AUTOMATIC OPTICAL INSPECTION

InterElectronic

INTRODUCTION

InterElectronic Hungary Ltd. offers equipments, machines and different materials (ESD) of different production technologies (SMT/THT/LED). Including high quality, special request fulfilling soldering machines, devices, tools, instruments and materials for the electronic industry and services.

SERVICES

Our each and every product has a warranty granted by the InterElectronic Hungary Ltd. For more complex appliances our company offers a well-needed training for set up and usage. We grant the repair of all of the products traded by our company during and after the warranty period. As well as we guarantee the continuous supply of accessories and instruments.

DEMONSTRATON

In case if any of our products aroused your interest the InterElectronic Hungary Ltd. would be glad to visit your company and hold a presentation of the product of your interest. As far as possible we serve you by bringing demo devices with us. In the most cases of our products we are proud possessors of references nation-wide. Major machines also could be observed at our partners' site.

PRICE LIST

Most of the prices of our products can be requested on our website and will be sent via email to you. In case of special and more complex machines the prices are given after consultation individually through a price offer. If you are interested in more information or user manuals of our products we recommend you to visit our website (www.interelectronic.com), which is updated continuously with professional information. We also recommend you to visit our office, where you can purchase any of the needed devices and spare parts of the product of your interest.

ORDER/SHIPPING

Our soon to be partners are welcomed to be helped via telephone, fax or e-mail. We use different ways of delivery, depending on the preference of our partner. We can deliver your purchased product by ourselves, by freight or courier service. The way of delivery might be negotiated previously. We offer you cash on delivery nation-wide!

TABLE OF CONTENT

GOEPEL electronic has been one of the pioneers of the most innovative electrical test technology for electronic components and PCBs, JTAG/Boundary Scan. All engineering tasks required to introduce the Boundary Scan technology up to the generation of product-specific test programs as well as training seminars are part of the overall customer support by GOEPEL electronic.In the meantime, Automated Optical Inspection has developed to one of the most commanding test technologies in electronic production. In the first year just a few systems were manufactured, but relatively quickly a product range emerged that found an appropriate infrastructure in the new company building, which was opened in 2003.Additionally, the functional test of electronic assemblies and devices, in particular for Automotive Testing, has been one of the supporting pillars in the Company's business activities. They are mainly focussed on the requirements of the automotive industry.Furthermore the customized Functional Test Systems optimally suit for the automation of test runs. Integrated in a production line, as test system for final products or as repair station, versatile requirements can be realised with these systems.

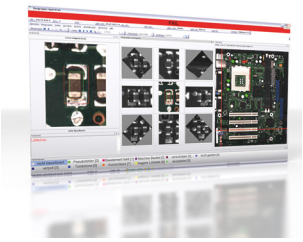
AUTOMATIC OPTICAL INSPECTIONS

AOI SmartLine

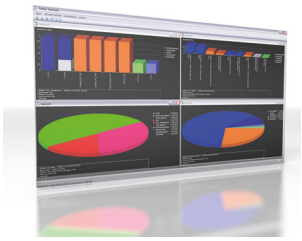
Desktop AOI System for efficient Inspection of Small Batches

The compact design enables space-saving utilization at various places within the production process. The optical inspection quality is ensured by the unique multispectral illumination and integrated reference data base.

Keyboard for comfortable fault analysis at the repair station



Repair station software



Statistics module

SAFE FAULT DETECTION

Unique multispectral illumination

Program optimisation via statistically recorded inspection data

Assured inspection quality via reference data base

COMPANY-SPECIFIC PRODUCTION INTEGRATION

Individual integration opportunities into the production process (repair station, fault output, usage of serial numbers)

Extensive data interfaces to quality

Management and traceability systems (ZVEI standard, iTAC, customised)

