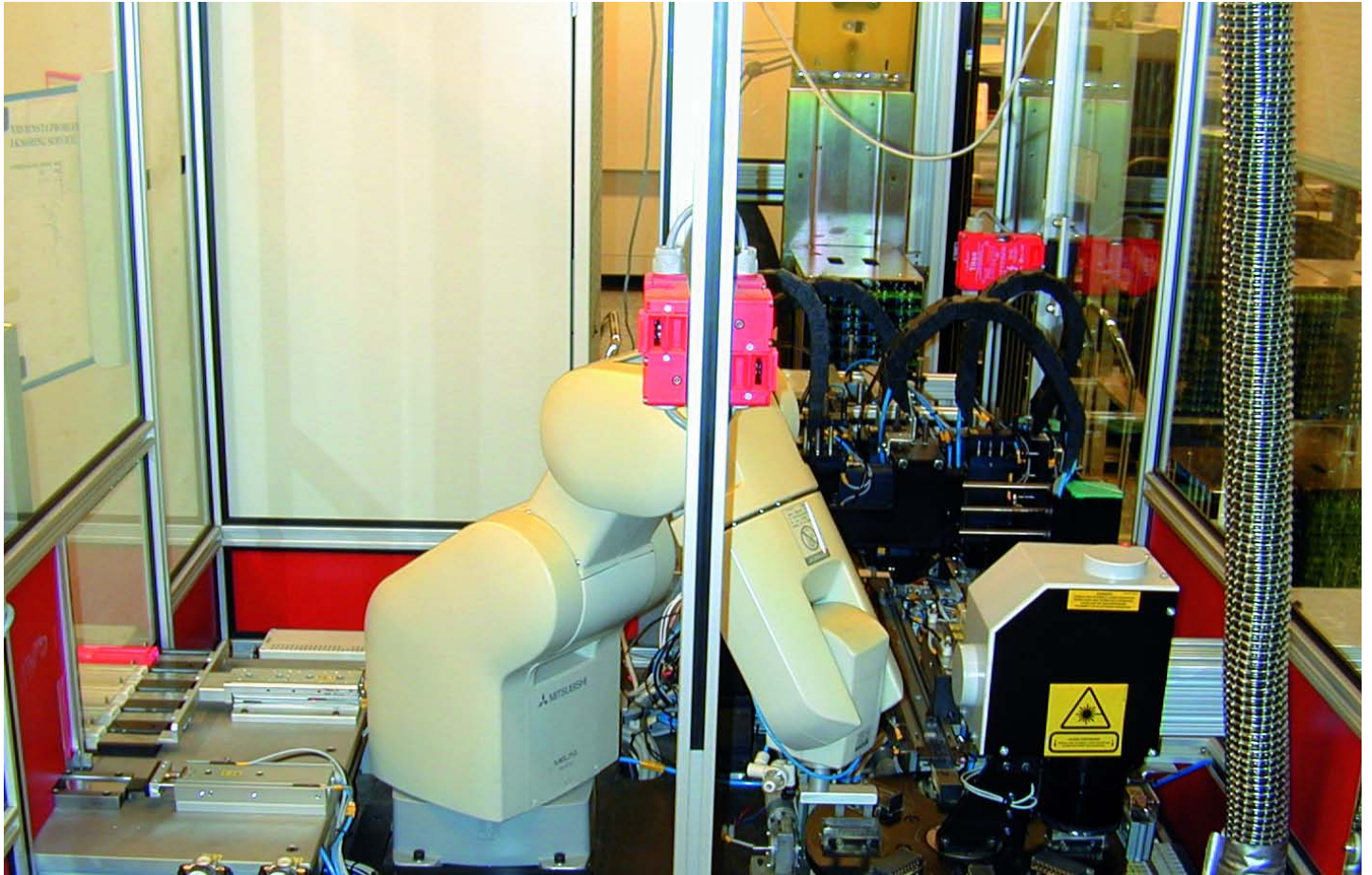




visionFIREBOX:
Industrial image processing using FireWire technology





Flexible image processing for complex assignments

The right solution

When it comes to choosing a suitable solution, the starting point is a detailed analysis of the individual project and the customer's specific terms of reference. The complete product spectrum we offer, ranging from simple smart cameras through to high-end systems, allows us to recommend the optimum solution every time.

Your competent partner

Part of the Leuze Group of Companies employing a workforce of over 1600, Leuze electronic has been setting standards in the field of optoelectronic components and systems for industrial automation for the last four decades. Our innovative drive and consistent orientation to individual customer requirements make us a reliable and effi-

cient partner to a wide spectrum of different industrial sectors.



