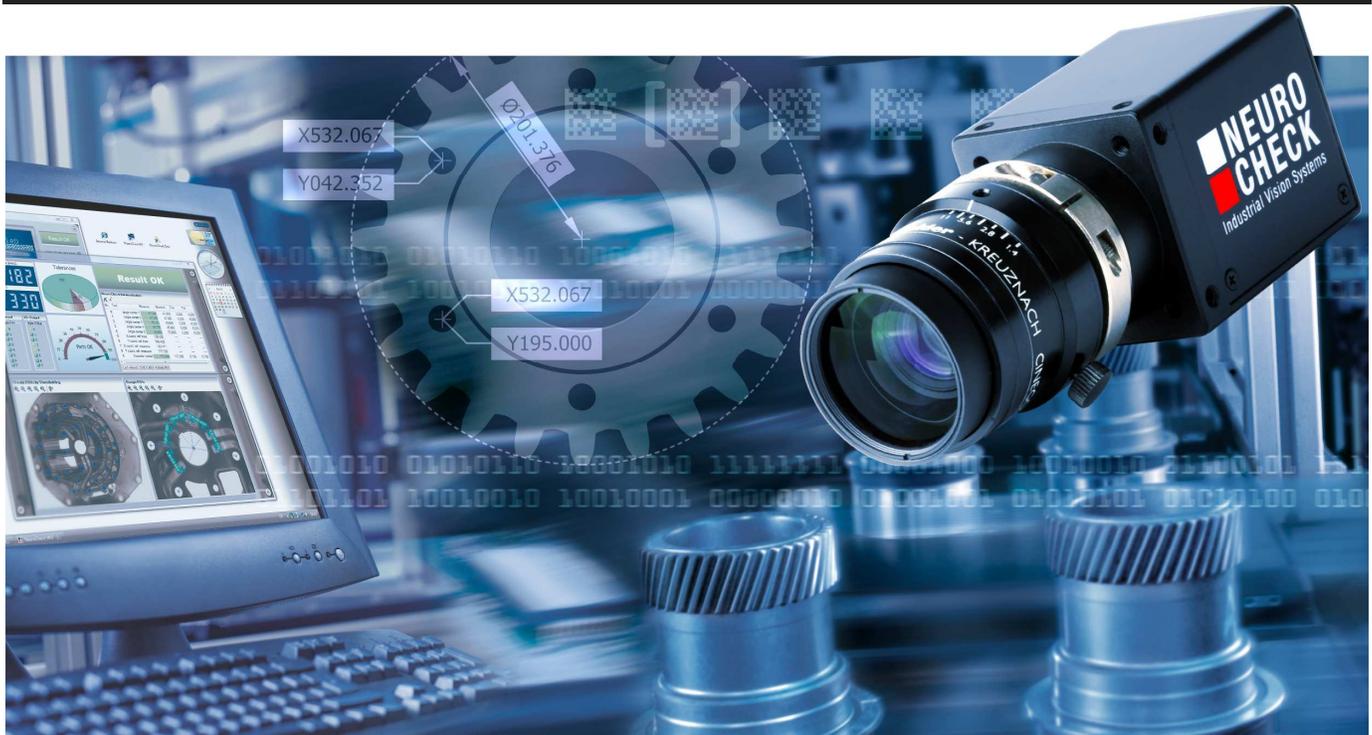




NeuroCheck— Application Software for Industrial Vision Systems





NeuroCheck: The unique machine vision software - Developed from our experience of more than 8,000 applications

For over 15 years, the name NeuroCheck has stood as an innovative software product in all application areas of machine vision for industrial visual inspection.

The challenge we set ourselves when the company was founded in 1993 was to develop a powerful and easy-to-use platform for machine vision. The result is NeuroCheck, the software product whose flexible architecture makes the development of machine vision applications easy as never before. Due to the reliability and the outstanding ease-of-use, NeuroCheck has established itself as the leading system in the machine vision market.

