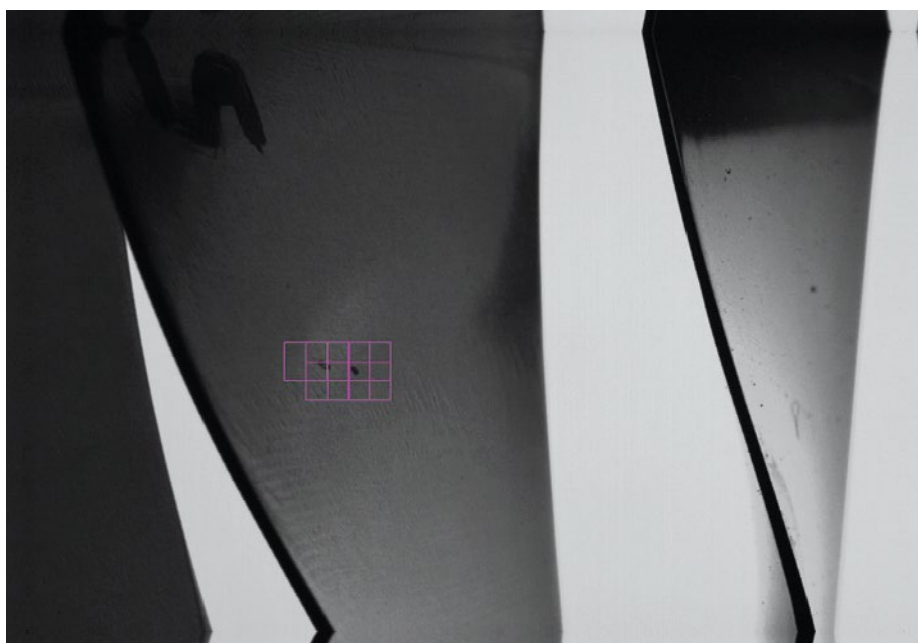
Any region on the Blisk surface can now be inspected by a combination of a 3D-position in space and rotation of the turntable. By the appropriate choice of illumination and the angle between the camera and the surface all different types of defects can be made visible and thus detectable. In the case of an unfavorable positioning of sensor and illumination some defects may not be visible at all. For this reason, the optical sensor consists of two cameras and three types of illumination.

The position of the camera and the selection of the illumination for a particular region (or defect type) on the Blisk is trained once. Depending on the Blisk-type, up to 60 positions are necessary to inspect the complete surface. The following steps will be executed for the surface inspection:

- The software selects a trained camera position (3D coordinates and angles) and the CMM moves to this position.
- The Blisk is rotated 360 degrees via the turntable and at regular intervals an image is taken by the camera sensor.
- The image processing algorithms detect all defects and calculate their position in 3D-coordinates for the later interferometric inspection (step 3).
- The detected defects are immediately displayed in the user interface.
- The sequence starts again at 1., until all trained positions have been approached.
- Certain regions on the Blisk are tested several times with different lighting or camera angles in order to find all defect types safely. Therefore, in a last step, all of the multiple detections must be combined. The display in the user interface is updated accordingly.



A challenge for image processing is the precise position determination of defects in 3D-coordinates. Fraunhofer used a raytracing-algorithm for the 3D-coordinate estimation.



A typical defect on the air foil of a Blisk

The Algorithms

For a stable detection of all defects, several algorithms have been developed which are each used for a particular type of surface defect or certain regions on the Blisk (e.g. special algorithms for the blades). It was important that all algorithms were able to automatically segment the images, because due to the complex geometry a manual segmentation was not possible. This means that the software had to automatically detect all edges on the surface, but should not mistake defects such as cracks for an edge.

In summary, two classes of algorithms were developed: The first class of algorithms detects defects by combining simple algorithms such as edge detectors with complex methods from texture analysis and morphology. This class of algorithms is not self-learning; however, certain parameter adjustments are performed independently by the methods. In order to allow a distinction between „real“ edges and defects, several images are collected and an kind of “mask image” is created from repeating elements. All edges within the mask are thus true defects.

The second class of algorithms uses a machine learning method. With this algorithms, defect candidates can be detected in new, not yet classified images. The algorithms subdivide the images into small patches and calculate certain properties (features) for each patch. With a clustering algorithm, these features were divided into individual groups (defect types and „no defect“). In this context a cluster is a group of „similar participants“, i.e. patches with similar features, are iteratively combined. A voting procedure is then used to decide to which cluster a patch belongs. The cluster, in turn, determines whether the region is recognized as a defect

or not. An advantage of this method is that no segmentation is necessary.

In the course of the project, it has been shown that only the combination of all this algorithms and classes of algorithms makes stable defect detection possible.

Since all potential defects detected by the image processing were to be geometrically measured in a third step, a method had to be implemented that estimates the 3D positions of defects based on the 2D image data. For this purpose, a modified raytracing-algorithm has been implemented which, using the CAD model of the Blisk as well as the camera position in space, estimates the positions of all the defects found in one image.

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Further Information

The AMI4Blisk project was as part of the EU-Cleansky project with the mission to develop technologies that improve the ecological footprint of aviation by developing low-noise aircraft with lower fuel consumption.

About Allied Vision

For more than 25 years, Allied Vision has been helping people see the bigger picture. With our technology and our expertise, we help our customers gain insight by seeing more and hence be more successful in what they do.

Individual Advice, Individual Solution

Allied Vision supplies camera technology and image capture solutions for industrial inspection, science, medicine, traffic monitoring and many more application areas in digital imaging. With a deep understanding of customers' needs, Allied Vision offers a camera for nearly any application. If no standard product fits, the Allied Vision Modular Concept creates additional flexibility providing hardware option combinations that are almost endless. Allied Vision cameras are easy to integrate into any machine vision system thanks to our Software Development Kit (SDK) that is compatible with all common operating systems, camera interfaces and image-processing libraries.

First-class Quality, First-class Service – Worldwide

Allied Vision's highly qualified engineers and technicians design and manufacture our digital cameras according to the highest quality standards in



the industry. Our quality management system is not only ISO 9001 certified, it also complies with the ISO 13485 standard for medical equipment.

With eight R&D, Manufacturing and Sales locations in Europe, North America and Asia and distribution partners in more than 30 countries around the world, we keep close to our markets order to develop meaningful products and service innovations. Thanks to this worldwide network, Allied Vision customers enjoy a service and technical support that is second to none in the industry.



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Cameras, Interfaces/Cables/
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Applications

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Vision 2D, Robot Vision 3D

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Associations

AIA, EMVA, EVA, JIIA, VDMA

Regions served

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North America, national



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About Basler

The Future Is in Our Sight

For nearly three decades, Basler has pushed the limits of what industrial cameras are capable of. This dedication to research, development, and superior manufacturing has led us to become the world's largest producer of industrial digital cameras, with ideal solutions for factory automation, robotics, medical & life sciences, microscopy, retail, traffic, and a wide range of other applications. Our history of innovation is defining the future of vision, and our support is guiding you there. That's what makes Basler the most trusted brand and the world market leader in industrial cameras.

We Set Trends that Set Standards

Basler has always been in on the ground floor of game-changing technology. We developed unique ways to increase our efficiency so you decrease your costs. We championed the standardization of Camera Link, GigE Vision and USB3 Vision. And we pioneered the adoption of CMOS sensors to deliver dynamic performance, high speeds and high resolution with a superb performance for the price compared to CCD. At Basler, we establish advanced technologies that offer new and immediate value to you.

Outperforming Begins In-house

Basler has built the industry's largest and smartest industrial camera portfolio, featur-



ing more than 300 models with GigE Vision, USB3 Vision or Camera Link interfaces to ensure that there's a perfect camera for your application. In order to support such a robust offering, we're continually investing in new ways to maximize our manufacturing and testing capabilities and make sure that each product performs in the field. Our in-house production facilities in Germany and Singapore are living laboratories, where we learn through experience how to improve our cameras' performance in image quality, reliability, repeatability and ease of use. We're driven to grow our portfolio, so we can drive your results.

Basler's Components Enhance Your Vision

Basler puts everything you need to get the full picture in a single place. We offer a broad range of vision components that seamlessly integrate with the camera, such as lenses, I/O cables, hubs, PCI cards and other essential accessories. All of our cameras and components are rigorously tested before they leave our facility to ensure that they deliver the high quality and reliability that you expect from Basler.

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Inspection Webbed Material,
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Engineering/Optics/Machine
Vision, Traffic/Logistics, Other

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About Baumer

The Baumer Group is one of the worldwide leading manufacturers of sensors, encoders, measuring instruments and components for automated image-processing. With around 2,300 employees and 38 subsidiaries in 19 countries, the family-owned group of companies is always close to the customer.

Capture the Essential: Industrial Cameras and Vision Sensors

Merging cutting-edge technologies and customer-focused consultancy has made us one of the leading manufacturers for image processing components. We offer a unique range of products, from industrial cameras and vision sensors to image processing components, for many different applications across varied industries. The location in Germany accommodates R&D and production under one roof which ensures our high product quality standards. Prior to delivery, every component undergoes rigid electrical and optical testing and inspection.

High-performance Industrial Cameras

High frame rates, exceptional image quality and ease of integration – that's what our industrial cameras stand for. Their robust, industrial design is the basis for long-term stability and precise image analysis. The portfolio includes CCD- and CMOS-based matrix cameras, standard-compliant with GigE Vision, Camera Link and USB3 Vision. Our many

years of expertise make us understand your requirements to provide the optimum product for your application. Where standard products are too limited, we work together with you to develop customized components that fit perfectly to your application.

Easy and Intuitive Vision Sensors

Intuitive operation, fast and easy integration and configuration within minutes: These attributes characterize the Baumer VeriSens vision sensors. They can perform up to 20 different feature checks on object position and location, presence and completeness, reading and verifying human-readable imprints (OCR/OCV) or bar and matrix codes including GS1 codes. High process reliability is achieved with our patented FEX image processor. Models for color identification and inspection, with C-Mount design and integrated flash controller are also available as well as models with integrated white and infrared illumination.



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About Point Grey

Point Grey is a global leader in the design and manufacture of innovative, high-performance digital cameras for industrial, medical and life science, traffic, biometric, GIS, and people counting applications.

Innovation

At Point Grey, “innovation” is more than a tagline; it’s a way of life. The synergies of a broad range of hardware, software and mechanical engineering skills under one roof allows Point Grey to successfully bring many innovative and ground-breaking products to market. This drive for innovation has led to many industry firsts, including the world’s first and smallest 1394b digital camera, the world’s smallest GigE camera, and the world’s first USB 3.0 camera.

Product Excellence

All design, prototyping, manufacturing, testing, and packaging is done out of a state-of-the-art facility in Vancouver, Canada. These facilities include dedicated SMT lines, AOI and X-ray machines, industrial clean room, and automated test stations. The “Seal of Quality” label on each camera cannot be printed until the camera has been 100% inspected and tested. This rigorous qual-

ity testing, together with hassle-free product warranties, ensures that customers can rely on Point Grey cameras for their demanding vision applications.

Customer Care

To ensure our customers achieve maximum value from their camera systems, Point Grey offers world-class support on installation, configuration, customization and trouble shooting. Our Customer Support program includes quick response email and phone support, online user manuals, online knowledge base articles and regular firmware updates.

End-to-End Imaging

A critical component of any vision system is the speed and reliability of the imaging pipeline, from light hitting the image sensor to data reaching the host system. Point Grey Research has taken ownership of the entire pipeline, and over the last 20 years has created a diverse portfolio of digital cameras, peripheral components, and software.

- Designed and manufactured in Canada
- Global distribution network
- 300 staff worldwide
- ISO 9001:2008 registered company



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Character Recognition, Digitalization, High Speed Analysis, Inspection Piece Parts, Material Testing, Metrology 3D, Part Identification, Particle Analysis, Robot Vision 2D, Robot Vision 3D, Symbol Recognition

Industries served

Automotive and Suppliers, Electronics/Semiconductors, Energy/Water/Solar Technology, Foodstuffs/Beverages, Glass/Ceramics, Mechanical Engineering/Line Building, Medical Technology, Metal, Packaging, Paper/Wood, Pharmaceuticals/Cosmetics/Chemicals, Plastics, Precision Engineering/Optics/Machine Vision, Traffic/Logistics

Associations

AIA, EMVA, JIIA, Other

Regions served

Asia, Europe, Latin America, North America and ROW (Rest of the World)



Point Grey Research GmbH
Schwieberdinger Straße 60
71636 Ludwigsburg
Germany
Tel.: 49 7141 488817 0
Fax: 49 7141 488817 99
eu-sales@ptgrey.com
www.ptgrey.com

See our ad on **Inside Front Cover**

About Chromasens



Machine Vision 'Made in Germany'

Chromasens develops and produces both standardized machine vision components – as color line scan cameras, spectral cameras, 3D stereo cameras and line scan lights – and

custom-specific image processing solutions. Chromasens employees have comprehensive expertise in development, project management, application creation, system integration and professional services. The company's know-how is further enhanced through continuous dialogue with universities and research centres. The intensive cooperation with the customer in the form of comprehensive support throughout every project phase is a cornerstone of the company philosophy. Development and manufacturing takes place at the company's facility in Constance.



Chromasens GmbH
Max-Stromeyer-Straße 116
78467 Konstanz
Germany
Tel.: +49 7531 876 0
Fax: +49 7531 876 303
info@chromasens.de
www.chromasens.com

Management

Martin Hund, CEO
Markus Schnitzlein, CEO

Foundation

2004

Staff

60

Products

Cameras, Lighting Equipment

Applications

Archiving, Character Recognition, Digitalization, High Speed Analysis, Inspection Piece Parts and Web Material, Material testing, Color Measurement,

Metrology 2D and 3D, Particle Analysis

Industries served

Automotive, Electronics, Semiconductor, Food, Ceramics, Medical, Metal, Packaging, Paper, Wood, Pharma, Cosmetics, Plastics, Machine Vision, Traffic, Logistics, Printing, Other

Associations

AIA, EMVA, VDMA

Regions served

Asia and Pacific Rim, Europe, North America, Latin America, national, ROW



About Edmund Optics



Edmund Optics, leading supplier of optics, imaging, and photonics technology with manufacturing sites in the US and Asia and global sales offices, holds with a portfolio of 27,600 products the world's largest inventory of optical components for immediate delivery.

Building up great competency in imaging and imaging components, EO provides com-

plete imaging solutions with a large product line, technical expertise, manufacturing capabilities, extensive technical support, and assists customers in every way possible to maximize the performance of their imaging system. From stock items in the catalog to custom imaging lenses, from prototype to high volume: "EO – Your Partner in Imaging Optics!"



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76227 Karlsruhe
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Fax: +49 721 6273 750
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www.edmundoptics.de

Office(s)

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Barrington, NJ 08007, USA
Tel.: +1 856 5736 250
Fax: +1 856 5736 295
sales@edmundoptics.com
www.edmundoptics.com

EO Europe has locations in Finland, France, Germany and the UK and cooperates with various representatives throughout the continent. In addition, local phone and fax numbers are available.

France
Tel.: +33 8 20 20 75 55
Fax: +33 8 20 206 303

Finland
Tel.: +358 9 751 99 000
Fax: +44 1904 788 610

Italy
Tel.: +39 800 875 211
Fax: +39 800 875 212

Spain
Tel.: +34 900 998 955
Fax: +44 1904 788 610

UK

Tel.: +44 1904 7886 00
Fax: +44 1904 7886 10

Management

Samuel Sadoulet, President & COO, MD EO Germany

Marisa Edmund, EVP Global Sales & Marketing, MD EO Germany

Helge Vogt, Director Sales Europe

Dr. Boris Lange, Imaging Solutions Engineer, Germany

Foundation

1942 in USA, 2000 in Germany

Staff > 800

Products

Cameras, Lighting Equipment, Microscopes, Optics

Industries served

Electronics/Semiconductors, Medical Technology, Mechanical Engineering/Line Building, Pharmaceuticals/Cosmetics/Chemicals, Precision Engineering/Optics/ Machine Vision, Traffic/Logistics

Associations AIA, EMVA, JIIA

Regions served Worldwide

About Fujifilm Europe

Fujinon Lenses from Fujifilm

Tapping into optical technologies and precision processing and assembling technologies nurtured over many years, Fujifilm offers a wide variety of Fujinon lenses. The Fujinon brand is world-renowned for its innovative and reliable products in the field of broadcast & cine lenses, binoculars, CCTV lenses, machine vision applications as well as for special custom made optical products, for example those used in digital projectors, automobiles and in many other applications.