Leuze electronic, Owen/Teck

Our performance spectrum

We attach particular importance to customer service. What sets image processing solutions from Leuze electronic apart from the rest is that our work does not finish with delivery of the hardware and software. The services we provide include

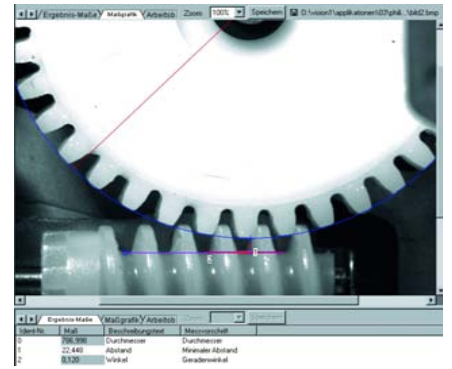
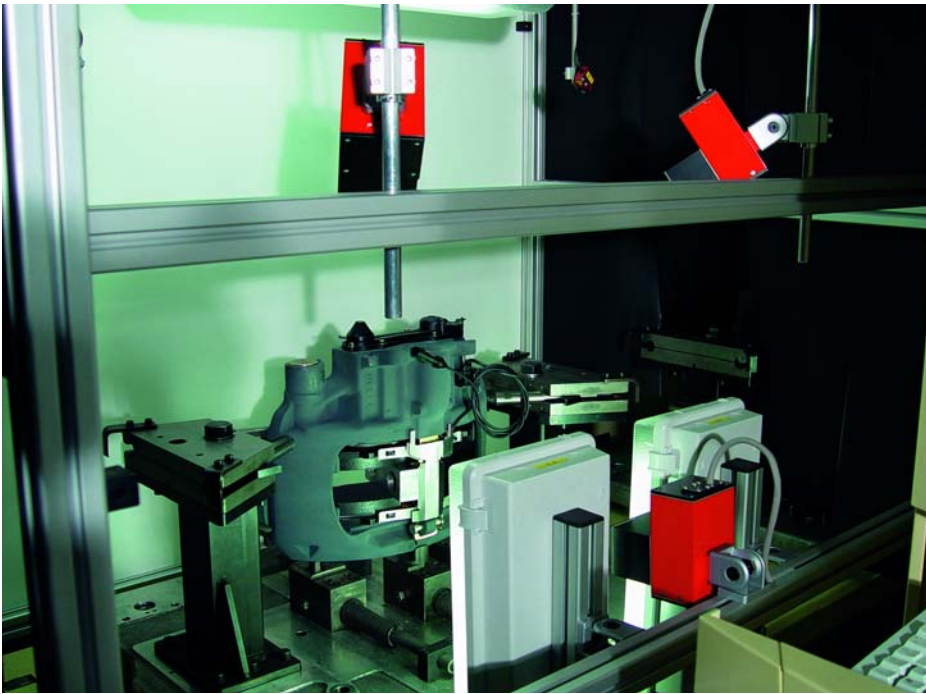
- Feasibility studies
- Delivery of complete solutions
- Installation and commissioning

- Training operating personnel
- Servicing and maintenance
- Hotline and technical support

This comprehensive range of services offers our customers a reassuring degree of security.

Proven competence

Image processing systems from Leuze perform 100% checks in over 500 installations throughout the world of industrial manufacturing – providing an absolute assurance of quality. Completed installations include: *Abbott, Aventis, Bielomatik, BMW, Coca-Cola, Continental, Daimler-Chrysler, Delphi, Dunlop, Ericsson, Faurecia Automotive, Johnson Controls, Kappa Sieger, Knorr Bremse, Kraft Foods, Kronos, Lever Fabergé, L'ORÉAL, Mazda, MSD, Nestlé, Novartis, Opel, Pfizer, Radeberger, Siemens, Südzucker, VW, ...*



Dimensional control

The *visionFIREBOX* also provides an outstanding solution for demanding dimensional control applications. These include monitoring

- distances
- angles
- radii
- parallelism
- and curvature

as well as gauging diameters and contours. Tolerances and dimensions can be entered online. With a resolution of up to 1/10 pixel, measurements can be performed to an accuracy of fractions of a millimetre.