Compactness and mobility enable flexible utilisation opportunities

AOI OptiCon SmartLine
Specification

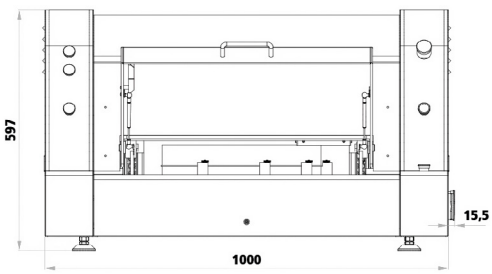
INSPECTION PARAMETERS

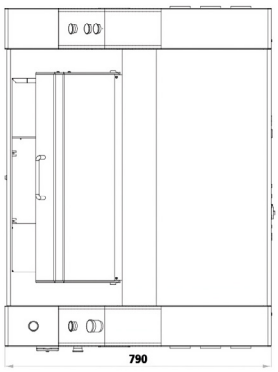
Orthogonal top inspection

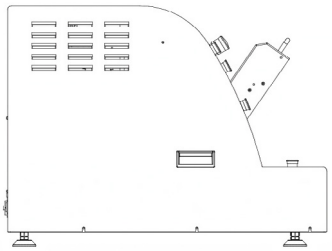
Image capturing technology	up to 12 megapixels, 24 bit colour depth
Lens	telecentric
Resolution	up to 10.5 µm
Illumination	multispectral, multi-directional
Handling time	minimised by quick-clamping
Inspection speed	up to 25 cm²/s
PCB size	up to 400 mm x 390 mm
Max. PCB weight	5 kg
PCB clearance top side	up to 65 mm
PCB clearance bottom side	up to 100 mm
Smallest inspectable component	01005 / pitch 0.3

SYSTEM SPECIFICATIONS

Power requirements	230 V AC / 1 kVA
Dimensions (w x d x h)	1,000 mm x 790 mm x 597 mm
Weight	ca. 200 kg

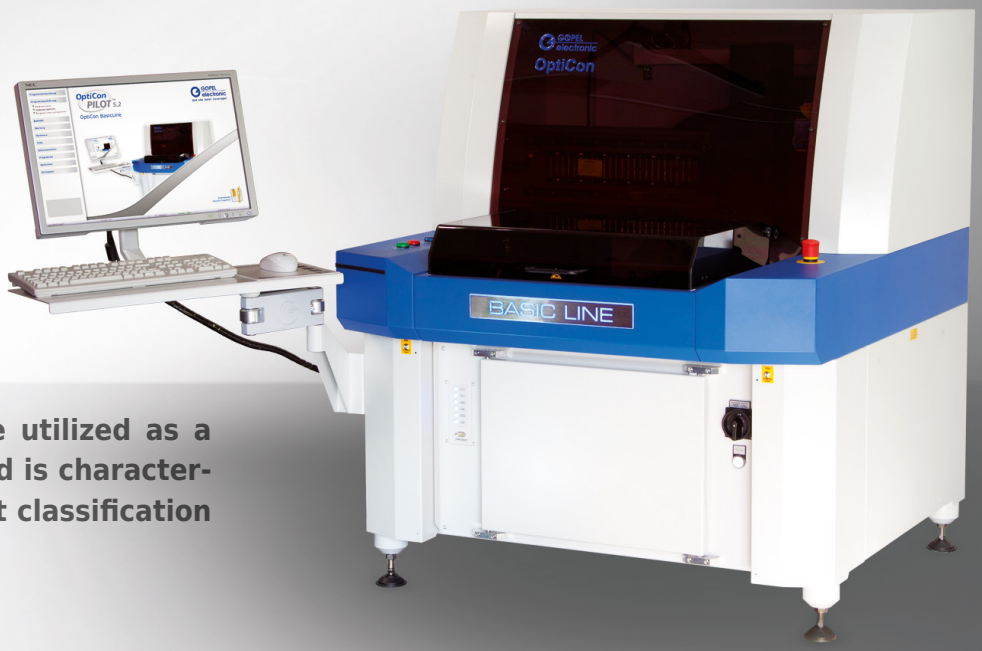






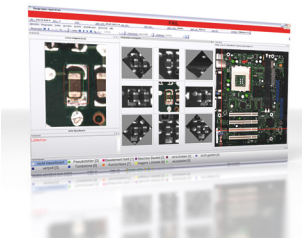
AOI BasicLine

Stand-alone AOI System
for manual Loading
and flexible Adaptation
of different Assemblies

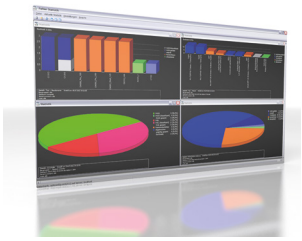


The BasicLine can also be utilized as a separate repair station and is characterized by a comfortable fault classification via keyboard.