CCTV and Machine Vision lenses: The extensive product range of Fujinon CCTV and

Machine Vision lenses features the appropriate solution for almost every application. The Japanese manufacturer offers a continuously growing product range of high resolution megapixel Zoom and Varifocal lenses for security applications in HD quality. Lenses for Machine Vision are precise optics with minimized distortion for optimal image quality – even in harsh environments. Special lenses round off the wide product range, like infrared-coated lenses for Day&Night, lenses for 3CCD cameras or high resolution 185° Fish Eye lenses. You no longer miss anything with Fujinon lenses.

Fujifilm Europe GmbH
Heesenstr. 31
40549 Düsseldorf
Germany
Tel.: +49 211 5089 0
Fax: +49 211 5089 8900
cctv@fujifilm.eu
www.fujifilm.eu/fujinon

FUJIFILM

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Management

Go Miyazaki,
Takaaki Kurose,
Masaru Yoshizawa
(Managing Directors)

Foundation

1934

Staff

500

Products

Optics

Applications

Character Recognition,
Digitalization, High Speed
Analysis, Inspection Piece Parts,
Metrology 2D, Metrology 3D,
Part Identification, Robot
Vision 2D, Robot Vision 3D,
Symbol Recognition

Industries served

Precision Engineering/Optics/
Machine Vision

Regions served

Central Europe, EMEA, Europe,
national

About the JAI Group

JAI is a global manufacturer of digital cameras for machine vision, traffic imaging, surveillance, life science and scientific research.

Besides a broad range of leading-edge 1-CCD and 1-CMOS progressive area scan and line scan cameras, JAI is a leading provider of multi-imager cameras incorporating advanced prism-block technology, including 3-CCD RGB area scan cameras, 2-CCD multi-spectral/HDR cameras plus a complete family of 3-CMOS/4-CCD/4-CMOS line scan cameras. JAI's product program includes cameras for visible, UV, NIR and



SWIR imaging with GigE Vision, Camera Link, USB 3.0 Vision and CoaXPress interfaces.



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2500 Valby
Denmark
Tel.: +45 4457 8888
Fax: +45 4491 3252
camerasales.emea@jai.com
www.jai.com



See the possibilities

See our ad on page **63**

Office(s)

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Tel.: +49 6022 26 1500
camerasales.emea@jai.com

JAI Oy, Finland
Tel.: +358 207 579 518
camerasales.emea@jai.com

JAI Inc. USA
Tel.: +1 408 383 0300
camerasales.americas@jai.com

JAI Ltd. Japan
Tel: +81 45 440 0154
camerasales.apac@jai.com

JAI Ltd. China
Tel.: +86 21 61800533 053
camerasales.apac@jai.com

Management

Jørgen Andersen, CEO
Masao Watabe,
President of JAI Ltd. Japan
Flemming W. Maunsbach,
Group VP of Finance
Christian Felsheim,
VP Sales EMEA
Shuichi Suibui, Global
Marketing and Product Manager
Yosuke Muraki,
Group VP of R&D

Foundation

1963

Staff

101–250

Products

Cameras, Interfaces/Cables/
Peripherals, Software, Other

Applications

Character Recognition, High
Speed Analysis, Inspection Piece
Parts, Inspection Webbed Material,
Metrology 2D, Part Identification,
Robot Vision 2D, Symbol
Recognition

Industries served

Automotive and Suppliers,
Electronics/Semiconductors,
Energy/Water/Solar Technology,
Foodstuffs/Beverages, Glass/
Ceramics, Mechanical Engineering/
Line Building, Medical
Technology, Metal, Packaging,
Paper/Wood, Pharmaceuticals/
Cosmetics/Chemicals, Precision
Engineering/Optics/Machine
Vision, Traffic/Logistics, Other

Associations

AIA, EMVA, JIIA

Regions served

APAC, EMEA, The Americas

About Lumenera Corporation

Lumenera Corporation, headquartered in Ottawa, Canada, is a leading developer and manufacturer of high performance digital cameras and custom/OEM solutions. Lumenera's solutions provide unique combinations of speed, resolution and sensitivity to satisfy the most demanding digital imaging requirements. The company's core competencies include digital bus technologies such as USB 3.0, USB 2.0, HDMI, Ethernet and GigE as well as the integration of CMOS and CCD sensors. Lumenera leverages its leading edge technology to provide customized design ser-



vices, continuous innovation and licensing options to OEM partners. Lumenera customers achieve the benefit of superior price-to-performance ratios and faster time to market with the company's commitment to high quality, cost effective product solutions.

Lumenera Corporation
7 Capella Court
Ottawa, Ontario K2E 8A7
Canada
Tel.: +1 613 736 4077
info@lumenera.com
www.lumenera.com



See our ad on page **41**

Office(s)

Lumenera Corporation
7 Capella Court
Tel.: +1 613 736 4077
info@lumenera.com
www.lumenera.com

Management

Huw Leahy, President
Stephan Shaw, Vice President Finance
Dany Longval, Vice President Worldwide Sales
Rob Sample, Vice President Manufacturing
Nick Bulitka, Chief Technology Officer
Eric Ramsden, Director of Product Management
Skylar Davies, Marketing Manager

Foundation

2002

Staff

60

Products

Cameras, Software, Interfaces/Cables/Peripherals, Consulting, R&D

Applications

Inspection Piece Parts, Inspection webbed Material, Robot Vision

2D, Robot Vision 3D, Character Recognition, Symbol Recognition, Part Identification, Metrology 2D, Metrology 3D, High Speed Analysis, Particle Analysis, Material Testing, Digitalization

Industries served

Mechanical Engineering/Line Building, Automotive and Suppliers, Electronics/Semiconductors, Packing, Precision Engineering/Optics/Machine Vision, Plastics, Pharmaceuticals/Cosmetics/Chemicals, Foodstuffs/Beverages, Medical Technology, Metal, Glass/Ceramics, Traffic/Logistics, Paper/Wood, Energy/Water/Solar Technology

Platforms supported

Windows XP, Vista, Win 7, Win 8, Linux OS - both 32 and 64 versions; Most X86 and some ARM solutions

Associations

EMVA, AIA

Regions served

Africa, Asia, Australia, China, Central Europe, Europe, EMEA, Japan, Latin America, North America, ROW, national

About Matrix Vision

Matrix Vision is a leading manufacturer and offers a large spectrum of digital cameras – from USB, GigE with Power over Ethernet to smart cameras with integrated easy configurable machine vision software. A wide range of USB 3.0 cameras with CMOS sensors up to 10 megapixels are provided with the USB3 Vision Standard. Matrix Vision introduced a new, revolutionary 6D perception camera. It detects objects in space by means of motion, depth information and experience. The perception camera is ideal for palletizing, de-palletizing and pick & place applications in logistic, packaging and auto-



motive sectors. Besides an extensive range of standard products we offer custom solutions, which provide maximum utility for users as a result of continuous development. Join our vision world and benefit from cutting-edge technologies and extensive services.

Matrix Vision GmbH
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info@matrix-vision.de
www.matrix-vision.com



See our ad on page **35**

Office(s)

Benelux
Eastern Europe
France
Italy
UK & Ireland
Scandinavia
India

Management

Erhard Meier, CEO
Uwe Furtner, CTO
Dirk Muschert, Sales Manager
Marcus Bleise, Sales Manager International

Foundation

1986

Staff

51-100

Products

3D Cameras, Digital Cameras, Frame Grabber, Smart Cameras, USB 3.0 and GigE Cameras, Software

Applications

Digitalization, High Speed Analysis, Inspection Piece Parts, Inspection Webbed Material, Material Testing, Metrology 2D, Metrology 3D, Part Identification, Particle Analysis, Robot Vision 2D, Robot Vision 3D, Symbol Recognition, Others

Industries served

Automotive and Suppliers, Electronics/Semiconductors, Energy/Water/Solar Technology, Foodstuffs/Beverages, Glass/Ceramics, Mechanical Engineering/Line Building, Medical Technology, Metal, Packaging, Paper/Wood, Pharmaceuticals/Cosmetics/Chemicals, Plastics, Precision Engineering/Optics/Machine Vision, Traffic/Logistics, Other

Associations

AIA, DNHK, VDMA

Regions served

Africa, Asia, Australia, Central Europe, China, EMEA, Europe, Japan, Latin America, North America

About Micro-Epsilon

Micro-Epsilon is a medium-sized family-run company which plays a leading role in measurement technology. For more than 45 years we have continuously offered reliable, high performance, unique solutions particularly when high precision measurement or inspection is required. Our product range covers sensors for the measurement of distance and displacement, sensors for IR temperature measurement and color detection, as well as systems for dimensional measurement and defect detection.



Innovative products that provide the highest level of precision are created through intensive research and development processes, unique know-how and a broad network of collaborative operations.



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 Fax: +49 8542 168-90
 info@micro-epsilon.com
 www.micro-epsilon.com

See our ad on page **3**

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 info@micro-epsilon.co.uk

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 me-usa@micro-epsilon.com

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 info@micro-epsilon.com.cn

Czech Republic
 Tel.: +420 38 1213011
 info@micro-epsilon.cz

France
 Tel.: +33 1 39102100
 france@micro-epsilon.com

Switzerland
 Tel.: +41 71 2500838
 info@micro-epsilon.ch

Foundation
 1968

Staff
 800

Products

Vision Sensors/Smart Cameras, Optical Instruments, Turn-Key Systems, Other

Applications

Inspection Piece Parts, Metrology 2D, Metrology 3D, Robot Vision 2D, Robot Vision 3D, Part Identification, High Speed Analysis, Thermography

Industries served

Automotive and Suppliers, Electronics/Semiconductors, Foodstuffs/Beverages, Glass/Ceramics, Mechanical Engineering/Line Building, Medical Technology, Metal, Paper/Wood, Pharmaceuticals/Cosmetics/Chemicals, Plastics, Precision Engineering/Optics/Machine Vision, Traffic/Logistics

Associations

AMA

Regions served

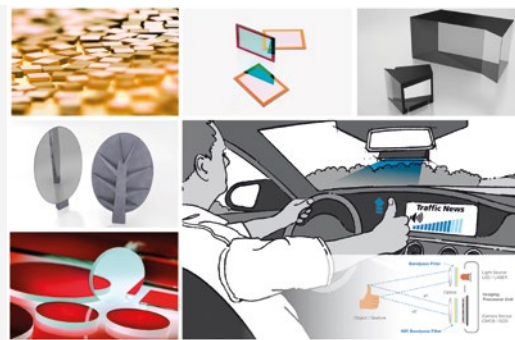
Asia, China, Europe, North America, South/Central America, national

About Optics Balzers

Optics Balzers is the innovative and independent industry partner for the development and production of coated optical components and subassemblies. The company possesses a broad and in-depth know-how in optical thin-film coating processes, complemented by sophisticated patterning, glass bonding and sealing, and further processing capabilities necessary for producing optical thin-film coated components up to optical subassemblies.

Highly experienced and skilled development and engi-

neering teams closely collaborate with customers to develop innovative solutions meeting their requirements and design robust processes to manufacture the customer specific components. The combination of these capabilities and skills places Optics Balzers at the forefront of markets in the photonics industry such as Automotive, Biophotonics, Laser, Space & Defence, Lighting & Projection, Sensors & Imaging, and Industrial Applications.



Offices

Optics Balzers Jena GmbH
 Otto-Eppenstein-Straße 2
 07745 Jena, Germany

Germany
 Tel.: +49 6196 999 4144

France
 Tel.: +33 699 5562 83

Switzerland, Austria
 Tel.: +423 388 9216

USA
 Tel.: +1 720 974 5927

Singapore
 Tel.: +65 6809 5243

Foundation
 2009 / 1946

Staff

101-250

Products

Optics, Optical Coatings, Optical Components

Industries served

Automotive, Medical Technology, Packaging, Precision Engineering/Optics/Machine Vision, Others

Applications

Others

Regions served

Asia, EMEA, Europe, North America



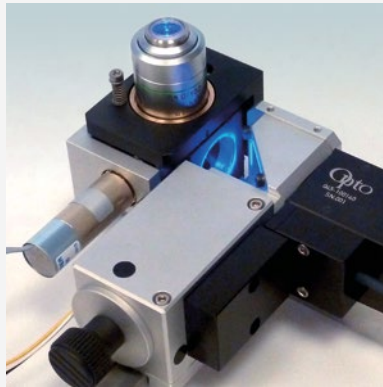
Optics Balzers AG
 Neugrüt 35
 9496 Balzers
 Liechtenstein
 Tel.: +423 388 9200
 Fax: +423 388 9390
 info@opticsbalzers.com
 www.opticsbalzers.com

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About Opto

Opto develops and manufactures customized, optoelectronic modules, optical components and systems for the industrial and biomedical markets. With its own facilities in Germany, France, Switzerland, the UK and Asia, Opto is a globally recognised solution provider, able to support customers from around the globe.

For more than three decades, Opto GmbH has established itself as a leading International supplier of machine vision solutions based on industrialized microscopy and machine vision. Through its



deep application knowledge, Opto provides its clients with special optomechanical solutions that are reduced to the essentials of the application and perfectly cost optimised.



See our ad on page 49

Opto GmbH
Lochhamer Schlag 14
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Tel.: +49 89 898055 0
Fax: +49 89 898055 18
info@opto.de
www.opto.de

Office(s)

Opto France S.A.S.
Tel.: +33 475 53 1400
info@opto-france.com

Opto UK Ltd.
Tel.: +44 1925 606 595
info@opto-uk.com

Management

Markus Riedi, CEO
Klaus Flügel, CTO
Martin Price, CMO
Roman Hartwich, COO

Foundation

1980

Staff

11-50

Products

Optical Instruments, Optics, Custom OEM Modules & Systems, Image Analysis Systems, Machine Vision Objectives, R&D, Vision Sensors, Imaging Modules

Applications

High Speed Analysis, Inspection Piece Parts, Material Testing, Metrology 2D/3D, Particle Analysis

Industries served

Automotive and Suppliers, Electronics/Semiconductors, Energy/Water/Solar Technology, Glass/Ceramics, Mechanical Engineering/Line Building, Medical Technology, Metal, Packaging, Paper/Wood, Precision Engineering/Optics/ Machine Vision, Biotechnology, Security, Aerospace

Associations

AIA, EMVA, VDMA, bayern photonics

Regions served

Asia, Australia, China, EMEA, Europe, Japan, Latin America, North America

About Ricoh Imaging in Europe

Ricoh Imaging Deutschland GmbH, formerly known as Pentax Imaging, is proud of the respect its products have gained over 50 years of high quality manufacturing. All lenses are developed with the focus on quality and performance and designed for a long service-free life.

This is achieved by the combination of modern technology and precision manufacturing.

In 2016/2017 Ricoh will show many more new and interesting innovations including high-res. wide angle lenses for 1" sensors with up to 9 megapixels resolution.



Ricoh Imaging Deutschland GmbH
Am Kaiserkai 1
20457 Hamburg
Germany
Tel.: +49 40 53 201 3366
Fax: +49 40 53 201 3339
iosd@eu.ricoh-imaging.com
www.ricoh-mv-security.eu

Offices

Ricoh Imaging
Deutschland GmbH
Tel.: +49 40 532 01 33 66
iosd@eu.ricoh-imaging.com

Management (EMEA)

Thomas Feichtner

Foundation

1962

Staff

11-50

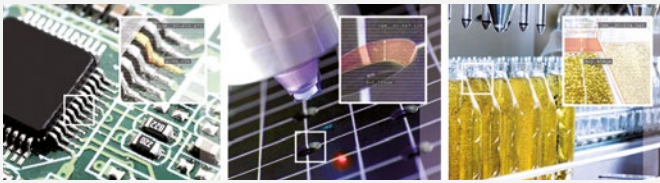
Products

Cameras, Equipment, Filters, Optics, Special Camera Systems

Regions served

EMEA

About Stemmer Imaging



Stemmer Imaging is Europe's largest imaging technology and service provider with head office in Germany (Puchheim near Munich) and subsidiaries in many European countries. Our customers have access to a wide variety of imaging products and solutions from the world's leading manufacturers who provide cutting edge vision technology across all product segments, including Stemmer Imaging's independent,

modular programming library for imaging applications, Common Vision Blox (www.commonvisionblox.com).