Combining software expertise with application integration NeuroCheck GmbH offers a unique service in the vision industry – that of machine vision software manufacturer and vision system integrator – giving us unparalleled expertise and experience in vision technology for automated quality control. Our applications department supports our customers in the development of turnkey machine vision solutions that are implemented within the standard software, providing fully integrated machine vision solutions.

For our customers, the benefits of this unique combination are obvious: With the NeuroCheck software you have at your disposal the knowledge we have developed in years of practical experience in developing optical inspection systems for industrial manufacturing. In close collaboration with our customers and our applications department, the software is continuously developed and improved. Due to our unique position, each new software version has already proven itself in practical use before coming to market.

The NeuroCheck user is supported by an extensive training course program, highly qualified technical support and a truly knowledgeable service team.

NeuroCheck GmbH offers all the advantages and security of a leading manufacturer and stands for innovation, unsurpassed quality and reliability in the machine vision market.

NeuroCheck in Use—Customers

ABB, Adam Opel, Alfing, Arburg, Audi, Bausch & Lomb, BD Medical, Beru, Bippus, BMW, Boehringer Ingelheim, Braun, BSHG, Cherry, Conergy, Continental Teves, Cozart, Daimler, Danfoss, Delphi, Eaton Automotive, EMAG, Estee Lauder, Fod, GE Healthcare, Getrag, GlaxoSmithKline, Heidelberger Druck, Huf, Ishida, Johann A. Krause, Johnson & Johnson, Johnson Matthey, KHS, Kia Motors, Klumpp, Kodak, Komax, Krauss-Maffei, Kubat, KUKA, Leuze electronic, MAHLE, Marquardt, Motorola, Nissan, Nokia, Norgren, Otto Fuchs, Owen Mumford, Panasonic, PepsiCo, Pjuderer, Philips Lighting, Powergen, Riwisa, Robert Bosch, RPC Formatec, Sarstedt, Schaeffler, Siemens, Sigpack, Solar-Fabrik, Sortimat, STIWA, Stoba, Teamtechnik, THEME, TRW Automotive, Tyco Electronics, United Springs, Vernacare Medical, Vistakon, Volkswagen, Walter, Wrigleys, Ypsomed, ZF Lemforder, ZF Lenksysteme.



NeuroCheck - The complete and flexible software standard for machine vision

NeuroCheck is the universal machine vision system for all areas of automatic visual inspection in industrial manufacturing.

NeuroCheck offers an integrated environment for the interactive configuration of visual inspection applications and their fully automated execution on the manufacturing line. Machine vision can therefore be integrated quickly and easily without extensive prior knowledge across all application areas in industry, manufacturing and quality control:

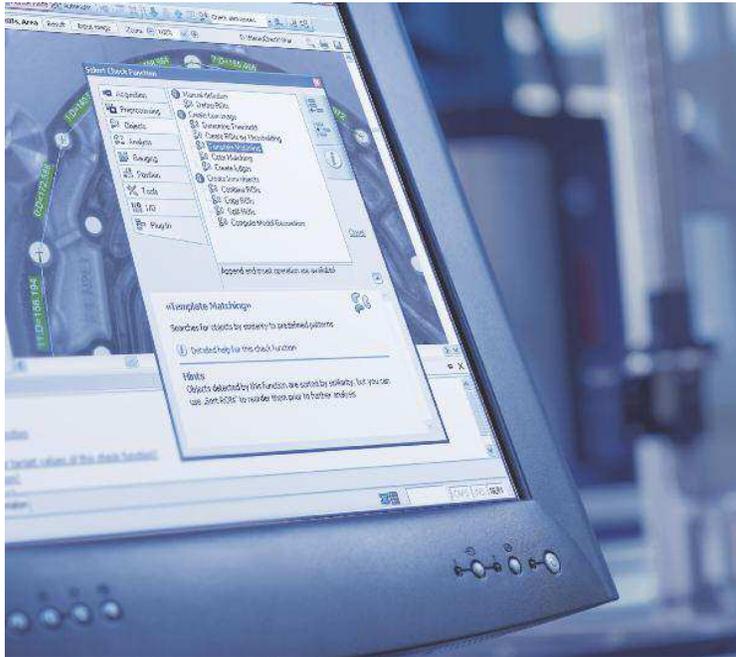
- Presence verification / Completeness check
- Gauging / Dimensional inspection
- Character recognition (OCR, OCV)
- Bar code and Data Matrix code identification
- Pattern recognition
- Color processing / Color recognition
- Surface inspection
- Position verification and robot guidance
- Print inspection