Keyboard for comfortable fault analysis at the repair station



Repair station software



Statistics module

MAXIMUM FAULT DETECTION

Unique multispectral illumination

patented 360° inspection in 1° steps with adapted focal plane

program optimisation by means of statistically recorded inspection data

COMPANY-SPECIFIC PRODUCTION INTEGRATION

Individual integration opportunities into the production process (repair station, fault output, usage of serial numbers)

Extensive data interfaces to quality management and traceability systems (ZVEI standard, iTAC, customised)

FLEXIBLE CAMERA CONFIGURATIONS

inspection modules for various speeds and test tasks (SMD, THT, THR)

extension opportunities: rotatory angled-view inspection, laser height measurement and add-on camera with microscopic resolution

AOI OptiCon BasicLine
Specification

INSPECTION PARAMETERS

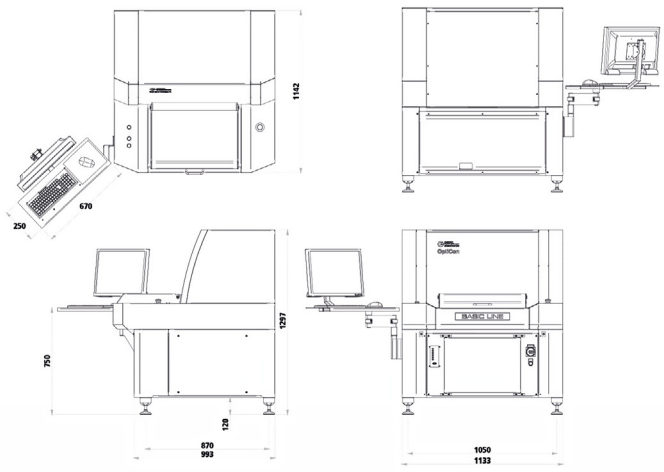
Orthogonal top inspection, angled-view top inspection

Image capturing technology	up to 48 megapixels, 24 bit colour depth
Lens	telecentric
Resolution	up to 3.2 µm
Illumination	multispectral, multi-directional
Handling time	minimised by quick-clamping
Inspection speed	up to 60 cm²/s
Angled-view inspec	0°–360° in 1° steps
PCB size	up to 510 mm x 500 mm
Max. PCB weight	5 kg
PCB clearance top side	up to 65 mm
PCB clearance bottom side	up to 65 mm
Smallest inspectable component	01005 / pitch 0.3

SYSTEM SPECIFICATIONS

Power requirements	230 V AC / 1 kVA
Dimensions (w x d x h)	1,000 mm x 790 mm x 597 mm
Weight	ca. 200 kg

This AOI system can be individually integrated into your process of PCB assembly. The various error output varieties per screen, label or test protocol are suited for many PCBs production methods.



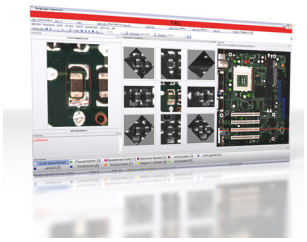
A multitude of variants and settings in illumination and camera make the system a highly precise and fast inspection device. Customized configurations and technical upgrades are also possible.

AOI AdvancedLine

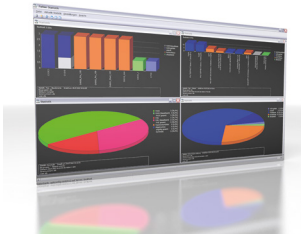
Inline AOI System for flexible Integration Opportunities

The AdvancedLine AOI system's decisive advantage is the multitude of opportunities for inline integration into the production process. The system can be utilized at each position in a PCB production line. No requirements or specifications will remain unfulfilled as your boards can be transported in each direction.