This broad range of components and solutions, our experience of 40 years in imaging and a comprehensive support by a staff of more than 250 employees allows us to offer you everything you need to solve your imaging task.

Stemmer Imaging – Imaging is our passion!

STEMMER[®]
IMAGING

Stemmer Imaging
Gutenbergstr. 9–13
82178 Puchheim
Germany
Tel.: +49 89 80902 0
Fax: +49 89 80902 116
info@stemmer-imaging.de
www.stemmer-imaging.com

See our ad on page **39**

Office(s)

Belgium
Denmark
Finland
France
Germany (Head office)
Ireland
Poland
Sweden
Switzerland
The Netherlands
United Kingdom

Additional served countries:

Austria, Estonia, Iceland, Latvia, Liechtenstein, Lithuania, Luxembourg, Norway

Foundation

1987

Staff

> 250

Products

Accessories, Acquisition, Cabling, Cameras, Consulting, Illumination, Optics, Software, Vision Computers, Vision Systems

Applications

Character Recognition, Digitalization, High Speed Analysis, Inspection Piece Parts, Inspection Webbed Material, Material Testing, Metrology 2D, Metrology 3D, Part Identification, Particle Analysis, Robot Vision 2D, Robot Vision 3D, Symbol Recognition, Thermography, Others

Industries served

Automotive and Suppliers, Electronics/Semiconductors, Energy/Water/Solar Technology, Foodstuffs/Beverages, Glass/Ceramics, Mechanical Engineering/Line Building, Medical Technology, Metal, Packaging, Paper/Wood, Pharmaceuticals/Cosmetics/Chemicals, Plastics, Precision Engineering/Optics/Machine Vision, Traffic/Logistics, Other

Associations

AIA, EMVA, UKIVA, VDMA

Regions served

Asia, Europe, North America, national

About Teledyne Dalsa

Teledyne Dalsa is a global leader in the design, development, and manufacture of digital imaging products and solutions. In addition, Teledyne Dalsa specializes in the engineering and fabrication of semiconductor components and services. The company employs approximately 1,000 people world-wide with sales offices across North America, Europe and Asia which support an international distribution network serving more than 40 countries.

Today, Teledyne Dalsa image sensors, cameras, frame



grabbers and software are used in thousands of automated inspection systems around the world and across multiple industries.

Office(s)

Teledyne Dalsa
Lise-Meitner-Str. 7
82152 Krailling (Munich)
Germany
Tel: +49 89 89 54 57 30
Fax: +49 89 89 54 57 346
sales.europe@teledynedalsa.com

Management

Edwin Roks, President, Teledyne Dalsa, Vice President, Teledyne Technologies, Inc.

Foundation

1980

Staff

501–1000

Products

Cameras, Factory Floor Automation Solutions, Frame Grabber, Processors, Software, Vision Sensors/Smart Cameras/Embedded Systems, X-ray Equipment

Applications

Character Recognition, Digitalization, High Speed Analysis, Inspection Piece

Parts, Web Inspection, Material Testing, Metrology 2D, Metrology 3D, Part Identification, Particle Analysis, Robot Vision 2D, Robot Vision 3D, Symbol Recognition, Thermography, Others

Industries served

Automotive and Suppliers, Electronics/Semiconductors, Energy/Water/Solar Technology, Foodstuffs/Beverages, Glass/Ceramics, Mechanical Engineering/Line Building, Medical Technology, Metal, Packaging, Paper/Wood, Pharmaceuticals/Cosmetics/Chemicals, Plastics, Precision Engineering/Optics/Machine Vision, Traffic (ITS)/Logistics

Platforms supported

Windows/Linux/DSP/ARM/FPGA/x86/32 & 64 bit

Associations

AIA, EMVA, JIIA

Regions served

Asia Pacific, Europe, North America, South America

TELEDYNE DALSA
Everywhere you look

Teledyne Dalsa
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Tel.: +1 519 886 6000
Fax: +1 519 886 8023
sales.americas@teledynedalsa.com
www.teledynedalsa.com/mv

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About Vision Components

Vision Components GmbH is a leading supplier in the field of machine vision and develops and distributes intelligent, network-compatible real-time Smart Cameras which are able to operate without a PC. These embedded vision solutions can be easily integrated into almost any application. Customers can choose between models with ARM processors with freely programmable FPGA and VC Linux OS or DSP-based models with the proprietary VCRT OS. The product



portfolio includes Smart Cameras with/without protective housing, single board cameras, vision sensors. Providing custom-tailored OEM solutions for all kinds of applications are the core of the more than 20 years experience in machine vision and imaging.

Vision Components GmbH
 Ottostr. 2
 76275 Ettlingen
 Germany
 Tel.: +49 7243 21670
 Fax: +49 7243 2167 11
 info@vision-components.com
 www.vision-components.com



See our ad on page **33**

Office(s)

Vision Components US Office
 Hudson, NH 03051, USA
 Tel.: +1 603 598 2588
 etoth@vision-components.com

Sedeco Vision Components
 Mijdrecht, The Netherlands
 Tel.: +31 297 24 17 17
 info@sedeco.nl

Foundation

1996

Staff

12

Products

Cameras, Smart Cameras/
 Embedded Systems, Vision
 Sensors, other

Applications

Character Recognition, High
 Speed Analysis, Inspection
 Piece Parts, Inspection Webbed
 Material, LPR, Material Testing,
 Metrology 2D, Metrology 3D,
 Part Identification, Particle
 Analysis, Robot Vision 2D, Robot

Vision 3D, Symbol Recognition,
 3D Vision

Industries served

Automotive and Suppliers,
 Electronics/Semiconductors,
 Energy/Water/Solar Technology,
 Entertainment + Sports, Food-
 stuffs/Beverages, Glass/Ceram-
 ics, ITS, Mechanical Engineering/
 Line Building, Medical Technol-
 ogy, Metal, Packaging, Paper/
 Wood, Pharmaceuticals/Cosmet-
 ics/Chemicals, Plastics, Precision
 Engineering/Optics/Machine
 Vision, Traffic/Logistics, Non-
 industrial Applications

Platforms supported

ARM, DSP, PC platforms
 (Windows, Linux, RTOS)

Associations

AIA, JIA, OSADL, SIA, SPIE,
 VDMA

Regions served

Africa, Asia, Australia, Central
 Europe, China, EMEA, Europe,
 Japan, North America, Latin
 America, ROW, national

About Ximea

Ximea designs and produces leading-edge, high-performance cameras with the lowest power consumption and the smallest footprint, as well as highly optimized camera and imaging solutions for volume OEM applications.

Our camera designs are based on powerful, flexible technology platforms that include an application programming interface (API) for many common Vision libraries as well as compliance with industry standards like USB3 Vision. xiAPI supports Windows, Linux and OS X operating systems.

Customers can further adapt Ximea cameras by selecting

specialized optics and data interfaces, while OEM customers can leverage Ximea's Custom Engineering services. This is how Ximea differentiates from the competition.

To ensure that Ximea offers the highest quality cameras at the best price, Ximea owns and operates its own engineering and production facilities in Bratislava, Slovakia. This allows us to design your solution with only the best components and to guarantee the optimal compromise between performance and cost with short lead times.

Ximea GmbH
 Am Mittelhafen 16
 48155 Münster
 Germany
 Tel.: +49 251 202 408 0
 Fax: +49 251 202 408 99
 info@ximea.com
 www.ximea.com



See our ad on page **7**

Office(s)

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 United States of America
 Tel.: +1 303 389 9838
 Fax: +1 303 202 6350
 info@ximea.com

Ximea s.r.o.
 Slovakia
 Tel.: +421 2 205 104 26
 Fax: +421 2 205 104 27

Management

Dr. Vasant Desai
 Max Larin

Foundation

2010 / 1992

Staff

11-50

Products

Hyperspectral-, X-Ray- and
 Subminiature Cameras,
 OEM Cameras, USB-, PCIe-,
 Firewire- and Thunderbolt-
 Cameras

Applications

Astronomy, (Aerial) Mapping,
 Digitalization, Metrology 2D/3D,
 Microscopy, Part Identification,



Particle Analysis, Robot Vision
 2D/3D, Symbol Recognition, Vir-
 tual Reality, Others

Industries served

Agriculture, Automotive and
 Suppliers, Defense, Electronics/
 Semiconductors, Embedded Vi-
 sion, Machine Vision, Medical
 Technology, Packaging, Paper/
 Wood, Plastics, Traffic/Logistics,
 UAV, Other

Associations

AIA, EMVA, VDMA, Other

Regions served

Worldwide

Germany Austria Switzerland



Producer, Solution Provider

ABW GmbH · Siemensstr. 3, 72636 Frickenhausen, Germany, Tel.: +49 7022 949292, info@abw-3d.de, www.abw-3d.de

Distributor

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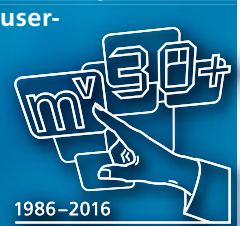


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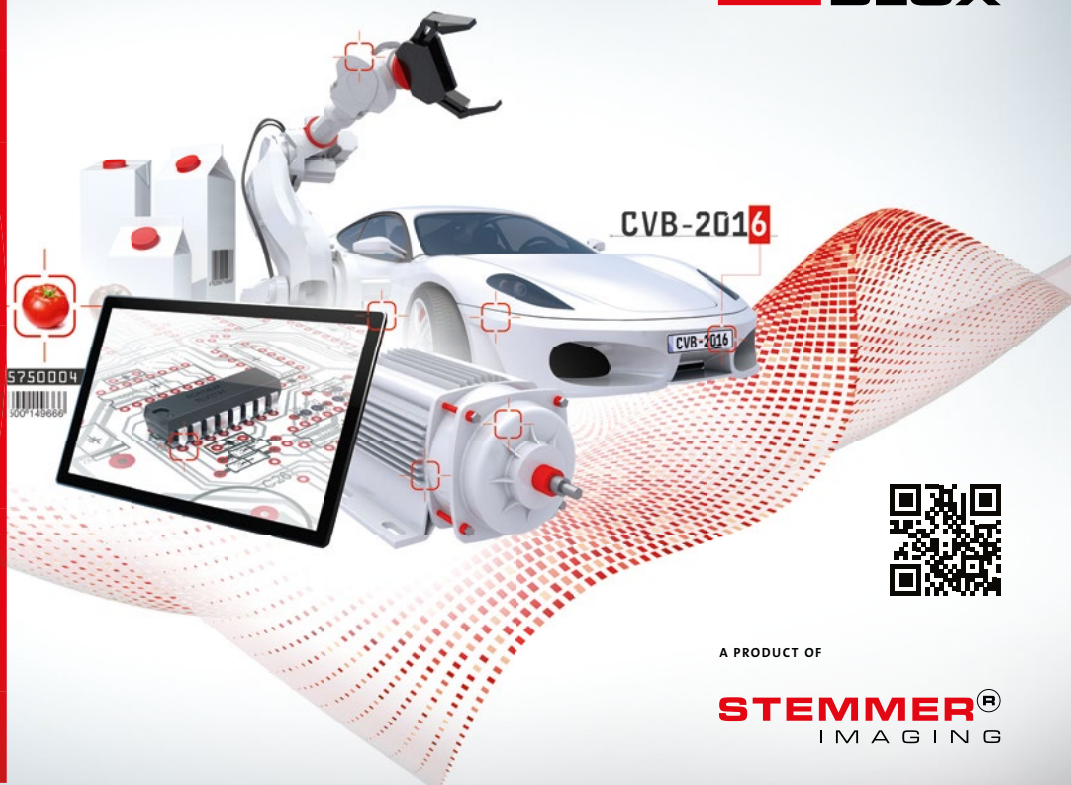
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Machine Builder/OEM, Solution Provider

Seidenader Vision GmbH · Lilienthalstr. 8, 85570 Markt Schwaben, Germany, Tel.: +49 8121 802 0, info@seidenader.de, www.seidenader.de

Producer

SensoPart Industriesensorik GmbH · Nägelseestr. 16, 79288 Gottenheim, Germany, Tel.: +49 7665 947 69 0, info@sensopart.de, www.sensopart.de

Producer

Sensor to Image GmbH · Lechtorstr. 20, 86956 Schongau, Germany, Tel.: +49 8861 2369 0, email@sensor-to-image.de, www.sensor-to-image.de

Machine Builder/OEM

Sglux GmbH · Ostendstr. 25, 12459 Berlin, Germany, Tel.: +49 30 530 152 14, welcome@sglux.de, www.sglux.com

Producer

Shape Drive GmbH · Bindingstr. 11, 82131 Stockdorf, Germany, Tel.: +49 89 454 612 86, info@shape-drive.com, www.shape-drive.com

Producer

Sharp Microelectronics Europe · Sonninstr. 3, 20097 Hamburg, Germany, Tel.: +49 40 2376 0, info.sme@sharp.eu, www.sharpsme.com

Producer

Sick is one of the world's leading suppliers of Industrial Sensors and Safety solutions. Sick provides industrial vision cameras for factory and logistics automation. The product line includes Vision Sensors, Smart Cameras, Code readers, Accessories and Cameras for high speed 3D Machine Vision. Target customers are Machine Builders, System Integrators and End Users.

Sick AG · Erwin-Sick-Str. 1, 79183 Waldkirch, Germany, Tel.: +49 7681 202 0, bildverarbeitung@sick.de, www.sick.com

Producer

Siemens AG Process Industries and Drives, Process Automation · Gleiwitzer Str. 555, 90475 Nürnberg, Germany, Tel.: +49 911 895 0, simatic-ident.i-ia@siemens.com, www.siemens.de/ident

Solution Provider

Signum Computer GmbH · Rüdeshheimer Str. 21, 80686 München, Germany, Tel.: +49 89 5470550, sales@signum-vision.de, www.signum-vision.de

Producer

Silicon Software is one of the international technology leaders with innovative product lines for industrial applications in Machine Vision and service provider for customized adaptations. The company produces off-the-shelf products as well as customized OEM solutions.

Hardware products are the series of intelligent image acquisition and processing boards. VisualApplets offers a graphical programming of FPGA processors in frame grabbers and cameras.