Easy configuration and seamless interaction with established industrial hardware and software standards make NeuroCheck the ideal platform for machine vision in companies of any size.

- Automotive and automotive supplier industry
- Electrical engineering and electronics
- Engineering
- Food processing
- Glass production and processing
- Medical devices, pharmaceuticals and cosmetics
- Packaging and print technology
- Plastics processing
- Solar technology and semiconductor manufacturing

Worldwide, more than 8,000 NeuroCheck machine vision solutions are in use across many industry sectors.





The NeuroCheck Functions— optimum interaction in all areas

NeuroCheck combines the interface for developing inspection solutions with that for the automatic inspection operation in one package. This makes it the comprehensive software solution for the rapid deployment of production-ready machine vision applications.

From camera integration to result output, to the control system or master computer –NeuroCheck meets all demands made of a machine vision system with a single universal PC standard software. The entire functionality is presented using an ergonomic and intuitive Windows® user interface. To use NeuroCheck requires no knowledge of software programming.

The main functions of NeuroCheck are:

Manual Mode

Manual mode presents a development interface for creating an inspection solution with an interactive graphical approach. Here you can determine the logical structure of the check procedure and the parameters for executing the inspection process.

Automatic Mode

In automatic mode, the previously configured check runs automatically. The system monitor visualizes status and results in freely configurable windows. Process control is effected via PLC or master computer or manual intervention by an operator.

Cameras

NeuroCheck supports a large number of modern digital cameras according to FireWire™ a/b and Gigabit Ethernet standards with various resolutions. The unique NeuroCheck device manager makes setup and configuration of cameras simple and easy.

Machine Vision Functions

The software encapsulates thousands of powerful and long-proven machine vision functions of the NeuroCheck image processing library. The check functions are logically grouped into categories such as image capturing, image pre-processing, machine vision analysis and measuring.

Process integration

For communicating with the supervisory control system, a number of modern standard interfaces are available. Execution of the inspection procedure can be affected dynamically by the process peripherals. NeuroCheck also sends the inspection results and measurement values to the peripherals.

With these functions, NeuroCheck provides the very latest camera hardware and up-to-date software technologies available to its users.



Machine Vision Software that delivers - All NeuroCheck advantages at a glance

NeuroCheck is a Windows®-based standard software. All features and advantages of the Windows architecture can be utilized.

NeuroCheck utilizes the modern Microsoft .NET Framework and runs under Windows® XP and Vista® and Windows 7. Its intelligent architecture combines the advantages of an operating system standard proven in millions of installations with an abundance of functionality to solve your machine vision tasks.

Flexible

After only a short time, solutions for the whole area of machine vision can be created by combining pre-configured functions.

Scalable

From compact mini PC systems to networked multi-camera inspections solutions, the software can be scaled according to need. Thus, a uniform software standard can be established throughout production, minimizing adaption, training and maintenance costs.

Interactive

The entire design process takes place in an interactive graphical interface in a modern environment. For the user this means shorter development cycles and higher reliability compared with traditional programming.

Integrated

The integrated development and runtime environment with built-in process integration enables configuration and optimization of inspection systems directly at the production line. Thus you can respond directly to any change in the production process.