Keyboard for comfortable fault analysis at the repair station



Repair station software



Statistics module

MAXIMUM FAULT DETECTION

Unique multispectral illumination

Patented 360° inspection in 1° steps with adapted focal plane

Program optimisation by means of statistically recorded inspection data

COMPANY-SPECIFIC PRODUCTION INTEGRATION

Individual integration opportunities into the production process (transportation direction, inline verification station, usage of serial numbers)

Extensive data interfaces to quality management and traceability systems (ZVEI standard, iTAC, customised)

FLEXIBLE CAMERA CONFIGURATIONS

Inspection modules for various speeds and test tasks (SMD, THT, THR)

Extension opportunities: rotatory angled-view inspection, laser height measurement and add-on camera with microscopic resolution

AOI OptiCon AdvancedLine
Specification

INSPECTION PARAMETERS

Orthogonal top inspection, angled-view top inspection

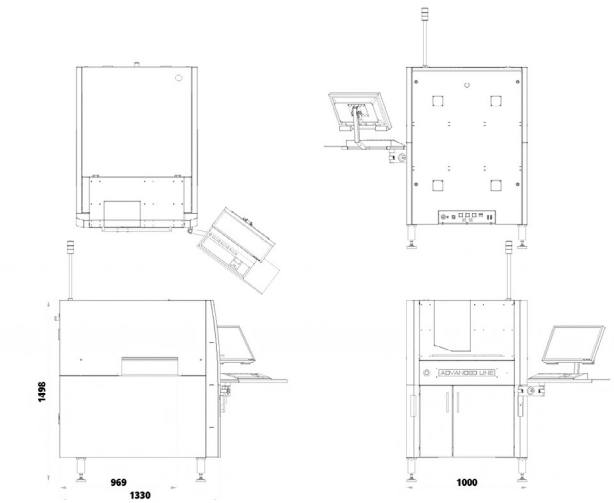
Image capturing technology	up to 48 megapixels, 24 bit colour depth
Lens	telecentric
Resolution	up to 3.2 µm
Illumination	multispectral, multi-directional
Inspection speed	up to 60 cm²/s
Angled-view inspec	0°–360° in 1° steps
PCB size	up to 800 mm x 450 mm
Max. PCB weight	5 kg
PCB clearance top side	up to 65 mm
PCB clearance bottom side	50 mm
Smallest inspectable component	01005 / pitch 0.3

SYSTEM SPECIFICATIONS

Inline interface	SMEMA, Siemens, Sensor
Transportation directions	left-right / right-left / left-left / right-right
Power requirements	230 V AC / 1 kVA 6 bar compressed air, consumption < 20 l/h
Dimensions (w x d x h)	1,000 mm x 1330 mm x 1500 mm
Weight	ca. 580 kg

This AOI system can be individually integrated into your process of PCB assembly. The various error output varieties per screen, label or test protocol are suited for many PCBs production methods.

A multitude of variants and settings in illumination and camera make the system a highly precise and fast inspection device. Customized configurations and technical upgrades are also possible.



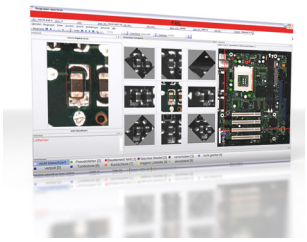
AOI TurboLine

Inline AOI System for High-End Inspection

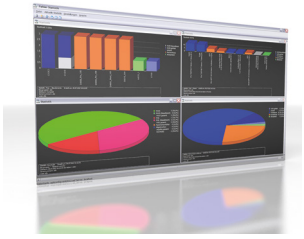
The TurboLine AOI system's special features are opportunities for double-sided inspection as well as various camera and illumination configurations.

It is possible to inspect the PCB bottom side without assembly turning. This is a decisive advantage over common AOI systems as inline speed is guaranteed. The rotatable angled-view and the segmented band module also help for faster inspection.

Keyboard for comfortable fault analysis at the repair station



Repair station software



Statistics module

MAXIMUM FAULT DETECTION

- Unique multispectral illumination
- Patented 360° inspection in 1° steps with adapted focal plane
- Program optimisation by means of statistically recorded inspection data

18 DIFFERENT CAMERA CONFIGURATIONS

- orthogonal top inspection (optional microscopic resolution)
- orthogonal bottom inspection
- rotatory angled-view inspection with unique inspection area

SPEED ADVANTAGES OVER COMMON AOI SYSTEMS

- double-sided PCB inspection without flipping
- identical inspection areas of the orthogonal and angled-view cameras
- loading and reloading by three-segment-belt during inspection