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Producer

Sill Optics GmbH & Co. KG · Johann-Höflfritsch-Str. 13, 90530 Wendelstein, Germany, Tel.: +49 9129 9023 0, info@silloptics.de, www.silloptics.de

Solution Provider

Simon IBV GmbH · Bayreuther Str. 5b, 95494 Gesees, Germany, Tel.: +49 9201 91 742 0, info@simon-ibv.de, www.simavis.de

Producer, Solution Provider

Slomotec, Dr. Frank Gabler · Grimmelshausenstr. 14, 63628 Bad Soden-Salmünster, Germany, Tel.: +49 6056 9836 674, info@slomotec.de, www.slomotec.de

Producer, Solution Provider

Smartray GmbH · BGM-Finsterwalder-Ring 12, 82515 Wolftrathshausen, Germany, Tel.: +49 8171 9683 400, info@smartray.de, www.smartray.de

Integrator, Solution Provider

SmartSurv Vision Systems GmbH · Malmshheimer Str. 7, 71063 Sindelfingen, Germany, Tel.: +49 7031 304 18 00, info@smartsurv.de, www.smartsurv.de

Producer

Solving3D GmbH · Osteriede 5, 30827 Garbsen, Germany, Tel.: +49 5131 907 97 20, info@solving3d.de, www.solving3d.de

Producer

Steinbichler Optotechnik GmbH · Georg-Wiesböck-Ring 12, 83115 Neubeuern, Germany, Tel.: +49 8035 8704 0, sales@steinbichler.de, www.steinbichler.de

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Integrator

Stöhrmann Systemtechnik · Im Erlenwäldle 21, 77955 Ettenheim, Germany, Tel.: +49 7822 895203, info@stoehrmann.de, www.stoehrmann.de

Producer

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Consultant

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www.stra-te-gema.com

Producer

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Producer

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Werner-von-Siemens-Str. 12, 98693 Ilmenau, Germany,
Tel.: +49 3677 208066, stz@stz-ilmenau.de, www.stz-ilmenau.de

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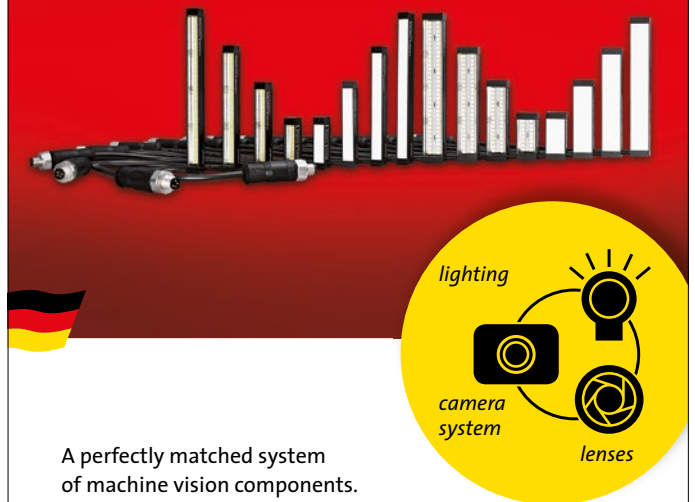


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Producer

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Producer, Solution Provider

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Producer

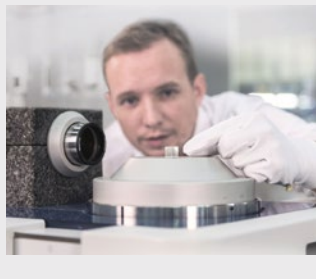
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Producer, Solution Provider

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Producer

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Producer

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Consultant, Integrator, Machine Builder/OEM, Producer, Solution Provider, Other

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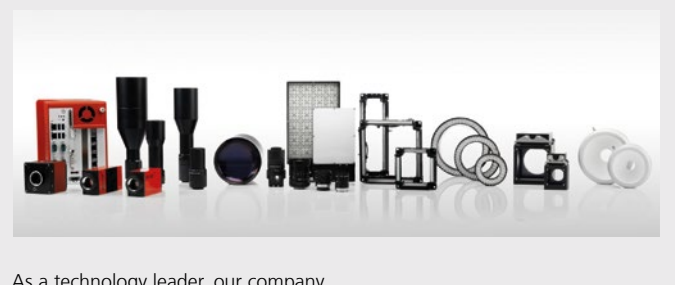
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Consultant, Other

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Consultant

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Solution Provider

Vision Tools Bildanalyse Systeme GmbH - Goethestr. 63-65, 68753 Waghäusel, Germany, Tel.: +49 7254 9351 0, info@vision-tools.com, www.vision-tools.com

Consultant

Vision Ventures is an independent, internationally operating boutique M&A advisory that focuses on SMEs active in machine vision and optical technologies. Our services cover strategy consulting, identification and improvement of value drivers – especially

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Distributor, Integrator, Producer, Solution Provider

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Distributor

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72793 Pfullingen, Germany, Tel.: +49 7121 9797 0, hs@vkt.de, www.vkt.de

Producer

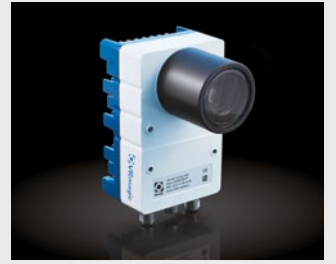
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Solution Provider

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Integrator, Solution Provider

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Distributor, Integrator, Solution Provider

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Producer

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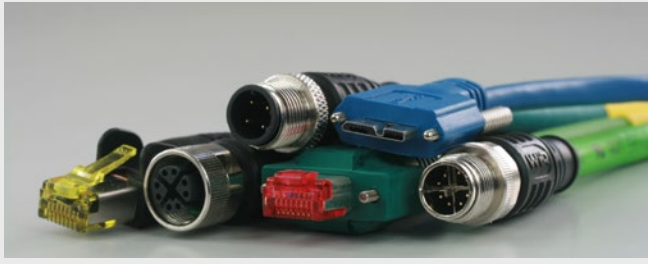
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Producer

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Integrator, Solution Provider

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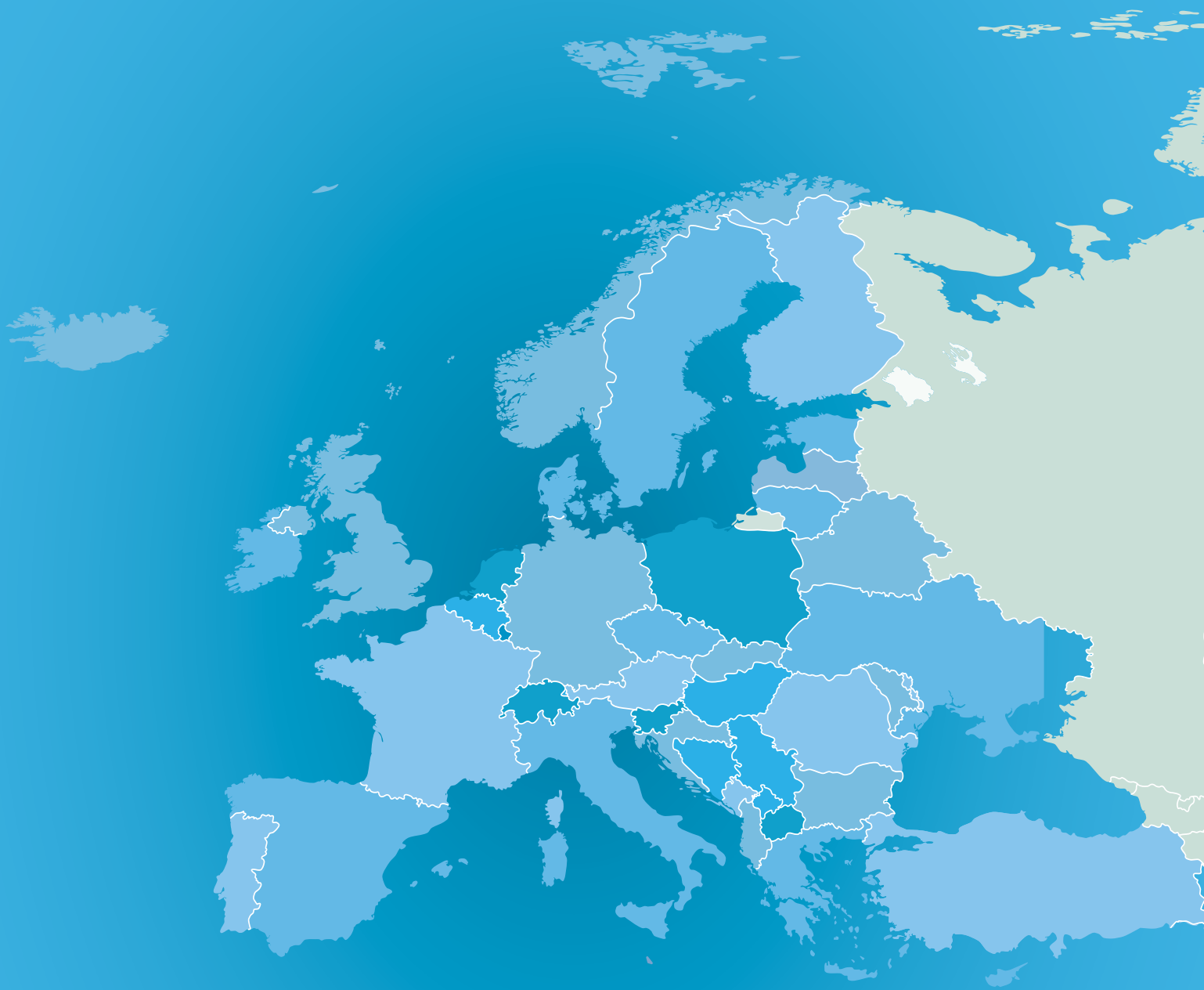
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Producer

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Producer

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Producer

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Solution Provider

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Producer

AnaFocus is specialized in the design and production of custom high-speed, high-performance CMOS camera systems on-chip (camera SoC) and vision systems on-chip (VSoC) for industrial, surveillance, scientific, and medical

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Integrator, Solution Provider

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Europe

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Distributor

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Solution Provider

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Producer

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Producer

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Machine Builder/OEM, Solution Provider

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Integrator, Solution Provider

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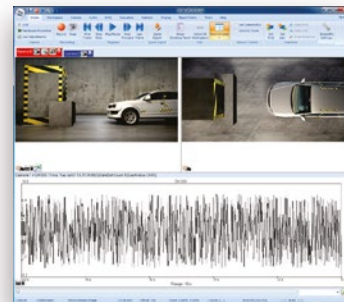
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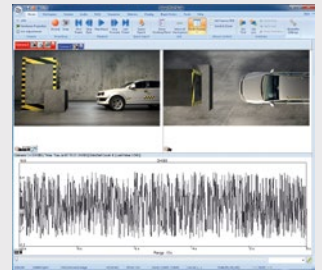
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North America

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Association

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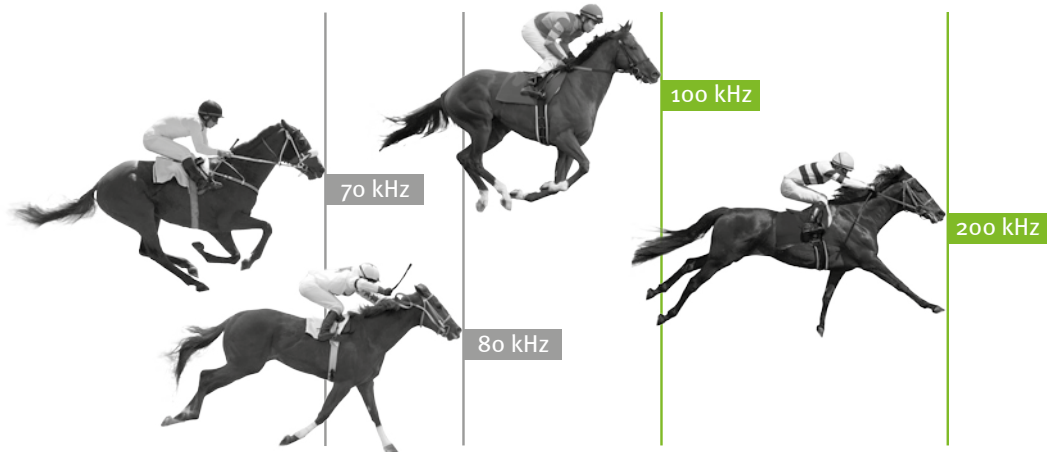
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AMS Technologies	www.amstechnologies.com
AnaFocus	www.anafocus.com
Andanta	www.andanta.de
Andor Technology	www.andor.com
AOS Technologies	www.aostechnologies.com
Applied Scintillation Technologies	www.scintacor.com
Artray	www.artray.co.jp
Asentics	www.asentics.de
Automation Technology	www.automationtechnology.de
BAP Image Systems	www.bapimgsys.com
Basler Vision Technologies	www.baslerweb.com
Baumer	www.baumer.com
Beijing Microview	www.microview.com.cn
Bock Optronics	www.bockoptronics.ca
C-Cam Technologies	www.c-cam.be
China Daheng Group	www.daheng-image.com
Chromasens	www.chromasens.de
Cmos Vision	www.cmosvision.com
Cmosis	www.cmosis.com
Cognex	www.cognex.com
Cohu	www.cohu-cameras.com
Compar	www.compar.ch
Cosyco	www.cosyco.de
CSEM	www.csem.ch
Cypress Semiconductor	www.cypress.com
Datalogic Automation	www.datalogic.com
Dedo Weigert	www.dedoweigertfilm.de
Digital West Imaging	www.highspeedvideos.com
e2v	www.e2v.com
ebs Automatisierte Thermographie und Systemtechnik	www.irpod.net

Edmund Optics	www.edmundoptics.de
EHD imaging	www.ehd.de
Eltec Elektronik	www.eltec.com
Entner Electronics	www.entner-electronics.com
Epix	www.epixinc.com
Erhard + Leimer	www.erhardt-leimer.com
Eureca Messtechnik	www.eureca.de
Euresys	www.euresys.com
eVision Systems	www.evision-systems.de
Fabrimex Systems	www.fabrimex-systems.ch
Fairchild Imaging	www.fairchildimaging.com
Fastec Imaging	www.fastecimaging.com
FiberVision	www.fibervision.de
FJW Optical Systems	www.findrscope.com
Flir Systems	www.flir.com
Fluke	www.fluke.de
Fort	www.fort-fr.com
Framos	www.framos.eu
Fraunhofer IMS	www.ims.fraunhofer.de
FSI Technologies	www.fsinet.com
Fuzhou Feihua Optoelectronic Technology	www.fzfh.com
G4 Technology	www.g4.com.tw
Gevicam	www.gevicam.com
gsvitec	www.gsvitec.com
Hamamatsu Photonics	www.hamamatsu.com
Helion	www.helionvision.com
Heliotis	www.heliotis.ch
High Speed Vision	www.hsvision.de
Hitachi Kokusai Electric Europe	www.hitachi-keu.com
Horn Imaging	www.horn-imaging.de
Ico Data	www.icodata.de
IDS	www.ids-imaging.com
Ifm electronic	www.ifm.com
Ikegami	www.ikegami.de
Illunis	www.illunis.com
Image House	www.imagehouse.dk
Image S	www.imagersrl.com
Imaging Solutions Group	www.isgcameras.com

Imi tech	www.imi-tech.com
Imperx	www.imperx.com
IMS Chips	www.ims-chips.de
Industrial Vision Systems	www.industrialvision.co.uk
Infaimon	www.infaimon.com
InfraTec	www.infratec.de
Insensiv	www.insensiv.de
IOS	www.ios-web.de
Ircam	www.ircam.de
IS Imaging Solutions	www.imaging-solutions.de
ISVI	www.isvi-corp.com
JAI	www.jai.com
Japan F.A. Systems	www.jfas.co.jp
JenCam	www.jencam.de
Jenoptik	www.jenoptik.de
Kamera Werke Dresden	www.kwdo.de
Kappa opto-electronics	www.kappa.de
Karlheinz Hinze Opto-engineering	www.hinze-opto.de
KeeKoon Electronics	www.keekoon.com
Klughammer	www.klughammer.de
Kvant	www.kvant.sk
Lambda Photometrics	www.lambdaphoto.co.uk
Lambert Instruments	www.lambert-instruments.com
Leitner Industrial Endoscopy	www.leitner-efer.de
Leutron Vision	www.leutron.com
Leuze electronic	www.leuze.com
LMI Technologies	www.lmi3d.com
Lord Ingenierie	www.lord-ing.com
LOT Quantum Design	http://lot-qd.de
Lumasense Technology	www.lumasenseinc.com
Lumenera	www.lumenera.com
Luster LightVision Tech	www.lusterinc.com
MAK Bildtechnik	www.mak-bildtechnik.de
Matrix Vision	www.matrix-vision.de
MaxxVision	www.maxxvision.com
Menzel Vision and Robotics	www.menzelab.com
Mesa Imaging	www.mesa-imaging.ch
MG Optical Solutions	www.mgopticalsolutions.com

Micro-Epsilon Eltrotec	www.eltrotec.com
Microsystems	www.microsystems.it
Mikromak Service	www.mikromak.com
Mikrotron	www.mikrotron.de
msiVision	www.msivision.com
NAC	www.nacinc.de
Narragansett Imaging	www.nimaging.com
National Instruments	www.ni.com
NED	www.ned-sensor.co.jp
NET	www.net-gmbh.com
NeuPro Solutions	www.neupro-solutions.com
New Imaging Technologies	www.new-imaging-technologies.com
NTI	www.nti-measure.com
Odem Technologies	www.odem.co.il
Olympus	www.olympus-europa.com
Omron	www.industrial.omron.de
Opto Fidelity	www.optofidelity.com
Opto Sonderbedarf	www.opto.de
Oprima	www.opprima.com
Optris	www.optris.de
Optronis	www.optronis.com
Orbis	www.orbis.eu
Panasonic Electric Works	www.panasonic-electric-works.de
Parameter	www.parameter.se
PCO	www.pco.de
Pentacon	www.pentacon.de
PerkinElmer Optoelectronics	www.perkinelmer.com
Philips	www.apptech.philips.com/vision
Photonfocus	www.photonfocus.com
Photron	www.photron.com
Phytec Messtechnik	www.phytec.de
Pi4 Robotics	www.pi4.de
Pieper	www.pieper-video.de
PixeLink	www.pixelink.com
PMDTec	www.pmdtec.com
Point Grey Research	www.ptgrey.com
Polytec	www.polytec.de
Premier Electronics	www.premierelect.co.uk