Expandable

The NeuroCheck software can be expanded in all directions. Customized user-interfaces, data base connectivity, additions to the built-in functionality—these are just some of the many options available.

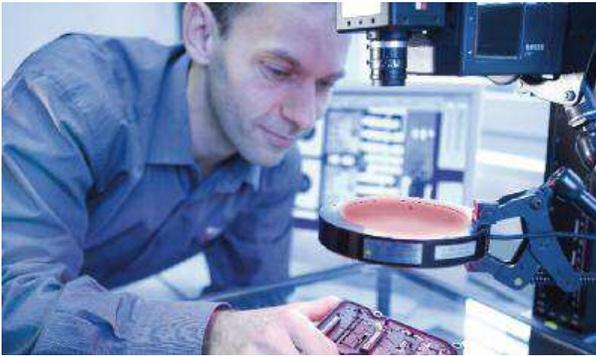
These features guide you through all phases of your machine vision solution. Let NeuroCheck convince you of these advantages – step by step!

Feasibility Study

Inspection Solution

Deployment

Automatic Operation



Each inspection task is a new challenge. Selecting the optimum hardware requires experience.

NeuroCheck supports the applications engineer with flexible tools for the quick and efficient development of alternative inspection strategies.

The diversity of machine vision makes high demands on an applications engineer. Because of the numerous possible applications in various industrial sectors, engineers are confronted with new tasks on a daily basis. Camera technology, optics and illumination have to be adjusted anew to the specific requirements of every customer. This requires a software that gives optimal and quick support during the evaluation phase and one that can be used intuitively.

Camera selection

Solving an inspection task depends significantly on the camera hardware used. Even when looking at sample parts for the first time, the question of what camera to use has to be assessed. What image resolution is necessary? Color or monochrome? Is an area-scan or line-scan camera best suited to the solution? How many cameras are needed?

NeuroCheck supports a large number of powerful digital cameras according to FireWire™ a/b and Gigabit Ethernet standard with various resolutions. The NeuroCheck “device manager” is used to integrate one or more cameras with a few mouse clicks. With activated “Auto-Detect” function, the software integrates the new cameras automatically at the start of the program without user intervention.

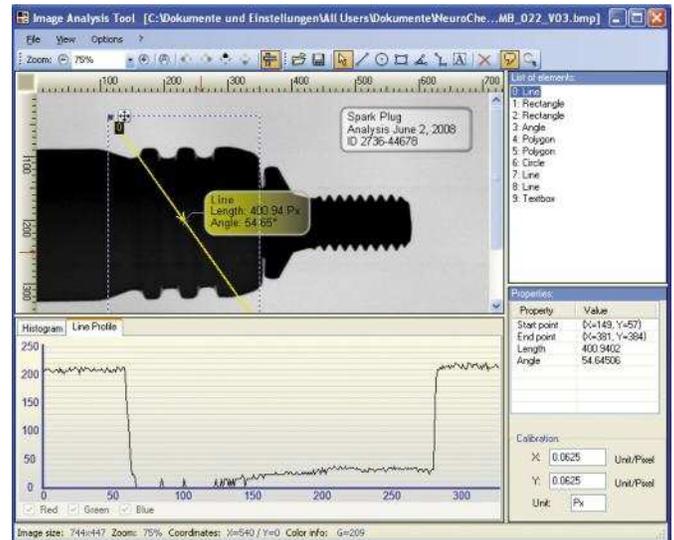


All camera parameters such as exposure time, gain etc. are set in a basic parameter dialog with display of a live image. Even complex multi-camera applications with triggered image capturing can be configured interactively.

Image analysis tool

The “image analysis tool” enables the applications engineer to make a quick evaluation of the currently selected optical components and illumination conditions.

Is the camera resolution sufficient for the precision required? Do the illumination and optics work together? Is it possible to render the object features that are necessary for the quality decision “PASS” or “FAIL”?