AOI OptiCon TurboLine
Specification

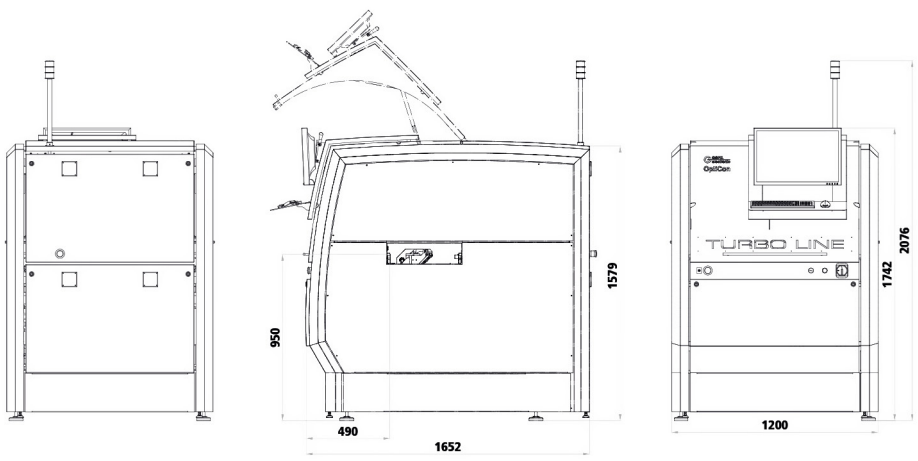
INSPECTION PARAMETERS

Orthogonal top inspection, angled-view top inspection

Image capturing technology	up to 48 megapixels, 24 bit colour depth
Lens	telecentric
Resolution	up to 6.5 µm
Illumination	multispectral, multi-directional
Handling time	3 s
Inspection speed	up to 60 cm²/s
Angled-view inspec	0°–360° in 1° steps
Double-side PCB inspection	without flipping
PCB size/ carrier size	up to 610 mm x 460 mm
Max. PCB weight	5 kg
PCB clearance top side	up to 80 mm
PCB clearance bottom side	up to 50 mm
Smallest inspectable component	01005 / pitch 0.3

SYSTEM SPECIFICATIONS

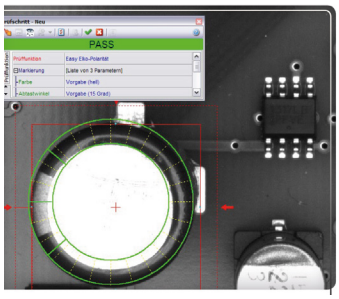
Inline interface	SMEMA, Siemens, Sensor
Transportation directions	left-right / right-left / left-left / right-right
Power requirements	230 V AC / 1 kVA 6 bar compressed air, consumption < 20 l/h
Dimensions (w x d x h)	1,200 mm x 1,652 mm x 1,742 mm
Weight	ca. 1000 kg



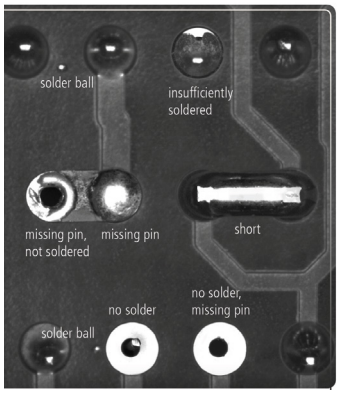
AOI THT-Line

AOI System for efficient Quality Check of THT Assemblies

AOI System for efficient quality assurance of THT Assemblies in the production process. It can be utilised either per manual feeding or as an inline system utilising a roller conveyor transport system. THT-Line enables the automated inspection of THT assemblies with up to 80 mm component height.