Princeton Instruments	www.princetoninstruments.com	Tekno Optik	www.teknooptik.se
Proxitronic	www.proxitronic.com	Tekstar Optical	www.tekstaroptical.com
Qualimatest	www.qmt.ch	Teledyne Dalsa	www.teledynedalsa.com
Quest Innovations	www.quest-innovations.com	The Imaging Source	www.theimagingsource.com
Rad-icon Imaging	www.rad-icon.com	Thermosensorik	www.thermosensorik.de
Rauscher	www.rauscher.de	Tichawa Vision	www.tichawa.de
Redlake	www.redlake.com	Toshiba	www.toshiba.ch
RH Engineering	www.rhengineering.de	Toshiba Teli	www.toshiba-teli.co.jp
Ricoh Imaging Deutschland	www.ricoh-mv-security.eu	TriDiCam	www.TriDiCam.de
Roper Scientific	www.roperscientific.de	TVI Vision	www.tvivision.com
Rubroeder	www.rubroeder.de	Unibrain	www.unibrain.com
Salvador Imaging	www.salvadorimaging.com	VDS Vosskühler	www.vdsvossk.de
Schael-Optik	www.schael-optik.de	Vega Technology Group	www.vegatcgroup.com
Schmachtl	www.schmachtl.at	Vialux	www.vialux.de
SDT - Dr. Seitner	www.sdt-seitner.com	Vicon Motion Systems	www.vicon.com
Second2None	www.visiondragon.com	Videology Imaging Solutions	www.videologyinc.com
Secube	www.secube.co.kr	Videor Technical	www.videor.com
Sedeco Vision Components	www.sedeco.nl	ViDiSys	www.vidisys.de
Seiwa Optical	www.seiwaopt.co.jp	visicontrol	www.visicontrol.com
Sensor to Image	www.sensor-to-image.de	Visiolaser	www.vannier-photelec.fr/visiolaser
Sensors Unlimited	www.sensorsinc.com	Vision & Control	www.vision-control.com
Sentech	www.sentech.co.jp	Vision Components	www.vision-components.com
Sglux	www.sglux.com	Vision Research	www.visionresearch.com
Sharp Microelectronics	www.sharpsme.com	Vision Tools	www.vision-tools.com
SKS Vision Systems	www.visionsystems.fi	Visiosens	www.visiosens.de
Slomotec	www.slomotec.de	Vistas	www.vistas-gmbh.de
Smartek	www.smartek.hr	Vitronic	www.vitronic.com
Smartray	www.smartray.de	Vizaar	www.vizaar.de
Soliton Technologies	www.solitontech.com	VKT	www.vkt.de
Sony	www.pro.sony.eu/vision	VRmagic	www.vrmagic.com
Stemmer Imaging	www.stemmer-imaging.com	Weiss Imaging and Solutions	www.weiss-imaging.de
STZ Qualitätssicherung und Bildverarbeitung	www.stz-ilmeneau.de	Werner Nophut	www.dsam.de
Sugitoh	www.sugitoh.jp	Xenics	www.xenics.com
SVS Vistek	www.svs-vistek.com	Ximea	www.ximea.com
Symco	www.symco.co.jp	Zertrox	www.zertrox.de
Systematic Vision	www.systematicvision.com		
Tattile	www.tattile.com		

Consulting, Marketing, Education & Other Services

AIA Automated Imaging Association	www.machinevisiononline.org
Alfavision	www.alfavision.de
AMC	www.amc-hofmann.com
Arvoo Imaging Products	www.arvoo.com
AS Thermographie	www.as-thermografie.de
Asentics	www.asentics.de
CMES – Chinese Mechanical Engineering Society	www.cmes.org
Cmos Vision	www.cmosvision.com
Cmosis	www.cmosis.com
Cognex	www.cognex.com
Collischon Optik-Design	www.mikro-optik.de
CSEM	www.csem.ch
CTMV	www.ctmv.de
Datapixel	www.datapixel.com
de Man Industrie-Automation	www.deman.de
Digital West Imaging	www.highspeedvideos.com
Duwe 3D	www.duwe-3d.de
EMVA European Machine Vision Association	www.emva.org
Entner Electronics	www.entner-electronics.com
Erhard + Leimer	www.erhardt-leimer.com
Farbmessung Schröder	www.farbmessung.com
FiberVision	www.fibervision.de
Framos	www.framos.eu
Fraunhofer Allianz Vision	www.vision.fraunhofer.de
G4 Technology	www.g4.com.tw
Gesellschaft für Bild- und Signalverarbeitung (GBS)	www.gbs-ilmenau.de
GFai	www.gfai.de
GIT Verlag	www.gitverlag.com
IDS	www.ids-imaging.com
Imaging Lab	www.imaginglab.it
Impuls	www.impuls-imaging.com
INB Vision	www.inb-vision.com
Infaimon	www.infaimon.com
InRay Solutions	www.inrays.com
Irida Labs	www.irdalabs.gr
IS Imaging Solutions	www.imaging-solutions.de

IVAN	www.feda.nl
JIIA Japan Industrial Imaging Association	www.jiia.org
Joanneum Research	www.joanneum.at
Kappa opto-electronics	www.kappa.de
Landesmesse Stuttgart	www.vision-fair.de
Lincoln Laser Company	www.lincolnlaser.com
Messe München	www.messe-muenchen.de
Michigan Metrology	www.michmet.com
msiVision	www.msivision.com
Neurocheck	www.neurocheck.com
Norman N. Axelrod Associates	www.axelrodassociates.com
NTI	www.nti-measure.com
Omron	www.industrial.omron.de
Optical Research Associates	www.opticalres.com
Opto	www.opto.de
Opto Fidelity	www.optofidelity.com
P.E. Schall	www.schall-messen.de
Phytec Messtechnik	www.phytec.de
Pi4 Robotics	www.pi4.de
Polytec	www.polytec.com
Rubroeder	www.rubroeder.de
Sensor to Image	www.sensor-to-image.de
SmartSurv	www.smartsurv.de
Solving3D	www.solving3d.de
SPG Data 3D	www.spgdata3d.com
Stemmer Imaging	www.stemmer-imaging.com
Strategema Frank Olschewski Consulting	www.stra-te-gema.com
STZ Qualitätssicherung und Bildverarbeitung	www.stz-ilmenau.de
Supercomputing Systems	www.scs-vision.ch
SVS Vistek	www.svs-vistek.com
Symop	www.symop.com
Systematic Vision	www.systematicvision.com
UKIVA	www.ukiva.org
University of Applied Sciences	www.fbmn.h-da.de
Univision	www.univision.it
Van de Loosdrecht Machine Vision	www.vdlmv.nl

Frame Grabber

VDMA Industrielle Bildverarbeitung	www.vdma.org/vision
Vega Technology Group	www.vegatcgroup.com
Vision & Control	www.vision-control.com
Vision Academy	www.vision-academy.org
Vision Club of Finland	www.automaatioseura.fi
Vision Machines	www.vision-machines.com
Vision Tools	www.vision-tools.com
Vision Ventures	www.vision-ventures.eu
Visionlink	www.visionlink.it
Vitronic	www.vitronic.com
VMT	www.vmt-gmbh.com
Wenglor sensoric	www.wenglor.com
Zertrox	www.zertrox.de

Active Silicon	www.activesilicon.com
Adlink	www.adlinktech.eu
Alacron	www.alacron.com
Alrad Imaging	www.alrad.co.uk
Arvoo Imaging Products	www.arvoo.com
Baumer	www.baumer.com
Beijing Microview	www.microview.com.cn
BitFlow	www.bitflow.com
Bock Optronics	www.bockoptronics.ca
China Daheng Group	www.daheng-image.com
Cognex	www.cognex.com
Cosyco	www.cosyco.de
Cyberoptics Semiconductor	www.imagenation.com
EDT	www.edt.com
EHD imaging	www.ehd.de
Ellips	www.ellips.nl
Eltec Elektronik	www.eltec.com
Epix	www.epixinc.com
Fabrimex Systems	www.fabrimex-systems.ch
Fast	www.fast-corp.co.jp
Framos	www.framos.eu
G4 Technology	www.g4.com.tw
Gidel	www.gidel.com
HaSoTec	www.hasotec.com
IDS	www.ids-imaging.com
Image House	www.imagehouse.dk
Image S	www.imagesrl.com
Imaging Solutions Group	www.isgcameras.com
Imperx	www.imperx.com
Infaimon	www.infaimon.com
IS Imaging Solutions	www.imaging-solutions.de
Isra Vision	www.isravis.com
Japan F.A. Systems	www.jfas.co.jp
Karlheinz Hinze Optoengineering	www.hinze-opto.de
Kvant	www.kvant.sk
Lambda Photometrics	www.lambdaphoto.co.uk
Leutron Vision	www.leutron.com
Luster LightVision Tech	www.lusterinc.com
Matrix Vision	www.matrix-vision.de
Matrox Imaging	www.matrox.com/imaging

Illumination & Lighting Systems

MaxxVision	www.maxxvision.com
Menzel Vision and Robotics	www.menzelab.com
Microsystems	www.microsystems.it
Mikrotron	www.mikrotron.de
msiVision	www.msivision.com
National Instruments	www.ni.com
Odem Technologies	www.odem.co.il
Orbis	www.orbis.eu
Parameter	www.parameter.se
Phytec Messtechnik	www.phytec.de
Pi4 Robotics	www.pi4.de
Polytec	www.polytec.com
Premier Electronics	www.premierelect.co.uk
Qualimatest	www.qmt.ch
Rauscher	www.rauscher.de
Schael-Optik	www.schael-optik.de
Schmachtl	www.schmachtl.at
Second2None	www.visiondragon.com
Sensor to Image	www.sensor-to-image.de
Silicon Software	www.silicon-software.de
Stemmer Imaging	www.stemmer-imaging.com
STZ Qualitätssicherung und Bildverarbeitung	www.stz-ilmenau.de
Sundance Multiprocessor Technology	www.sundance.com
SVS Vistek	www.svs-vistek.com
Symco	www.symco.co.jp
Systematic Vision	www.systematicvision.com
Teledyne Dalsa	www.teledynedalsa.com
The Imaging Source	www.theimagingsource.com
Videology Imaging Solutions	www.videologyinc.com
ViDiSys	www.vidisys.de
Vision Tools	www.vision-tools.com
Visionlink	www.visionlink.it
Vistek	www.vistekas.com
Weiss Imaging and Solutions	www.weiss-imaging.de

ABW	www.abw-3d.de
Acal BFi Germany	www.bfiptilas.com
Advanced Illumination	www.advancedillumination.com
Allison Park Group	www.apgvision.com
Alrad Imaging	www.alrad.co.uk
Balluff	www.balluff.com
Baumer	www.baumer.com
Bock Optronics	www.bockoptronics.ca
Büchner Lichtsysteme	www.buechner-lichtsysteme.de
Cavitar	www.cavitar.com
CCS Europe	www.ccs-grp.com
Ceres Vision	www.ceresvision.de
Chromasens	www.chromasens.de
Cognex	www.cognex.com
Coherent	www.coherent.com
Collischon Optik-Design	www.mikro-optik.de
DCM Sistemas	www.dcmsistemas.com
Dedo Weigert	www.dedoweigertfilm.de
Digital West Imaging	www.highspeedvideos.com
Edmund Optics	www.edmundoptics.de
Effilux	www.effilux.fr
Erhard + Leimer	www.erhardt-leimer.com
Fabrimex Systems	www.fabrimex-systems.ch
Falcon Illumination MV	www.falcon-illumination.de
Faseroptik Henning	www.faseroptik-henning.de
Fiberoptics Technology	www.fiberoptix.com
FiberVision	www.fibervision.de
Finger	www.finger-kg.de
Framos	www.framos.eu
Frankfurt Laser Company	www.frlaserco.com
FSI Technologies	www.fsinet.com
G4 Technology	www.g4.com.tw
Gardasoft Vision	www.gardasoft.com
GPP Chemnitz	www.gppc.de
Hamamatsu Photonics	www.hamamatsu.com
Helmut Hund	www.hund.de
Hema	www.hema.de
Herbert Waldmann	www.waldmann.com
IB/E Optics	www.ibe-optics.com
Ifm electronic	www.ifm.com

iiM	www.iimag.de
ILEE	www.ilee.ch
Image House	www.imagehouse.dk
Image S	www.imagesrl.com
Infaimon	www.infaimon.com
Insensiv	www.insensiv.de
IS Imaging Solutions	www.imaging-solutions.de
ISVI	www.isvi-corp.com
Japan F.A. Systems	www.jfas.co.jp
Jenoptik Laser, Optik, Systeme	www.jenoptik-los.de
Jos. Schneider Optische Werke	www.schneiderindustrial-optics.com
Karlheinz Hinze Optoengineering	www.hinze-opto.de
Keyence	www.keyence.de
Klastech	www.klastech.com
Klughammer	http://kms-e.de
Kvant	www.kvant.sk
Lambda Photometrics	www.lambdaphoto.co.uk
Laser 2000	www.laser2000.de
Laser Components	www.lasercomponents.com
LAT elektronik	www.latab.se
LDD Trading Associates	www.lddlight.com
Leistungselektronik Jena	www.lej.de
Leitner Industrial Endoscopy	www.leitner-efer.de
Leutron Vision	www.leutron.com
LMI Technologies	www.lmi3d.com
LOT Quantum Design	http://lot-qd.de
Luster LightVision Tech	www.lusterinc.com
Matrix Vision	www.matrix-vision.de
MaxxVision	www.maxxvision.com
Menzel Vision and Robotics	www.menzelab.com
Metaphase Technologies	www.metaphase-tech.com
MG Optical Solutions	www.mgopticalsolutions.com
Microscan	www.microscan.com
Microsystems	www.microsystems.it
Moritex	www.moritex.com
msiVision	www.msivision.com
MTD	www.mtd-light.com
Myutron	www.myutron.com

NET	www.net-gmbh.com
NeuPro Solutions	www.neupro-solutions.com
Odem Technologies	www.odem.co.il
Olympus	www.olympus-europa.com
Omicron Laserage	www.omicron-laser.de
Omron	www.industrial.omron.de
Opto	www.opto.de
Opto Engineering	www.opto-engineering.com
Opto Precision	www.optoprecision.de
Optometron	www.optometron.de
OptoPolymer	www.optopolymer.de
Orbis	www.orbis.eu
Parameter	www.parameter.se
PerkinElmer Optoelectronics	www.perkinelmer.com
Phaer	www.phaer.be
Phlox	www.phlox-gc.com
Phytec Messtechnik	www.phytec.de
Pi4 Robotics	www.pi4.de
Planistar Lichttechnik	www.planistar.de
POG Präzisionsoptik Gera	www.pog.eu
Polytec	www.polytec.com
Power Technology	www.powertechnology.com
Profactor	www.profactor.at
Qualimatest	www.qmt.ch
Rauscher	www.rauscher.de
RH Engineering	www.rhengineering.de
Rheintacho Messtechnik	www.rheintacho.com
Schael-Optik	www.schael-optik.de
Schäfter + Kirchhoff	www.sukhamburg.de
Schmachtl	www.schmachtl.at
Schott Lighting and Imaging	www.schott.com
Second2None	www.visiondragon.com
Sedeco Vision Components	www.sedeco.nl
Seiwa Optical	www.seiwaopt.co.jp
Sharp Microelectronics	www.sharpsme.com
Sill Optics	www.silloptics.de
Smart Vision Lights	www.smartvisionlights.com
Soliton Technologies	www.solitontech.com