The image analysis tool offers numerous interactive functions for histogram analysis and gauging. For example, by setting a gray value profile, you can make an initial evaluation of the reliability of an edge detection.

The clearly visualized results can be enhanced with comments directly in the image. This image material can be directly accessed using the Windows® clipboard, e. g. for writing a quotation or for documentation purposes. The customer can have a clear understanding of how the inspection process was evaluated.

**Develop the inspection solution in our powerful user interface
Combining high flexibility with an intuitive graphical interface.**

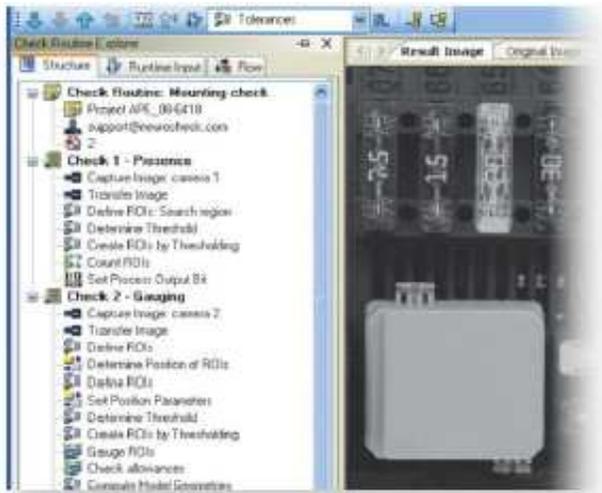


NeuroCheck presents all machine vision functions in a clear and flexible way. All parameters are clearly displayed in a Point & Click user interface which gives continual visual feedback regarding the machine vision solution.

The creation of the inspection solution takes place interactively without any programming in the “manual mode”. Here the applications engineer can build the logical structure of the check routine and set the parameters for executing the functions using an intuitive graphical user interface.

Easy to construct check routines

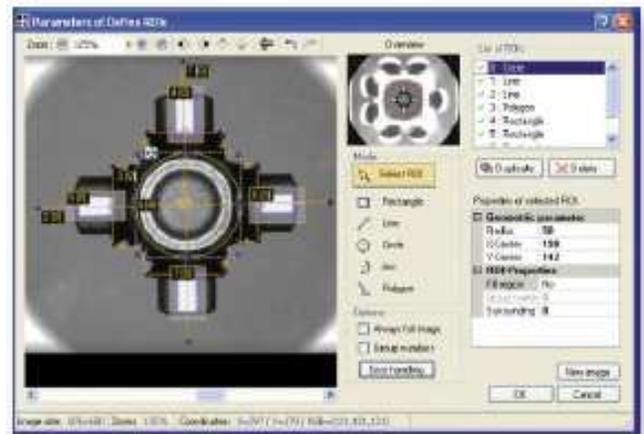
The “check routine” is the central control of the NeuroCheck software. A check routine contains in a clear hierarchical structure any number of “checks”. Usually you define one check per camera position.



Checks are executed sequentially; the execution logic can be changed using jumps and loops.

The actual machine vision evaluation itself takes place within each check by a freely definable sequence of “check functions”. For this the software offers more than 70 check functions logically grouped into categories such as image capturing, image pre-processing, evaluation and gauging. The check functions encapsulate thousands of powerful and long-proven algorithms and functions of the NeuroCheck machine vision library.