Polarity check at THT components



Typical solder faults

MAXIMUM FAULT DETECTION

- Unique multispectral illumination
- THT component, THT solder joint and wave-soldered SMD component inspection
- Freely configurable test functions and illumination opportunities

INTEGRATION OPTIONS FOR THT PRODUCTION PROCESS

- Manual or automated feeding via accumulating transport system
- Component side and solder side can be inspected at multiple positions within the production line
- Solder side inspection either on the upper conveyer belt or during the PCB return in the lower system area

SPEED ADVANTAGES OVER COMMON AOI SYSTEMS

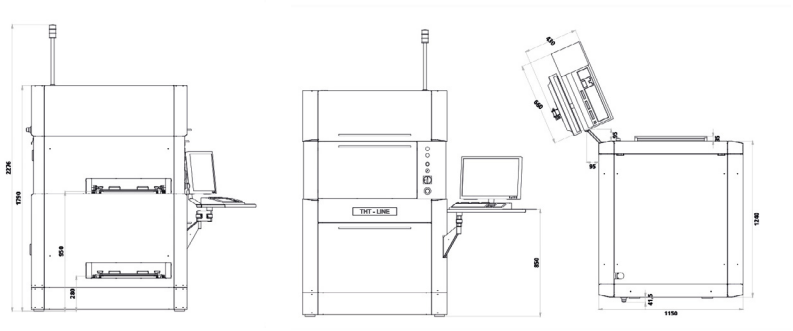
- ”Flip free“ double-sided inspection of THT assemblies
- Multiple and independently working AOI modules in one system

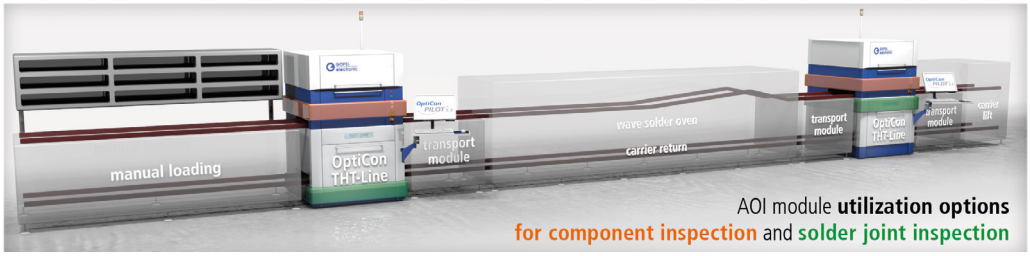
AOI OptiCon THT-Line Specification

OPTICON THT-LINE	Top-side AOI module	Bottom-side AOI modul
Image capturing technology	CCD matrix camera	CCD matrix camera
Colour depth	up to 24 bit	up to 24 bit
Integration	in upper transport system	in upper and lower transport system
Inspection scope	Presence, placement/ positioning, polaritiy and labelling (OCR) of THT assemblies	THT solder joints, SMD components, SMD solder joints
Illumination system	multispectral, multi-directional	multispectral, multi-directional
Inspection speed	up to 60 cm²/s	up to 100 cm²/s
Maximum carrier size	up to 620 mm x w510 mm	up to 620 mm x 510 mm
Maximum inspection area	540 mm x 450 mm	540 mm x 450 mm
Inspection height	up to 80 mm	5 mm
Clearance	above PCB: 80 mm below PCB: 20 mm	above PCB: 80 mm below PCB: 20 mm

SYSTEM SPECIFICATIONS	
Power requirements	230 VAC / 2 kVA; 6 bar compressed air, consumption < 20 l/h
Carrier transport system	accumulation roller
Transportation direction	left-right / right-left / left-left / right-right
Inline interface	SMEMA, Siemens, Sensor
Dimension (W x D x H)	1150 mm x 1300 mm x 1800 mm

OPTIONS	
	Barcode/2D code reading system
	Communication with RFID reading systems
	System configuration for manual loading



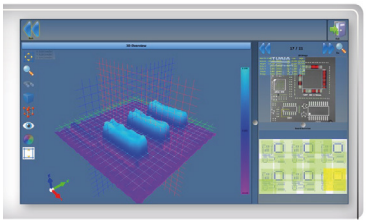


AOI module **utilization options**
for component inspection and solder joint inspection

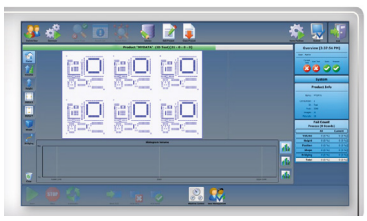
AOI SPI-Line 3D

3D Solder Paste
Inspection System

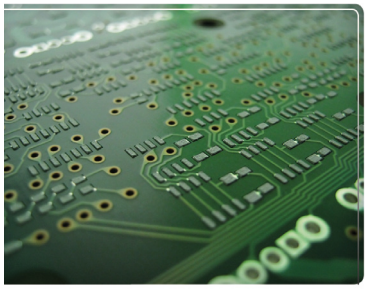
In comparison to other solder paste inspection systems, the SPI-Line 3D provides a true accurate measurement of applied solder paste. The solder paste printing is inspected for form, height, surface area, bridges, volume, x/y offset and coplanarity.