Microscopes, Endoscopes & Equipment

Special Application Products	www.sapltd.co.uk
Spectrum Illumination	www.spectrumillumination.com
Stemmer Imaging	www.stemmer-imaging.com
StockerYale	www.stockeryale.com
STZ Qualitätssicherung und Bildverarbeitung	www.stz-ilmenau.de
SVS Vistek	www.svs-vistek.com
Symco	www.symco.co.jp
Tecin	www.tecin.de
Tekno Optik	www.teknooptik.se
Tema	www.temavisio.com
The Imaging Source	www.theimagingsource.com
Univision	www.univision.it
V Cubed	www.vcubed.co.uk
Vialux	www.vialux.de
Visicontrol	www.visicontrol.com
Visiolaser	www.vannier-photelec.fr/visiolaser
Vision & Control	www.vision-control.com
Vision Light Tech	www.visionlighttech.com
Vision Tools	www.vision-tools.com
Visionlink	www.visionlink.it
Visitool	www.visitool.de
Vistas	www.vistas-gmbh.de
Volpi	www.volpi.ch
Weiss Imaging and Solutions	www.weiss-imaging.de
Wenglor sensoric	www.wenglor.com
Zertrox	www.zertrox.de

Alrad Imaging	www.alrad.co.uk
AMS Technologies	www.amstechnologies.com
Andor Technology	www.andor.com
Asylum Research	www.asylumresearch.com
Bock Optronics	www.bockoptronics.ca
Breitmeier Messtechnik	www.breitmeier.de
Carl Zeiss Microimaging	www.zeiss.de/microscopy
Deben UK	www.deben.co.uk
Dr. Heinrich Schneider Messtechnik	www.dr-schneider.de
Edmund Optics	www.edmundoptics.de
EHD Imaging	www.ehd.de
Fei Company	www.fei.com
Fort	www.fort-fr.com
FRT Fries Research & Technology	www.frt-gmbh.com
G4 Technology	www.g4.com.tw
Heliotis	www.heliotis.ch
Helmut Hund	www.hund.de
Hipp Endoskop Service	www.hipp-endoskopservice.com
Horn Imaging	www.horn-imaging.de
Infaimon	www.infaimon.com
Infinity Photo-Optical	www.infinity-usa.com
Karl Storz	www.karlstorz.com
Karlheinz Hinze Optoengineering	www.hinze-opto.de
Kdorf Automation	www.kdorf.de
Keyence	www.keyence.de
Klughammer	www.klughammer.de
Kvant	www.kvant.sk
Leica Microsystems	www.leica-microsystems.com
Leitner Industrial Endoscopy	www.leitner-efer.de
LOT Quantum Design	http://lot-qd.de
MBR	www.mbr-gmbh.com
Micos	www.micos.ws
Micro-Epsilon	www.eltrotec.com
Mikroskoptechnik Rathenow	www.askania.de
Mitutoyo	www.mitutoyo.de
Moritex	www.moritex.com
msiVision	www.msivision.com
NanoFocus	www.nanofocus.de

Optical Metrology

Nanosurf	www.nanosurf.com
Nikon	www.nikoninstruments.eu
Olympus	www.olympus-europa.com
Opto	www.opto.de
OptoMess	www.optomess.de
Optometron	www.optometron.de
Optoprim	www.optoprim.de
Oxford Instruments	www.oxford-instruments.com
Panasonic	http://business.panasonic.co.uk/imv
PCE Power Control	www.pce-powercontrol.de
Physik Instrumente	www.pi.ws
Pi4 Robotics	www.pi4.de
Pro Design Electronic	www.prodesign-europe.com
Richard Wolf	www.richard-wolf.com
Rubroeder	www.rubroeder.de
Schael-Optik	www.schael-optik.de
Schäfer Technologie	www.schaefer-tec.com
Seiwa Optical	www.seiwaopt.co.jp
STZ Qualitätssicherung und Bildverarbeitung	www.stz-ilmenau.de
Tecin	www.tecin.de
Tekno Optik	www.teknooptik.se
Thermosensorik	www.thermosensorik.de
Vega Technology Group	www.vegatcgroup.com
Vision Engineering	www.visioneng.de
Visitool	www.visitool.de
Walter Uhl	www.walteruhl.de
Weiss Imaging and Solutions	www.weiss-imaging.de
Werth Messtechnik	www.werthmesstechnik.de
Wild	www.wild.at

3D Shape	www.3d-shape.com
Alicona Imaging	www.alicon.com
Allsens Messtechnik	www.allsens.de
AMS Technologies	www.amstechnologies.com
Andor Technology	www.andor.com
Applied Electro-Optics	www.aeou.com
Applied Scintillation Technologies	www.scintacor.com
Armstrong Optical	www.armstrongoptical.co.uk
Avantes	www.avantes.com
Benteler Maschinenbau	www.benteler.de
Bentham Instruments	www.bentham.co.uk
Berliner Glas Gruppe	www.berlinglas.de
Breitmeier Messtechnik	www.breitmeier.de
BST eltomat International	www.bst-international.com
BST International	www.bst-international.com
Carl Zeiss IMT	www.zeiss.de/Messtechnik
Carl Zeiss Microimaging	www.zeiss.de/microscopy
Chunghwa Leading Photonics Tech (CLPT)	www.clpt.com.tw
CMC Kuhnke	www.cmc-kuhnke.de
ColorLite	www.colorlite.de
Confovis	www.confovis.com
Creaform Deutschland	www.creaform3d.com
Dantec Dynamics	www.dantecdynamics.com
Datapixel	www.datapixel.com
Digital Surf	www.digitalsurf.com
Dr. Heinrich Schneider Messtechnik	www.dr-schneider.de
Dr. Wehrhahn Messsysteme	www.drwehrhahn.com
Dyoptyka	www.dyoptyka.com
EHD Imaging	www.ehd.de
Electronic Systems	www.electronicssystem.it
ElektroPhysik Dr. Steingroever	www.elektrophysik.com
EVK DI Kerschhagl	www.evk.biz
Farbmessung Schröder	www.farbmessung.com
Faro	www.faro.com
FJW Optical Systems	www.findscope.com
Fraunhofer IFF	www.mpt.iff.fraunhofer.de

FRT Fries Research & Technology	www.frt-gmbh.com
G4 Technology	www.g4.com.tw
GE Sensing & Inspection Technologies	www.gemeasurement.com
GOM	www.gom.com
Hamamatsu Photonics	www.hamamatsu.com
Heitronics Infrarot Messtechnik	www.heitronics.com
Hexagon Manufacturing Intelligence	www.hexagonmi.com
Hipp Endoskop Service	www.hipp-endoskopservice.com
IB/E Optics	www.ibe-optics.com
Ico Data	www.icodata.de
iiM	www.iimag.de
ILEE	www.ilee.ch
Imetric	www.imetric.com
Infaimon	www.infaimon.com
Infinity Photo-Optical	www.infinity-usa.com
InfraTec	www.infratec.de
Innowep	www.innowep.com
InSystems Automation	www.insystems.de
Isi-sys	www.isi-sys.com
Jenoptik	www.jenoptik.de
Jos. Schneider Optische Werke	www.schneiderkreuznach.com
Kleiber Infrared	www.kleiberinfrared.com
Konica Minolta	www.konicaminolta.eu
Kreon Technologies	www.kreon3d.com
Lambda Photometrics	www.lambdaphoto.co.uk
LamTech	www.lamtech.de
Land Instruments	www.landinst.com
LAP	www.lap-laser.com
Laser 2000	www.laser2000.de
Laser Components	www.lasercomponents.com
Laser Quantum	www.laserquantum.com
LayTec	www.laytec.de
LDV Systeme	www.ldv-systeme.de
Leitner Industrial Endoscopy	www.leitner-efer.de
Limess	www.limess.com
LOT Quantum Design	http://lot-qd.de
M-u-t	www.mut-group.com
Mahr	www.mahr.de

Meta Vision Systems	www.meta-mvs.co.uk
Metris	www.metris.com
MG Optical Solutions	www.mgopticalsolutions.com
Michigan Metrology	www.michmet.com
Mikropack	www.mikropack.de
Mirco-Epsilon Eltrotec	www.eltrotec.com
Mitutoyo	www.mitutoyo.de
Moeller-Wedel Optical	www.moeller-wedel-optical.com
Molenaar Optics	www.molenaar-optics.com
Moritex	www.moritex.com
Mycrona	www.mycrona.de
NanoFocus	www.nanofocus.de
Nikon Metrology	www.nikonmetrology.com
Novacam Technologies	www.novacam.com
NTI	www.nti-measure.com
Nub3d	www.nub3d.com
Odem Technologies	www.odem.co.il
OGP Messtechnik	www.ogpmesstechnik.de
Olympus	www.olympus-europa.com
Opsira	www.opsira.de
Optimet Optical Metrology	www.optimet.com
Opto	www.opto.de
Opto Fidelity	www.optofidelity.com
Opto Precision	www.optoprecision.de
OptoMess	www.optomess.de
Optometron	www.optometron.de
OptoPolymer	www.optopolymer.de
Optoprim	www.optoprim.de
OptoSurf	www.optosurf.com
Optris	www.optris.de
Orbis	www.orbis.eu
Oxford Instruments	www.oxford-instruments.com
Parameter	www.parameter.se
Pentacon	www.pentacon.de
Perceptron	www.perceptron.com
PerkinElmer Optoelectronics	www.perkinelmer.com
Phaer	www.phaer.be
Phynix	www.phynix.de
Pi4 Robotics	www.pi4.de
Plasmo Industrietechnik	www.plasmo.eu

Polygon	www.polygon-technology.de
Polytec	www.polytec.de
Precitec Optronik	www.precitec-optronik.de
Premosys	www.premosys.com
Princeton Instruments	www.princetoninstruments.com
Proxitronic	www.proxitronic.com
Quest Innovations	www.quest-innovations.com
Raytek	www.raytek.de
Rheintacho Messtechnik	www.rheintacho.com
Richard Wolf	www.richard-wolf.com
Roper Scientific	www.roperscientific.de
Rudolph Technologies	www.rudolphtech.com
Schäfer Technologie	www.schaefer-tec.com
Sensor Instruments	www.sensorinstruments.de
Sensors Unlimited	www.sensorsinc.com
SGM Schut	www.schut.com
Shape Drive	www.shape-drive.com
Sick	www.sick.com
Sios Meßtechnik	www.sios.de
SKS Vision Systems	www.visionsystems.fi
Soliton	www.soliton-gmbh.de
Specim Spectral Imaging	www.specim.fi
Steinbichler Optotechnik	www.steinbichler.com
Stiefelmayer	www.stiefelmayer.de
Stil	www.stilsa.com
SynView	www.synview.com
Taylor Hobson	www.taylor-hobson.com
Tec5	www.tec5.com
TechnoTeam	www.technoteam.de
Tekno Optik	www.teknooptik.se
Topometric	www.topometric.net
Tordivel	www.scorpionvision.com
Ulis	www.ulis-ir.com
Vialux	www.vialux.de
Videometer	www.videometer.com
Visiolaser	www.vannier-photelec.fr/ visiolaser
Vision Machines	www.vision-machines.com
ViZaar	www.vizaar.de

Volform	www.volform.se
Wente/Thiedig	www.wente-thiedig.de
Werth Messtechnik	www.werthmesstechnik.de
Wild	www.wild.at
X-Rite	www.xrite.com
Xenics	www.xenics.com
Yxlon International	www.yxlon.com
Z-Laser	www.z-laser.com
Zwick	www.zwick.de
ZygoLOT	www.zygot.de

Optics

Acal BFi Germany	www.bfiptilas.com	Infaimon	www.infaimon.com
Allied Vision Technologies	www.alliedvisiontec.com	Ircam	www.ircam.de
Alrad Imaging	www.alrad.co.uk	IS Imaging Solutions	www.imaging-solutions.de
AMS Technologies	www.amstechnologies.com	ISVI	www.isvi-corp.com
Anteryon	www.anteryon.com	Japan F.A. Systems	www.jfas.co.jp
Armstrong Optical	www.armstrongoptical.co.uk	Jenoptik	www.jenoptik.de
Azure Photonics	www.azurephotonics.com	Jos. Schneider Optische Werke	www.schneiderkreuznach.com
B & M Optik	www.bm-optik.de	Karlheinz Hinze Optoengineering	www.hinze-opto.de
Baumer	www.baumer.com	KeeKoon Electronics	www.keekoon.com
Berliner Glas Gruppe	www.berlinerglas.com	Keyence	www.keyence.de
BK Interferenzoptik	www.interferenzoptik.de	Kowa Europe	www.kowa.eu
Bock Optronics	www.bockoptronics.ca	Kvant	www.kvant.sk
Carl Zeiss	www.zeiss.com/lenses4industry	Lambda Photometrics	www.lambdaphoto.co.uk
Carl Zeiss IMT	www.zeiss.de/messtechnik	Laser 2000	www.laser2000.de
Carl Zeiss Microimaging	www.zeiss.de/microscopy	Laser Components	www.lasercomponents.com
CBC Deutschland	www.cbc-de.com	Leading-Tech Laser	www.leading-techlaser.com
Collischon Optik-Design	www.mikro-optik.de	Lensation	www.lensation.de
Cosyco	www.cosyco.de	Leoni	www.leoni-fiber-optics.com
Deposition Sciences	www.depsci.com	Lincoln Laser	www.lincolnlaser.com
Docter Optics	www.docteroptics.com	LMI Technologies	www.lmi3d.com
Edmund Optics	www.edmundoptics.de	LOT Quantum Design	http://lot-qd.de
EHD imaging	www.ehd.de	Luster LightVision Tech	www.lusterinc.com
Eureca Messtechnik	www.eureca.de	Matrix Vision	www.matrix-vision.de
Fabrimex Systems	www.fabrimex-systems.ch	MaxxVision	www.maxxvision.com
FiberVision	www.fibervision.de	Menzel Vision and Robotics	www.menzelab.com
Finger	www.finger-kg.de	Meuser Optik	www.meuser-optik.com
Fisba Optik	www.fisba.ch	MG Optical Solutions	www.mgopticalsolutions.com
Framos	www.framos.eu	Micos	www.micos.ws
FRT Fries Research & Technology	www.frt-gmbh.com	Micro-Epsilon Eltrotec	www.eltrotec.com
Fujifilm	www.fujifilm.eu	Microsystems	www.microsystems.it
G4 Technology	www.g4.com.tw	Midwest Optical Systems	www.midopt.com
Goyo Optical	www.goyooptical.com	Moeller-Wedel Optical	www.moeller-wedel-optical.com
Helmut Hund	www.hund.de	Molenaar Optics	www.molenaar-optics.com
Holoeye Photonics	www.holoeye.com	Moritex	www.moritex.com
IB/E Optics	www.ibe-optics.com	msiVision	www.msivision.com
IDS	www.ids-imaging.com	Myutron	www.myutron.com
iiM	www.iimag.de	Navitar	www.navitar.com
Image House	www.imagehouse.dk	NET	www.net-gmbh.com
Image S	www.imagesrl.com	NeuPro Solutions	www.neupro-solutions.com
IMT	www.imtag.ch	Odem Technologies	www.odem.co.il

Olympus	www.olympus-europa.com
Omron	www.industrial.omron.de
Optec	www.optec.eu
Optics Balzers	www.opticsbalzers.com
Opto	www.opto.de
Opto Engineering	www.opto-engineering.com
Opto Precision	www.optoprecision.de
Optometron	www.optometron.de
Orbis	www.orbis.eu
Parameter	www.parameter.se
Phaer	www.phaer.be
Photonic Products	www.photonic-products.com
Pi4 Robotics	www.pi4.de
POG Präzisionsoptik Gera	www.pog.eu
Polytec	www.polytec.com
Profactor	www.profactor.at
Qioptiq	www.qioptiq.com
Qualimatest	www.qmt.ch
Rauscher	www.rauscher.de
Resolve Optics	www.resolveoptics.com
RH Engineering	www.rhengineering.de
Schael-Optik	www.schael-optik.de
Schäfter + Kirchhoff	www.sukhamburg.de
Schmachtl	www.schmachtl.at
Schott Lighting and Imaging	www.schott.com
Second2None	www.visiondragon.com
Sedeco Vision Components	www.sedeco.nl
Seiwa Optical	www.seiwaopt.co.jp
Sill Optics	www.silloptics.de
Space	www.spacecom.co.jp
Spectros	www.spectros.ch
Spectrum Illumination	www.spectrumillumination.com
Stemmer Imaging	www.stemmer-imaging.com
STZ Qualitätssicherung und Bildverarbeitung	www.stz-ilmenau.de
Sugitoh	www.sugitoh.jp
Sunex	www.sunex.com
SVS Vistek	www.svs-vistek.com
Sydor Optics	www.sydor.com