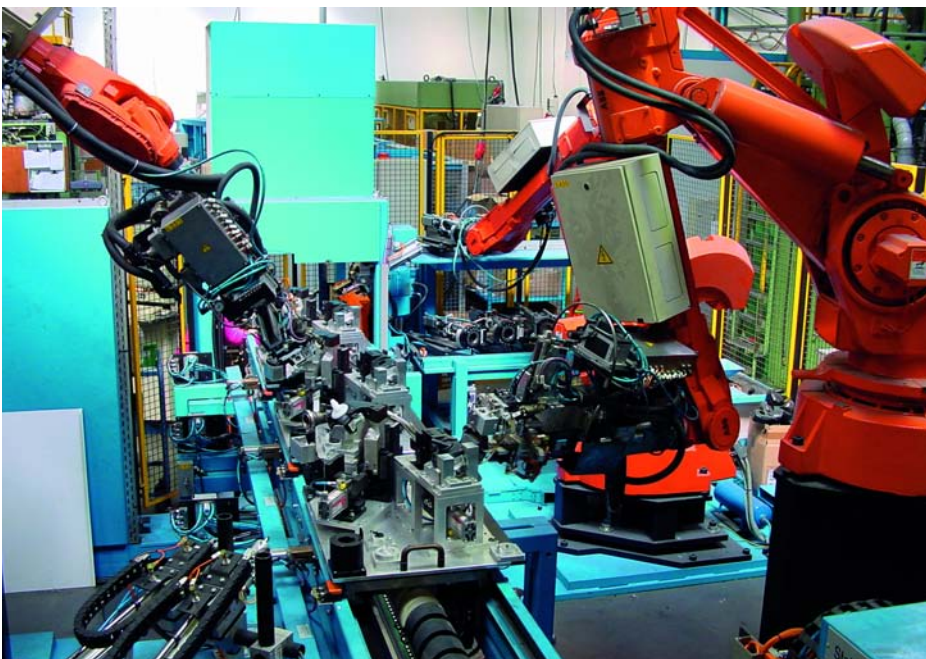


Visualization

Online visualization permits clear depiction of all information of relevance to the machine operator, such as

- measurement data
- inspection results
- images
- test statistics
- inspection times

All the individual elements can be defined and arranged on an application-specific basis.





Cameras and accessories

FireWire cameras

Camera type	Monochrome or colour
Pixel geometry	Square
Exposure time [μ s]	20 to 80.000
Image transmission	Digital
Lens mounting thread	C-Mount
“LR” camera	
Resolution [Pixel]	656 x 490
Chip size [*]	1/2
Image rate [Hz]	max. 100
“MR” camera	
Resolution [Pixel]	782 x 580
Chip size [*]	1/2
Image rate [Hz]	max. 53
“HR” camera	
Resolution [Pixel]	1300 x 1030
Chip size [*]	2/3
Images rate [Hz]	max. 15

Camera cable

6-pole, length [m]	4.5
6-pole, length [m]	10
Other cable lengths on request	

Light sources

- All customary light sources (VIS/IR/UV)
- Pulsed/continuous
- Directional lighting/back lighting
- Diffuse/directed
- Telecentric
- And special light sources



Presence and completeness checking

Presence checking is one of the most frequent applications of industrial image processing. The wide variety of possible distinguishing features which can be detected (colour, geometry, brightness etc.) makes *visionFIREBOX* ideal for this type of application. There is no

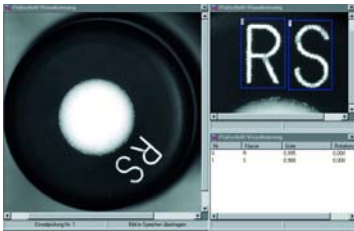
restriction imposed by the software on the number of test windows, and operation is simplified by flexible algorithms for segmenting and image processing.



Print quality control

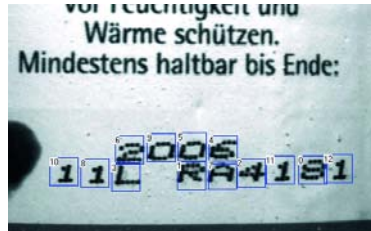
Print errors are a quality defect and must be detected at first glance. The use of *visionFIREBOX* permits products to be tested according to identical and objective criteria. This is done by teach-in of a good reference image which is stored in the system.

Depending on the setting, errors in both the imprint itself and in the background are detected. Test sensitivity can be adjusted to requirements. Any occurring brightness or position fluctuations are compensated by the software.



OCR/OCV

A highly developed software system (OCR) permits letters, numbers and logos to be read on fast-moving objects. The use of a neuronal network combines good flexibility with reliable evaluation. Other characters can be simply added using a menu.