Software interface SPI-Pilot:
3D display



Software interface SPI-Pilot:
initial screen



PCB with solder paste

PRECISE THREE-DIMENSIONAL SOLDER PASTE PRINTING MEASUREMENT

- Form • Bridges • X/Y offset • Surface area
- Height • Volume • Coplanarity

CAMERA HEAD OPTIMISED FOR SPEED

- 180 images per second at 4 megapixel resolution
- Highly precise 3D image capturing based on fringe projection technology
- Operating without moving parts

INTUITIVE SOFTWARE SPI-PILOT

- Touchscreen interface
- Program generation in less than 10 minutes

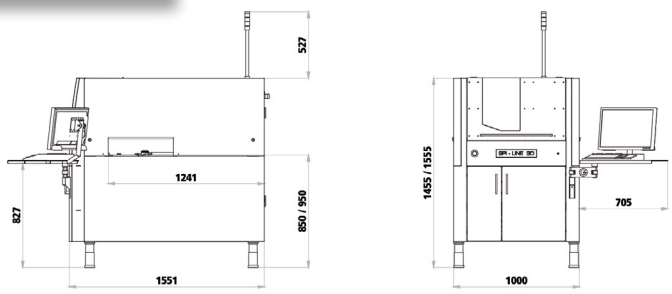
AOI OptiCon SPI-Line
Specification

OptiCon SPI-Line 3D

	Configuration 1	Configuration 2	Configuration 3
Measured values	form, height, volume, bridges, X/Y offset, coplanarity, surface area		
Camera	4 Megapixel, 180 fps		
X/Y resolution	20 µm	15 µm	10 µm
Z resolution	0.2 µm		
Z measuring accuracy (no target)	better than 2 µm		
Z measuring area	1,000 µm		
Inspection Speed	90 cm²/s	51 cm²/s	20 cm²/s
Volume repeatability (on target)	< 0,5 % at ± 3 σ		
Volume repeatability (on PCB)	< 2 % at ± 3 σ		
Gage R&R	<< 10 % at ± 6 σ		
Illumination	flexible illumination for fiducial and barcode/2D code recognition		
Max. PCB size	510 mm x 510 mm		
Min. PCB size	80 mm x 80 mm		
Top side clearance	50 mm		
Bottom side clearance	30 mm		
Max. PCB thickness	5 mm		
Min. PCB thickness	0,3 mm		
Max. PCB warpage	± 5 mm		
Max. PCB weight	5 kg		
Program generation	simple programming in typically less than 10 minutes		
Offline programming	yes		
Data import	Gerber data import (RS-274-X, RS-274-D), CAD, ODB++		
Closed-Loop	to paste printer		

SYSTEM SPECIFICATIONS

Operating system	Windows 7 (64 bit)
Inline interface	SMEMA, Siemens, Sensor
Energy requirements	230 VAC / 2 kVA; compressed air 6 bar, consumption < 20 l/h
Transport directions	left-right / right-left / left-left / right-right
Dimensions (w x d x h)	1000 mm x 1585 mm x 1520 mm
Weight	700 kg



AOI X-Line 3D

Combined 3D X-ray and Optical Inspection at Production Line Pace

For maximum fault coverage using digital tomosynthesis with outstanding inspection speed.

Benefits of the 3D X-Ray Inspection:

- **Safe inspection of double-sided assembled PCBs**
- **Reconstruction of any layers**
- **Spatial allocation of deteted faults**
- **Fast and user friendly test programm generation by using a single unified library**