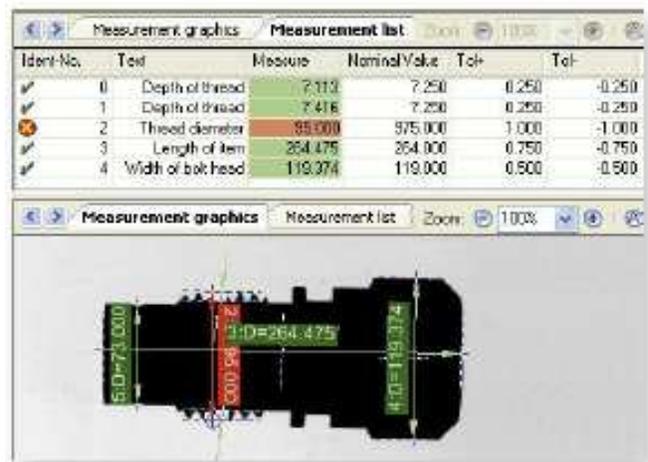
Simple parameter setting



The parameters for the check functions are set in dialogs carefully designed for their specific tasks. For example, regions of interest can be defined using Drag & Drop or by entering coordinates on the keyboard. Because of the numerous zoom and other display options, you’ll always have a good overview even with high-resolution camera images.

Visual feedback

During check function execution in manual mode, the intermediate results are visualized in detail step by step. This way, the applications engineer receives continuous feedback concerning the progress of his work.





Quick and easy integration is critical. Changes in production conditions and requirements at short notice pose a real challenge for machine vision integration.

At this point NeuroCheck's unique strengths and architecture can be used to the engineers advantage. The simple, direct switching between automatic and manual mode makes it possible to adjust the inspection solution quickly and in real-time to varying conditions.

Deployment at the customer's site is an important step on the way to a completed inspection solution. Within a minimum amount of time, a lab tested system has to be converted into an online automatic inspection system suitable for manufacturing tasks.

Integration into the process environment

For communicating with a PLC, a robot and a production master computer, a large number of modern standard interfaces are at your disposal. If necessary, more drivers can be added using a programming interface.



The communication paths and file formats are selected interactively within the software. No special knowledge about communication protocols is necessary. After activating the process integration, the system is ready for automatic operation.

Execution of the currently loaded check routine can be affected dynamically by setting target values and process parameters in the process peripherals. After the evaluation has been completed, NeuroCheck transfers the inspection results and measurement values.

Optimizing the check routine

The previously created check routine can be run directly without further adjustment on the target system. It does not matter what PC was used for configuring the check routines.



NeuroCheck offers a number of output windows with rich visualization. The system and process information displayed can be used to evaluate the robustness of the inspection process. Dynamic visual displays including real-time camera images, measurement results, statistics and process trends can be visualized graphically and in tables.

Because of the immediate switching between manual and automatic mode, the inspection solution can be quickly and easily adjusted to changing conditions even in the final commissioning phase. Automatically stored error images support the continuous optimization of the process.

Acceptance

Acceptance takes place together with the customer using previously defined samples. Camera images are stored and documented – they can be used during the entire system lifecycle for reviewing the correct operation of the system and calibration.

System acceptance by the customer is the result of a clearly structured user interface and reliability in continuous operation.



NeuroCheck's design tools offer optimum capabilities for the flexible design of content and layout of the user interface for automatic operation.

After successful acceptance, the system has to prove itself in continuous operation. Besides reliable operation, operating personnel expect a clearly structured presentation of the process data. The usual changes of target values or an adjustment of process parameters can easily take place during normal production.

User interface in automatic mode

The central control element in the automatic mode is the keyboard-oriented "Control Panel". The design is clearly structured and organizes the commands for operators to the essential components required. Commands are entered either using function keys or via touch screen operation.



The modern software architecture allows the design of the automatic screen in a task and user-oriented fashion. For this, the applications engineer utilizes graphical interactive design tools during the development phase.

Various freely configurable views, e.g. the current system status, inspection results and diagnosis, allows for individual adjustment for customer needs. Thus with a mouse click, the service technician can access a different output than the system operator.

A special dialog allows the input of new process parameters and target values during an inspection run.

Security profiles

For the security of the machine vision system, a carefully thought-out password management system allows any number of user levels and individually tailored access rights to be integrated into the finally installed system. You can, for example, restrict parameter changes to authorized service technicians. The profiles are selected manually in the software or using automatic input by a supervisory system.