If a legibility check (OCV) is required, target value information and rejection thresholds can be entered into the system using input masks. The flexible software tools even permit the reliable scanning of radially applied or inverted characters.

Specifications

PC

Basic unit	Compact PC
Processor	Current Pentium processor
Graphic card	SVGA
Storage media	Current size of hard disk 3.5" disk drive DVD drive
Operating system	Windows XP

Interfaces

Cameras	3x FireWire (IEEE1394)
Serial	2x USB, 1x serial Keyboard and mouse (PS/2)
Digital inputs/outputs	Each 8 digital outputs (opto-isolated max. 100 mA per output, 24 V) (optionally 16 inputs/outputs)
LAN	Fast Ethernet (10/100 MBit)
Video output	VGA (max. 1.600 x 1.200)
Housing	Aluminium
L x W x H [mm]	280 x 200 x 180

Power supply

Voltage [VAC]	230
Current consumption [W]	300 (without optional extras)
Operating temperature [°C]	0 to 45
Humidity [%]	< 90 (non-condensing)

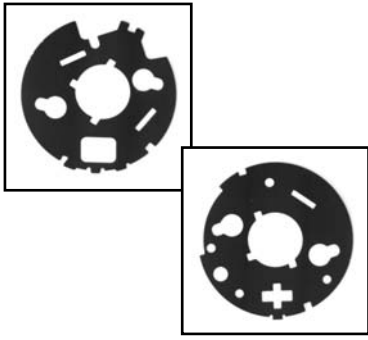


Colour monitoring

Mass products are frequently differentiated only by their colour. Colour coding is often used in order to avoid confusion during the assembly of industrial products. It is only with the installation of colour cameras that it is possible to distinguish between different colour nuances such as blue and green.



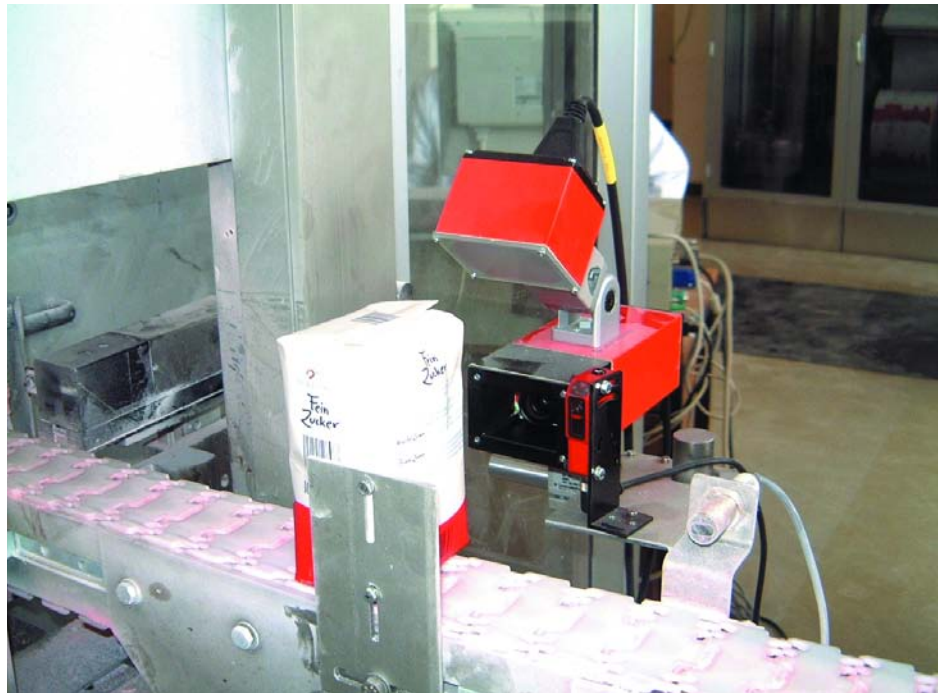
Detected colour objects can additionally be checked for completeness, shape and dimensional accuracy. FireWire technology permits the operation of colour cameras without special additional hardware. Hybrid operation of colour and monochrome colours is also possible.



Type monitoring

Products often bear no distinguishing inscriptions or code markings during the production process but still need to be clearly identified. *visionFIREBOX* features both a neuronal identification and a pattern and contour control function (optional extras).

Typical applications for these functional features include the differentiation of products with differing contours.