Symco	www.symco.co.jp
Tamron	www.tamron.de
Tekno Optik	www.teknooptik.se
Tekstar Optical	www.tekstaroptical.com
The Imaging Source	www.theimagingsource.com
Thermosensorik	www.thermosensorik.de
Vega Technology Group	www.vegatcgroup.com
Videology Imaging Solutions	www.videologyinc.com
Videor Technical	www.videor.com
Vision & Control	www.vision-control.com
Vision Light Tech	www.visionlighttech.com
Visitool	www.visitool.de
Volpi	www.volpi.ch
VS Technology	www.vst.co.jp
Weiss Imaging and Solutions	www.weiss-imaging.de
ZygoLOT	www.zygot.de

Processors, Interfaces, Cables, Peripherals

ABS	www.abs-jena.de
Active Silicon	www.activesilicon.com
Adaptive Vision	www.adaptive-vision.com
Adlink	www.adlinktech.eu
Aerotech	www.aerotech.com
Allied Vision Technologies	www.alliedvisiontec.com
Alysium-Tech	www.alysium-tech.com
AMS Technologies	www.amstechnologies.com
Andon Electronics	www.andonelect.com
Arvo Imaging Products	www.arvo.com
AutoVimation	www.autovimation.com
BAP Image Systems	www.bapimgsys.com
Bock Optronics	www.bockoptronics.ca
Components Express	www.componentsexpress.com
D.SignT	www.dsignt.de
de Man Industrie-Automation	www.deman.de
EDT	www.edt.com
Eltec Elektronik	www.eltec.com
Epix	www.epixinc.com
Ernst & Engbring	www.eue-kabel.de
Evision Systems	www.evision-systems.de
Fabrimex Systems	www.fabrimex-systems.ch
FiberVision	www.fibervision.de
Framos	www.framos.eu
G4 Technology	www.g4.com.tw
Gidel	www.gidel.com
GigaLinx	www.gigalinx.net
HaSoTec	www.hasotec.com
Hema	www.hema.de
IDS	www.ids-imaging.com
Igus	www.igus.de
Image House	www.imagehouse.dk
Image S	www.imagesrl.com
Infaimon	www.infaimon.com
Intercon1	www.intercon-1.com
Japan F.A. Systems	www.jfas.co.jp
Lemo	www.lemo.com
Leoni	www.leoni-fiber-optics.com
LMI Technologies	www.lmi3d.com
Luster LightVision Tech	www.lusterinc.com

Mad City Labs	www.madcitylabs.com
Matrix Vision	www.matrix-vision.de
Matrox Imaging	www.matrox.com/imaging
MaxxVision	www.maxxvision.com
MaZet	www.mazet.de
Menzel Vision and Robotics	www.menzelab.com
Micro-Epsilon	www.eltrotec.com
Micron	www.micron.com
Microsystems	www.microsystems.it
Mikrotron	www.mikrotron.de
Newnex Technology	www.newnex.com
Northwire Technical Cable	www.northwire.com
Orbis	www.orbis.eu
Parameter	www.parameter.se
Phytec Messtechnik	www.phytec.de
Pi4 Robotics	www.pi4.de
Pleora Technologies	www.pleora.com
Pro Design Electronic	www.prodesign-europe.com
Schmachtl	www.schmachtl.at
Seidenader	www.seidenader.de
Serview	www.serview.net
Sglux	www.sglux.com
Silicon Software	www.silicon-software.de
Stemmer Imaging	www.stemmer-imaging.com
STZ Qualitätssicherung und Bildverarbeitung	www.stz-ilmenu.de
Supercomputing Systems	www.scs-vision.ch
SVS Vistek	www.svs-vistek.com
Symco	www.symco.co.jp
Teledyne Dalsa	www.teledynedalsa.com
The Imaging Source	www.theimaging-source.com
Thinklogical	www.thinklogical.com
Unibrain	www.unibrain.com
ViDiSys	www.vidisys.de
Vision & Control	www.vision-control.com
Vision Tools	www.vision-tools.com
Vistas	www.vistas-gmbh.de
www.isgcameras.com	www.isgchips.com
www.USBFireWire.com	www.usbfirewire.com
Xilinx	www.xilinx.com

Acal BFi Germany	www.bfiophtilas.com
Alfavision	www.alfavision.de
Alicona Imaging	www.alicona.com
Anafocus	www.anafocus.com
Cmos Vision	www.cmosvision.com
CMOSIS	www.cmosis.com
Cognex	www.cognex.com
Collischon Optik-Design	www.mikro-optik.de
Creaform Deutschland	www.creaform3d.com
CSEM	www.csem.ch
CTR Carinthian Tech Research	www.ctr.at
Cypress Semiconductor	www.cypress.com
de Man Industrie-Automation	www.deman.de
Docter Optics	www.docteroptics.com
Eltec Elektronik	www.eltec.com
Entner Electronics	www.entner-electronics.com
Erhard + Leimer	www.erhardt-leimer.com
FiberVision	www.fibervision.de
Fraunhofer Allianz Vision	www.vision.fraunhofer.de
Fraunhofer IFF	www.mpt.iff.fraunhofer.de
Fraunhofer IMS	www.ims.fraunhofer.de
FRT Fries Research & Technology	www.frt-gmbh.com
Gesellschaft für Bild- und Signalverarbeitung (GBS) mbH	www.gbs-ilmenau.de
Gevicam	www.gevicam.com
GFai	www.gfai.de
HaSoTec	www.hasotec.com
Helion	www.helionvision.com
IDS	www.ids-imaging.com
Imaging Lab	www.imaginglab.it
Impuls	www.impuls-imaging.com
IMS Chips	www.ims-chips.de
Infaimon	www.infaimon.com
Isomorph	www.isomorph.it
Joanneum Research	www.joanneum.at
Kamera Werke Dresden	www.kwdo.de
Kappa opto-electronics	www.kappa.de
Lincoln Laser Company	www.lincolnlaser.com
LMI Technologies	www.lmi3d.com

Matrix Vision	www.matrix-vision.de
MaZet	www.mazet.de
Micro-Epsilon	www.eltrotec.com
Mikromak Service	www.mikromak.com
msiVision	www.msivision.com
Norpix	www.norpix.com
Opto	www.opto.de
Panavision Imaging	www.panavisionimaging.com
PCO	www.pco.de
Photonfocus	www.photonfocus.com
Phytec Messtechnik	www.phytec.de
pi4_robotics	www.pi4.de
Profactor	www.profactor.at
Schäfter + Kirchhoff	www.sukhamburg.de
Sensor to Image	www.sensor-to-image.de
SmartSurv	www.smartsurv.de
SPG Data 3D	www.spgdata3d.com
SPIE	www.spieeurope.org
Stemmer Imaging	www.stemmer-imaging.com
STZ Qualitätssicherung und Bildverarbeitung	www.stz-ilmenau.de
Tekno Optik	www.teknooptik.se
Tema	www.temavision.com
Thermosensorik	www.thermosensorik.de
Tichawa Vision	www.tichawa.de
Tordivel	www.scorpionvision.com
Univision	www.univision.it
V-Research	www.v-research.at
Vega Technology Group	www.vegatcgroup.com
Vision & Control	www.vision-control.com
Vision Machines	www.vision-machines.com
Vision Tools	www.vision-tools.com
Zertrox	www.zertrox.de

Software

A&B Software	www.ab-soft.com
ABW	www.abw-3d.de
Adaptive Vision	www.adaptive-vision.com
Alditech	www.alditech.ru
Alfavisio	www.alfavisio.de
Alicona Imaging	www.alicon.com
Alliance Vision	www.alliancevision.com
Alrad Imaging	www.alrad.co.uk
AMS Technologies	www.amstechnologies.com
Andor Technology	www.andor.com
AOS Technologies	www.aostechnologies.com
Applied Electro-Optics	www.aeou.com
Artray	www.artray.co.jp
Asentics	www.asentics.de
Attentra	www.attentra.de
Baumer	www.baumer.com
Cimetrix	www.cimetrix.com
Cognex	www.cognex.com
Cosyco	www.cosyco.de
de Man Industrie-Automation	www.deman.de
dhs Solutions	www.dhssolution.com
Digital Surf	www.digitalsurf.com
Duwe 3D	www.duwe-3d.de
Dynalog	www.dynalog-us.com
ebs Automatisierte Thermographie und Systemtechnik	www.irpod.net
EHD Imaging	www.ehd.de
Eltec Elektronik	www.eltec.com
Energid	www.energid.com
Epix	www.epixinc.com
Erhard + Leimer	www.erhardt-leimer.com
Euresys	www.euresys.com
EVT Eye Vision Technology	www.evt-web.com
Fabrimex Systems	www.fabrimex-systems.ch
Fast	www.fast-corp.co.jp
FDS Research	www.fdsresearch.si
FiberVision	www.fibervision.de
Framos	www.framos.eu
FSI Technologies	www.fsinet.com

G4 Technology	www.g4.com.tw
Gefasoft	www.gefasoft.com
Geomagic	www.geomagic.com
Gesellschaft für Bild- und Signalverarbeitung (GBS)	www.gbs-ilmenau.de
Gevicam	www.gevicam.com
Goldlücke Ingenieurleistungen	www.giib.de
HaSoTec	www.hasotec.com
IB/E Optics	www.ibe-optics.com
IDS	www.ids-imaging.com
iiM	www.iimag.de
Image House	www.imagehouse.dk
Image S	www.imagesrl.com
Imagic	www.imagic-imaging.com
Imaging Lab	www.imaginglab.it
Impuls	www.impuls-imaging.com
In-situ	www.in-situ.de
INB Vision	www.inb-vision.com
Industrial Vision Systems	www.industrialvision.co.uk
Infaimon	www.infaimon.com
InRay Solutions	www.inrays.com
Ircam	www.ircam.de
IS Imaging Solutions	www.imaging-solutions.de
Isomorph	www.isomorph.it
Isra Vision	www.isravision.com
IVS	www.industrialvision.co.uk
Japan F.A. Systems	www.jfas.co.jp
Joanneum Research	www.joanneum.at
Kappa opto-electronics	www.kappa.de
Karlheinz Hinze Optoengineering	www.hinze-opto.de
Klughammer	www.klughammer.de
Kvant	www.kvant.sk
Lambda Photometrics	www.lambdaphoto.co.uk
Lambda Research	www.lambdare.com
Leica Microsystems	www.leica-microsystems.com
Leutron Vision	www.leutron.com
LMI Technologies	www.lmi3d.com
Luster LightVision Tech	www.lusterinc.com
Math & Tech Engineering	www.mathtech.eu

Matrix Vision	www.matrix-vision.de
Matrox Imaging	www.matrox.com/imaging
MaxxVision	www.maxxvision.com
Menzel Vision and Robotics	www.menzelab.com
Micro Epsilon	www.micro-epsilon.com
Micro-Epsilon Eltrotec	www.eltrotec.com
Microscan	www.microscan.com
Microsystems	www.microsystems.it
Mikromak Service	www.mikromak.com
Mitutoyo	www.mitutoyo.de
msiVision	www.msivision.com
MVTec Software	www.mvtec.com
National Instruments	www.ni.com
Neogramm	www.neogramm.de
Neurocheck	www.neurocheck.com
Norpix	www.norpix.com
Odem Technologies	www.odem.co.il
Olympus	www.olympus-europa.com
Omron	www.industrial.omron.de
Optical Research Associates	www.opticalres.com
Optis	www.optis-world.com
Optometron	www.optometron.de
Orbis	www.orbis.eu
Parameter	www.parameter.se
Photonfocus	www.photonfocus.com
Pi4 Robotics	www.pi4.de
Pleora Technologies	www.pleora.com
Polytec	www.polytec.com
Profactor	www.profactor.at
Qualimatest	www.qmt.ch
Rapidform	www.rapidform.com
Rauscher	www.rauscher.de
RH Engineering	www.rhengineering.de
Rubroeder	www.rubroeder.de
SAC	www.sac-vision.de
Schmachtl	www.schmachtl.at
Second2None	www.visiondragon.com
Sedeco Vision Components	www.sedeco.nl

SensorDesk	www.sensordesk.com
Silicon Software	www.silicon-software.de
Simon IBV	www.simon-ibv.de
SmartSurv	www.smartsurv.de
SPG Data 3D	www.spgdata3d.com
Stemmer Imaging	www.stemmer-imaging.com
STZ Qualitätssicherung und Bildverarbeitung	www.stz-ilmenau.de
Supercomputing Systems	www.scs-vision.ch
SVS Vistek	www.svs-vistek.com
Symco	www.symco.co.jp
Systematic Vision	www.systematicvision.com
Tekno Optik	www.teknooptik.se
Teledyne Dalsa	www.teledynedalsa.com
Tema	www.temavisio.com
The Imaging Source	www.theimagingsource.com
The MathWorks	www.mathworks.com
Thermosensorik	www.thermosensorik.de
Tordivel	www.scorpionvision.com
TriVision	www.trivision.dk
TYZX	www.tyzx.com
Unique vision	www.unique-vision.net
Univision	www.univision.it
Van de Loosdrecht Machine Vision	www.vdlmv.nl
Vega Technology Group	www.vegatcgroup.com
Visicontrol	www.visicontrol.com
Visiolaser	www.vannier-photelec.fr/visiolaser
Vision & Control	www.vision-control.com
Vision Components	www.vision-components.com
Vision Machines	www.vision-machines.com
Vision Tools	www.vision-tools.com
Visionlink	www.visionlink.it
Vitronic	www.vitronic.com
Vizzion	www.vizzion.com
Weiss Imaging and Solutions	www.weiss-imaging.de
Wenzel	www.wenzel-group.com
X-Rite	www.xrite.com
Zertrox	www.zertrox.de

Vision Sensors, Smart Cameras & Embedded Systems

Acal BFi Germany	www.bfiophtilas.com
Active Silicon	www.activesilicon.com
Adaptive Vision	www.adaptive-vision.com
Adlink	www.adlinktech.eu
AIT Göhner	www.VisionAndID.com
Alfvision	www.alfvision.de
AMS Technologies	www.amstechnologies.com
Asentics	www.asentics.de
Banner Engineering	www.bannerengineering.com
Basler Vision Technologies	www.baslerweb.com
Baumer	www.baumer.com
Camsensor Technologies	www.camsensor.com
Cmos Vision	www.cmosvision.com
Cmosis	www.cmosis.com
Cognex	www.cognex.com
Compar	www.compar.ch
Computer Dynamics	www.cdynamics.com
Cosyco	www.cosyco.de
Datalogic	www.datalogic.com
de Man Industrie-Automation	www.deman.de
Di-soric	www.di-soric.de
Eltec Elektronik	www.eltec.com
Erhard + Leimer	www.erhardt-leimer.com
EVT Eye Vision Technology	www.evt-web.com
Fabrimex Systems	www.fabrimex-systems.ch
FastVision	www.fast-vision.com
Festo	www.festo.com
FiberVision	www.fibervision.de
Finger	www.finger-kg.de
FSI Technologies	www.fsinet.com
G4 Technology	www.g4.com.tw
Hans Turck	www.turck.com
Hema	www.hema.de
IBN	www.ibn-gmbh.de
Ifm electronic	www.ifm.de
Image House	www.imagehouse.dk
Image S	www.imagesrl.com
Imaging Solutions Group	www.isgcameras.com
Imago Technologies	www.imago-technologies.com
Imagsa Technologies	www.imagsa.com