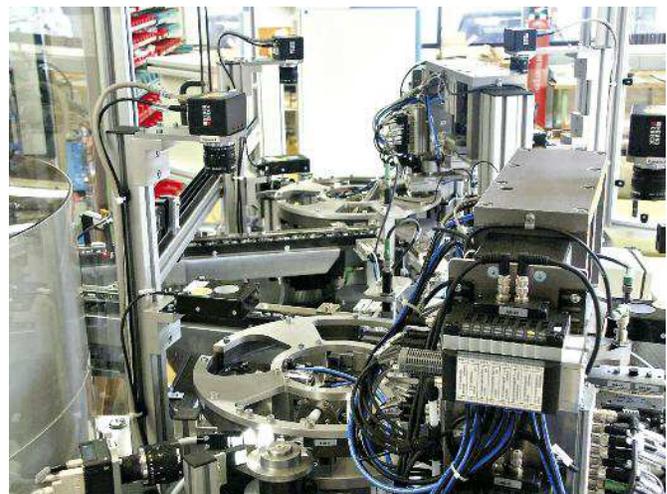
Diagnosis and maintenance

Complete logging of all system events allows for fault analysis at any time. Optionally, in addition to process data, all changes and system interventions by the user can be logged.

The integrated "Event display dialog" presents this data in a clearly structured way for the system operator or service technician. For example, all communication errors of the past 8 or 24 hours can be analyzed at a glance.

In a service situation, the software can be monitored and controlled using standard remote maintenance programs.

Even complex and powerful multi-camera applications can thus be serviced for years with little effort.



Software: NeuroCheck Version 6.0

NeuroCheck is powerful application software for machine vision which requires no programming. NeuroCheck 6.0 utilizes the latest software technology to provide a modern platform for machine vision integration. All in all more than 2,000 suggestions from our customers and business partners were collected, systematically evaluated, and implemented in the new software version. NeuroCheck 6.0 runs under Windows® XP, Windows® Vista® and Windows 7. Currently the software is available in an English and a German version.

System Requirements	
Operating System:	Windows® 7 (32-bit/64-bit) Vista® (32-bit) or XP SP 2 or higher (32-bit)
Processor:	2.0 GHz Dual Core
System memory:	1 GB RAM
Free space on hard drive:	1 GB on system partition
Screen Resolution:	1,024 X 768
Optical drive:	CD-ROM or DVD
Interface:	USB or Parallel Port

License levels

NeuroCheck is available in three different license levels:

- Professional Edition: Standard functionality for the typical machine vision user.
- Premium Edition: Using special editors and software interfaces, user-defined functions can be added to the system.
- Runtime Edition: Cost-effective duplication of completely configure machine vision applications.

Functions	Runtime	Professional	Premium
Check in automatic mode	✓	✓	✓
Use any number of cameras	✓	✓	✓
Integrate system into process environment	✓	✓	✓
Adjust target values and parameters during operation	✓	✓	✓
Build check routines interactively		✓	✓
Use interactive image analysis tool		✓	✓
Protect system with user profiles		✓	✓
Create user-defined functions (plug-in)			✓
Use a wizard to create plug-in functions			✓

Cameras

- Digital cameras according to FireWire™ (IEEE 1394) a/ b and Gigabit Ethernet standard
- Framegrabber for Camera Link™ and analog cameras
- Image resolution currently from 640x480 to 4,008x2,762 pixel
- Line-scan cameras with sensor size of 1K, 2K, 4K, 8K
- Gray value cameras with 8 bit or 12 bit depth
- Color cameras with 24 bit or 36 bit depth
- Sensor types CCD and CMOS
- Triggered image capturing (hardware or software trigger)
- Synchronized or parallel image capturing
- Up to 16 cameras in one system