1D and 2D code scanning

Another software tool permits data matrix codes as well as all commonly used bar codes to be scanned. Benefits include good legibility even where contrast is poor, and scanning of codes applied directly on the end product. If several codes have to be read simultaneously, placement of one inspection window per code is sufficient. Alongside pure code scanning, other applications such as the position output of codes or additional plain text scanning can be implemented without additional expense.





The benefits of PC-based image processing

Efficient hardware

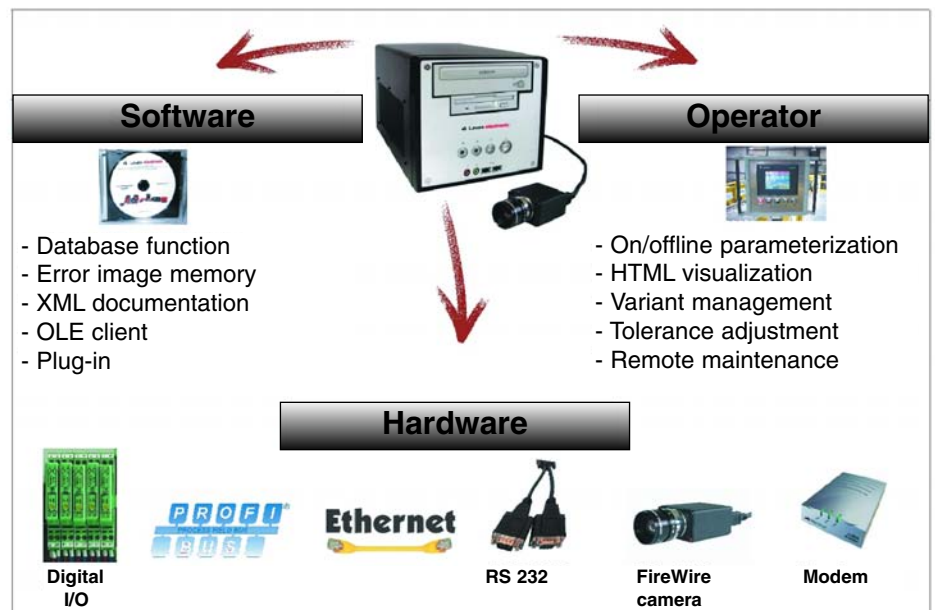
The inspection of complex quality characteristics and the storage and documentation of test results coupled with ever shorter cycle times place increasingly stringent demands on image processing systems. The resulting demand for ever more efficient hardware is ideally met by the short innovation cycles typically found in field of computer technology.

Open-ended, flexible technology

Modern production systems are designed to accommodate minimal batch sizes coupled with stringent quality requirements. *visionFIREBOX* imposes practically no restriction on the number of stored test programs. For variant production, this substantially reduces the set-up time required for new products, as the system can make use of already stored test routines.

Simple operation

Parameterization and navigation are performed using the familiar Windows user interface. The test program is interactively generated without the need for elaborate programming, compilation etc. The test results can be stored and evaluated using any PC. Test program documentation can be exported using the XML format.



Why digital FireWire cameras?

Monochrome or colour

Digital FireWire cameras (IEEE 1394) from Leuze electronic permit interference-free pick-up and transmission of camera images in optimum picture quality. With a wide selection of different resolutions on offer, precisely the right camera is available for every conceivable application. All the cameras are the progressive-scan type, and are available in a monochrome or colour version. Important camera parameters (shutter time, gain etc.) can be set and stored using the image processing software.

Plug and play bus system

As a high-speed bus system, FireWire is standardized in line with industrial standard IEEE 1394 for the transmission of image data. The transfer rate of 400 Mbits/s permits quality control also of fast moving objects. FireWire cameras are plug and play components, and are automatically recognized by the *visionFirebox*, irrespective of whether colour or monochrome cameras are used.



A qualified partner in the field of...



...detection

- Standard sensors in cubic design
- Cylindrical sensors
- Measuring sensors
- Forked photoelectric sensors
- Contrast, colour, luminescence scanners
- Fibre optic amplifiers
- Double sheet monitoring/splice detection
- Accessories



...identification

- Bar code readers
- Data matrix code readers
- Hand-held readers
- RF identification systems
- Bar code positioning systems
- Optical data transmission systems
- Laser distance measuring devices
- Industrial machine vision



...protection

- Safety light curtains
- Safety multiple-beam light barriers
- Safety laser scanners
- Safety interlocks
- Safety relays and interfaces
- Sensor accessories and signalling devices
- Measuring light curtains
- Comprehensive machine safety-related services

For quick, simple sales and service information go to...



...www.leuze.de