IMR Automatisierungstechnik	www.imr-le.de
Infaimon	www.infaimon.com
IOS	www.ios-web.de
Ioss	www.iooss.de
Ipf Electronic	www.ipf-electronic.de
IS Imaging Solutions	www.imaging-solutions.de
Isra Vision	www.isravision.com
ISW	www.isw-gmbh.biz
Japan F.A. Systems	www.jfas.co.jp
K + P Krempien + Petersen	www.kup-image.de
Keyence	www.keyence.de
Kontron	www.kontron.com
Lambda Photometrics	www.lambdaphoto.co.uk
Leutron Vision	www.leutron.com
Leuze electronic	www.leuze.com
LMI Technologies	www.lmi3d.com
Lord Ingenierie	www.lord-ing.com
Luster LightVision Tech	www.lusterinc.com
Matrix Vision	www.matrix-vision.de
Matrox Imaging	www.matrox.com/imaging
MaxxVision	www.maxxvision.com
MaZet	www.mazet.de
Menzel Vision and Robotics	www.menzelab.com
Micro Epsilon	www.micro-epsilon.com
Micro-Epsilon Eltrotec	www.eltrotec.com
Microscan	www.microscan.com
Microsystems	www.microsystems.it
msiVision	www.msivision.com
National Instruments	www.ni.com
NeuPro Solutions	www.neupro-solutions.com
Neuricam	www.neuricam.com
Norpix	www.norpix.com
Odem Technologies	www.odem.co.il
Omron	www.industrial.omron.de
Opto	www.opto.de
OptoMotive	www.optomotive.si
Orbis	www.orbis.eu
Panasonic Electric Works	www.panasonic-electric-works.de
Parameter	www.parameter.se
Pepperl & Fuchs	www.pepperl-fuchs.com

Peter Scholz Software + Engineering	www.scholzsue.de	Tordivel	www.scorpionvision.com
Phytec Messtechnik	www.phytec.de	Turck	www.turck.de
Pi4 Robotics	www.pi4.de	TYZX	www.tyzx.com
PMDTec	www.pmdtec.com	Vega Technology Group	www.vegatcgroup.com
Pollux	www.pollux.com.br	Vialux	www.vialux.de
Polytec	www.polytec.com	Videor Technical	www.videor.com
PPT Vision	www.pptvision.com	Visicontrol	www.visicontrol.com
Profactor	www.profactor.at	Visiolaser	www.vannier-photelec.fr/visiolaser
Pulsotronic	www.bildverarbeitung.pulsotronic.de	Vision & Control	www.vision-control.com
Qualimatest	www.qmt.ch	Vision Components	www.vision-components.com
Rauscher	www.rauscher.de	Vision Tools	www.vision-tools.com
RSB Optotechnik	www.rsb-optotechnik.de	Visionlink	www.visionlink.it
SAC	www.sac-vision.de	VRmagic	www.vrmagic.com
Schmachtl	www.schmachtl.at	Webview	www.webspec.com
Schunk	www.schunk.com	Wenglor sensoric	www.wenglor.com
Scintacor	www.scintacor.com	Werth Messtechnik	www.werthmesstechnik.de
Second2None	www.visiondragon.com	Wintriss Engineering	www.weco.com
Sedeco Vision Components	www.sedeco.nl	Ximea	www.ximea.com
SensoPart Industriesensorik	www.sensopart.de	Xiris Automation	www.xiris.com
Sensor to Image	www.sensor-to-image.de	Zertrox	www.zertrox.de
Shape Drive	www.shape-drive.com		
Sharp Microelectronics	www.sharpsme.com		
Sick	www.sick.com		
Siemens	www.siemens.de/ident		
SKS Vision Systems	www.visionsystems.fi		
Smartray	www.smartray.de		
SmartSurv	www.smartsurv.de		
Soliton Technologies	www.solitontech.com		
Sony	www.pro.sony.eu/vision		
Stemmer Imaging	www.stemmer-imaging.com		
Supercomputing Systems	www.scs-vision.ch		
SVS Vitek	www.svs-vitek.com		
Symco	www.symco.co.jp		
Tattile	www.tattile.com		
Tekno Optik	www.teknooptik.se		
Teledyne Dalsa	www.teledynedalsa.com		
Tichawa Vision	www.tichawa.de		
TopSenso	www.topsenso.de		

Vision Systems, Turnkey Solutions, Integration Services

3D Shape	www.3d-shape.com
ABB	new.abb.com
Act Smartware	wp.act-smartware.de
Adaptive Vision	www.adaptive-vision.com
Adept Electronic Solutions	www.adept.net.au
Adept Technology	www.adept.de
AGR International	www.agrintl.com
AIT Göhner	www.ait.de
AKU Vision Technologie	www.aku.eu
Alfa vision systems	www.alfavisionsystems.com
Alfavision	www.alfavision.de
Alliance Vision	www.alliancevision.com
Altair Industries	www.altairindustriesinc.com
Applied Vision	www.appliedvision.com
Asentics	www.asentics.de
ATM Vision	www.atmvision.de
ATN Automatisierungstechnik	www.atn-gmbh.com
Attentra	www.attentra.de
Automation Technology	www.automationtechnology.de
Automation W+R	www.automationwr.de
Autoware	www.autoware.it
AVT Advanced Vision Technology	www.avt-inc.com
Balluff	www.balluff.com
Basler Vision Technologies	www.baslerweb.com
Baumer	www.baumer.com
Beratronc	www.beratronc.de
Bertram Elektrotechnik	www.bertram-bevern.de
Bi-Ber	www.bilderkennung.de
Böwe Systec	www.boewe-systec.com
Brainware Solutions	www.null-ppm.info
BST eltomat International	www.bst-international.com
BST International	www.bst-international.com
Camsensor Technologies	www.camsensor.com
Ceres Vision	www.ceresvision.de
China Daheng Group	www.daheng-image.com
CLK	www.clkgmbh.de
Cognex	www.cognex.com
Coherix	www.coherix.com

Compar	www.compar.ch
Cosyco	www.cosyco.de
CoSynth	www.cosynth.com
Cyth Systems	www.cyth.com
Datalogic	www.datalogic.com
Datapixel	www.datapixel.com
de Man Industrie-Automation	www.deman.de
DE software & control	www.de-gmbh.com
Desconpro engineering	www.desconpro.de
Digital West Imaging	www.highspeedvideos.com
Divisoft	www.divisoft.com
DMC Vision & Motion	www.dmc-vision-motion.de
Dr. Schenk Industriemesstechnik	www.dr.schenk.com
Dr. Schwab Inspection Technology	www.schwabinspection.com
Dunkley International	www.dunkleymachinevision.com
Dutch Vision Systems	www.dvs-vision.de
e3Tam	www.e3tam.com
Eckelmann	www.eckelmann.de
Edixia	www.edixia.com
EHR	www.ehr.de
Eines	www.eines.es
Electronic Systems	www.electronicssystem.it
Ellips	www.ellips.nl
Emhart Glass	www.emhartglass.com
Epix	www.epixinc.com
Epson Deutschland	www.epson.de/robots
Erhard + Leimer	www.erhardt-leimer.com
EVK DI Kerschagl	www.evk.biz
EVT Eye Vision Technology	www.evt-web.com
EyeC-UK	www.eyec-ukandireland.co.uk
Fast	www.fast-corp.co.jp
Faude Automatisierungstechnik	www.faude.de
FAW Freudenberg Anlagen und Werkzeugtechnik	www.faw-freudenberg.de
FDS Research	www.fdsresearch.si
FiberVision	www.fibervision.de
Finger	www.finger-kg.de
Fuchs engineering	www.fuchs-engineering.de
Fuetec	www.fuetec.de

Futec Europe	www.futeceurope.com
G4 Technology	www.g4.com.tw
Gefasoft	www.gefasoft.com
Gefat Engineering	www.gefat-engineering.de
Gesellschaft für Bild- und Signalverarbeitung (GBS)	www.gbs-ilmenau.de
GFal	www.gfai.de
Gidel	www.gidel.com
Goldlücke Ingenieurleistungen	www.giib.de
GOM	www.gom.com
Göpel electronic	www.goepel.com
GPP Chemnitz	www.gppc.de
GreCon	www.grecon.de
HaSoTec	www.hasotec.com
Heitec	www.heitec.de
Helms Technologie	www.helms-technologie.de
Hengstmann Solutions	www.hengstmann.com
I-mation	www.i-mation.de
I3 tech	www.i3tech.de
Ibea	www.ibea.de
ICW [industrie-elektronik]	www.icw-news.de
iiM	www.iimag.de
Ikegami	www.ikegami.de
Image House	www.imagehouse.dk
Image S	www.imagesrl.com
Imago Technologies	www.imago-technologies.com
Imess	www.imess.com
Impuls	www.impuls-imaging.com
IMR Automatisierungstechnik	www.imr-le.de
In-situ	www.in-situ.de
INB Vision	www.inb-vision.com
Industrial Vision Systems	www.industrialvision.co.uk
Infaimon	www.infaimon.com
InfraTec	www.infratec.de
Inos Automationssoftware	www.inos-automation.com
InRay Solutions	www.inrays.com
Insensiv	www.insensiv.de
Inspectron	www.inspectron.ch
InSystems Automation	www.insystems.de

Intego	www.intego.de
Intopii	www.intopii.fi
IOS	www.ios-web.de
Ioss	www.ioss.de
Irida Labs	www.iridalabs.gr
IS Imaging Solutions	www.imaging-solutions.de
Isa Industrielektronik	www.isaweiden.de
Isomorph	www.isomorph.it
Isra Vision	www.isravision.com
ISW	www.isw-gmbh.biz
Itech engineering	www.itecheng.com
IVS	www.industrialvision.co.uk
J&P Vision	www.jupvision.de
Japan F.A. Systems Corporation	www.jfas.co.jp
JasVisio - Vision Artificial	www.jasvisio.com
JLI Vision	www.jli.dk
Joanneum Research	www.joanneum.at
K + P Krempien + Petersen	www.kup-image.de
Kaiser Computersysteme	www.isotronika.de
Kdorf Automation	www.kdorf.de
Keyence	www.keyence.de
Kirin Techno-System	www.kirintechno.co.jp
KMS Engineering	http://kms-e.de
L&P	www.lp-gmbh.de
Laetus	www.laetus.com
Leuze electronic	www.leuze.com
Limess	www.limess.com
Lincoln Laser Company	www.lincolnlaser.com
Machine Vision Technology	www.machine-vision-technology.co.uk
Menzel Vision and Robotics	www.menzelab.com
Meta Vision Systems	www.meta-mvs.co.uk
Mevisco	www.mevisco.com
Micro Epsilon	www.micro-epsilon.com
Micro-Epsilon Eltrotec	www.eltrotec.com
Microscan	www.microscan.com
Mikrotron	www.mikrotron.de
Modi Modular Digits	www.modi-gmbh.de
Moser Industrielektronik	www.moser-gmbh.de

msiVision	www.msivision.com
Neogramm	www.neogramm.de
NeuPro Solutions	www.neupro-solutions.com
Neuricam	www.neuricam.com
Neurocheck	www.neurocheck.com
Neurotechnology	www.neurotechnology.com
Nikka Research Deutschland	www.nikka-research.com
Nikon Metrology	www.nikonmetrology.com
Nokra	www.nokra.de
Norman N. Axelrod Associates	www.axelrodassociates.com
Norpix	www.norpix.com
Northwire	www.northwire.com
OCS	www.ocsgmbh.com
Octum	www.octum.de
Omron	www.industrial.omron.de
Opsis	www.opsis.de
Optel Vision	www.optelvision.com
OptoFidelity	www.optofidelity.com
OptoNova	www.optonova.se
Orbis	www.orbis.eu
Orbotech	www.orbotech.com
Orus Integration	www.orusintegration.com
Otto Vision Technology	www.otto-jena.de
Panasonic Electric Works	www.panasonic-electric-works.de
Parameter	www.parameter.se
Pattern Recognition Company	www.pattern-recognition-company.de
Paul Leibinger	www.leibinger-group.com
PCE Pharmacontrol	www.pharmacontrol.de
PCS Industries	www.pcindustries.com
Pepperl & Fuchs	www.pepperl-fuchs.com
Perceptron	www.perceptron.com
Peter Scholz Software + Engineering	www.scholzsue.de
Phytec Messtechnik	www.phytec.de
Pi4 Robotics	www.pi4.de
Pilz	www.pilz.de
Pixargus	www.pixargus.de
Plasmo Industrietechnik	www.plasmo.eu
POG Präzisionsoptik Gera	www.pog.eu

Pollux	www.pollux.com.br
Polygon	www.polygon-technology.de
Polytec	www.polytec.de
PPT Vision	www.pptvision.com
Pressco Technology	www.pressco.com
Profactor	www.profactor.at
Prüftechnik Schneider & Koch	www.prsuk.de
Pulsotronic	www.bildverarbeitung.pulsotronic.de
Qualimatest	www.qmt.ch
Quiss	www.quiss.com
R&W Industrieautomation	www.r-u-w.de
Radix Controls	www.radixcontrols.com
RBC Fördertechnik	www.rbc-robotics.de
Recognitec	www.recognitec.de
RH Engineering	www.rhengineering.de
Rohwedder	www.rohwedder.com
RSB Optotechnik	www.rsb-optotechnik.de
Rubroeder	www.rubroeder.de
Rudolph Technologies	www.rudolphtech.com
SAC	www.sac-vision.de
Scanware electronic	www.scanware.de
Schmachtl	www.schmachtl.at
Schönherr Elektronik	www.schoenherr-elektronik.com
Second2None	www.visiondragon.com
Seidenader	www.seidenader.de
Sensor Control	http://sensor-control.de
Serview	www.serview.net
Servo-Robot	www.servorobot.com
Sidonia Systems	www.sidoniasystems.de
Signum	www.signum-vision.de
Simac Masic	www.simacmasic.nl
Simon IBV	www.simon-ibv.de
SL Tec	www.sltec.de
Smartray	www.smartray.de
Solex	www.solexvision.com
Solving3D	www.solving3d.de
Soma	www.soma.de
SPG Data 3D	www.spgdata3d.com

Steinbichler Optotechnik	www.steinbichler.com
Stöhrmann Systemtechnik	www.stoehrmann.de
Stratec Control Systems	www.bbull.com
STZ Qualitätssicherung und Bildverarbeitung	www.stz-ilmenau.de
Sundance Multiprocessor Technology	www.sundance.com
Surface Inspection	www.surface-inspection.com
SVS Vistek	www.svs-vistek.com
Symacon Engineering	www.symacon.de
Symetix	www.symetix.com
Sys vision	www.isys-vision.de
SysCon	www.syscon-vision.de
Systech	www.systech-tips.com
Systematic Vision	www.systematicvision.com
Tattile	www.tattile.com
TechnoTeam	www.technoteam.de
Teledyne Dalsa	www.teledynedalsa.com
Tema	www.temavisio.com
Thermosensorik	www.thermosensorik.de
Tiama	www.tiama.com
Tichawa Vision	www.tichawa.de
Tordivel	www.scorpionvision.com
TriVision	www.trivision.dk
TST Technological Solutions	www.tst.pt
TYZX	www.tyzx.com
Unique vision	www.unique-vision.net
Univision	www.univision.it
V-Research	www.v-research.at
Vega Technology Group	www.vegatcgroup.com
Vester Elektronik	www.vester.de
Videometer	www.videometer.com
View-Factor	www.view-factor.com
Vigitek	www.vigitek.com
Viscom	www.viscom.com
Visicontrol	www.visicontrol.com
Visimation	www.visimation.de
Visio Nerf	www.visionerf.com

Visiolaser	www.vannier-photelec.fr/visiolaser
Vision Automation	www.visionautomation.dk
Vision Experts	www.vision-experts.com
Vision Machines	www.vision-machines.com
Vision Tools	www.vision-tools.com
Vision-consult Bildverarbeitung	www.vision-consult.com
Visionlink	www.visionlink.it
VisioTek	www.visiotek.com.tr
Visolution	www.visolution.de
Visotect	www.visotect.de
Visuelle Technik	www.visuelle-technik.de
Vitronic	www.vitronic.com
VMT	www.vmt-gmbh.com
Weber Systemtechnik	www.wesys.de
Weiss Imaging and Solutions	www.weiss-imaging.de
Weitblick Systems	www.weitblick-systems.at
Wenglor sensoric	www.wenglor.com
Wente/Thiedig	www.wente-thiedig.de
Wickon Hightech	www.wickon.com
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Wolf Systeme	www.wolfsysteme.de
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Ziemann & Urban	www.ziemann-urban.de

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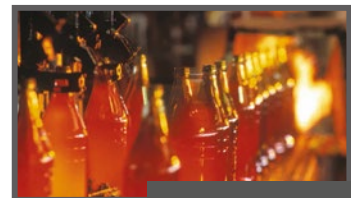
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