Functions & Algorithms

- Image enhancement (contrast, histogram, illumination)
- Geometrical transformations (rotation, mirroring, scaling)
- Image filters (smoothing, contrast, edges, morphology)
- Binary threshold, segmentation, blob analysis and pixel counter
- Edge extraction with subpixel precision
- Automatic position and angle correction
- Template Matching
- Color matching and color space transformations
- Model geometries (line, circle) with subpixel precision
- Analysis of geometrical features
- Print quality inspection
- Bar code and Data Matrix code identification
- Pattern and character recognition (OCR, OCV)
- Classification (neural network)
- Gauging
- Dimensional checks
- Calibration functions for images and measurements

Process Communication

- Digital I/O
- Field bus (PROFIBUS)
- Industrial Ethernet (PROFINET, Ethernet/IP, MODBUS/TCP, EtherCAT, PowerLink)*
- Standard Ethernet (TCP/IP, UDP/IP)
- Serial interface (RS-232)
- Data formats XML, CSV, TXT
- SQL data bases*
- OPC*

* In preparation

Extension Interfaces

- Plug-In Interface for specific functions or algorithms
- Communication Interface for custom-tailored communication protocols



Technical Support

At FSI Technologies Inc. (North American partner of NeuroCheck GmbH), machine vision specialists with many years of application experience provide consulting, engineering, deployment, remote maintenance and software support.

Training courses

Trained users guarantee lasting success. We offer our customers opportunities to attend group software training or individual "application-specific" consultations/training. Our basic courses provide the NeuroCheck beginner with a solid foundation of knowledge. Our most popular course (MVC-201) covers topics such as:

- Machine Vision technologies, architectures, evolution and purposes
- Basic setup/navigation of software
- NeuroCheck software tools & their usages
- Example applications
- Licensing media and administration
- Overview of hardware powered by NeuroCheck
- Machine Vision lighting design and lens types/selection
- Flow control, I/O and extensibility

Application specific courses are also available.

Training courses are held throughout the year in the Chicago area. Classes can be arranged to be at your site as well.

Further information

All important information concerning our company and our comprehensive service and training courses can be found at www.fsinet.com.

FSI Technologies Inc. specializes in Rotary Optical Incremental Encoders Machine Vision & Automatic Inspection Systems featuring NeuroCheck vision software, Engineering, Consulting, machine vision components including lighting and cameras; Sensors, Counters, and Kwangwoo Encoders.

We were formerly known as FSI / Fork Standards Inc.
FSI Technologies Inc. has been manufacturing and supporting quality factory automation products since 1998.

FSI Technologies Inc.

Encoder Controls Sensors
FSI & Kwangwoo Encoders • Incremental • Absolute • Optical Rotary • Solid and Hollow Shaft Industrial Encoders • Counters • Motion Management • Controls • Photoeyes

FSI Express
Machine Vision Lighting • Smart Cameras • Machine Vision Components • Binoculars • Back lights • J2-Beam su

FSI Machine Vision
Machine Vision Systems & Solutions • NeuroCheck • Automatic Inspection • Robot Guidance • Machine Vision Consulting • Engineering & Training

News:
NeuroCheck 6.0 SP 1 now available for download
NeuroCheck 6.1 SP 12 now available for download
FSI Technologies Inc. and Eye Vision Technology AG announce partnership
FSI a sponsor & technology supplier to Autonomous Ground Vehicle Competition
VSD Article "Introduction to neural net machine vision"
New Product Release: MBR-1000 Rotary Encoder
FSI / Fork Standards, Inc. has changed its corporate name to FSI Technologies Inc. (usa.fsinet.com)





**668 E. Western Ave.
Lombard, IL 60148
Phone 630-932-9380 800-468-6009
Fax 630-932-0016
www.fsinet.com
info@fsinet.com**

**Order our NeuroCheck Demo CD free of charge
Simply go to: www.fsinet.com and click on "machine vision" then "free demo"**

FSI Technologies Inc. is the North American partner of NeuroCheck GmbH.
This brochure has been adapted from materials copyrighted for NeuroCheck GmbH.