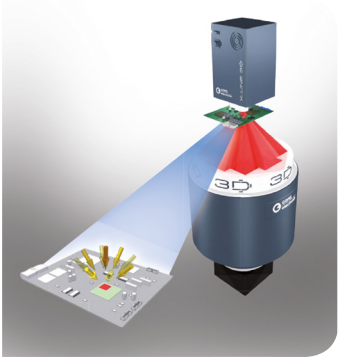
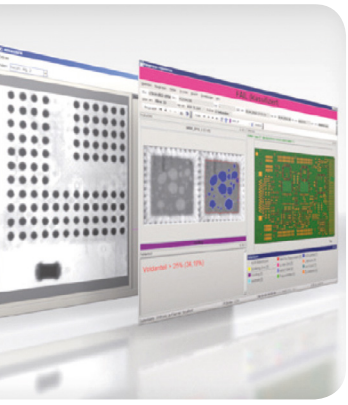


Image Capture



Repair station- and analysis software

IMAGE CAPTURE

- Complete 3D capturing can achieve test speeds of up to 40cm²/s by revolutionary GigaPixel™ technology
- Reconstruction processes possible due to tomosynthesis
- Simultaneous 3D x-ray inspection of top and bottom side of a double sided PCB
- Optimal adaptation to future components and manufacturing requirements via Software XI-PILOT
- Algorithm library suitable for all common components
- Minimal times for test program generation

PROCESS INTEGRATION

- Repair station software enables a visualisation of detected faults in various forms of presentation
- Powerful analysis software allows for the inspection of single layers objective rating of production quality and throughput with the help of comprehensive statistical evaluation package with numerous filter settings
- Warning and action limits as well as trend analyses are definable in the SPC Module

Automated X-Ray Inspection (AXOI)
AOI X-Line 3D Specification

High-Speed X-Ray System
for Maximum Test Coverage

OptiCon X-Line 3D is an automatic three-dimensional measuring X-ray inspection system for rapid inspection of printed circuit board assemblies. OptiCon X-Line 3D is based on a patent-pending detector concept, which has been developed in-house by GOEPEL electronic.
Using a maintenance-free microfocus X-ray tube it allows for real-time multi-angle image capture.
A continuously scanning image acquisition unit provides for highresolution X-ray images, which are acquired, pre-processed and re-constructed during axis motion. This enables an inspection throughput of up to 40 cm^2/s with full 3D acquisition of the board assembly. Reconstruction procedures based on digital tomosynthesis allow for concurrent inspection of top and bottom sides of assemblies, which are populated on both sides – within a single run. In addition, tomosynthesis allows for distinct analyses of defi ned board layers and inspection of solder joints with a reliable process. Inspection tasks, which can't be covered by X-ray technology, like polarity checks, character and/or colour recognition, will be addressed by an integrated AOI module.

DATABASE

- Layered reconstruction of components and solder joints
- Test program generation and actual inspection process are executed with geometrically calibrated, distortion free imaging of the real test objects
- Fast test program generation based on CAD data using a component library
- Predefined test algorithms and classifiers

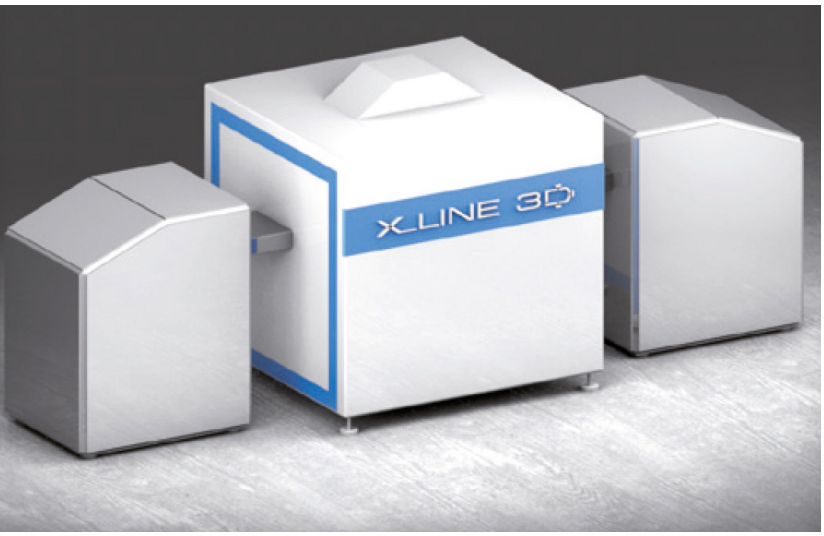
FAULT DETECTION

- Full-sized 3D x-ray inspection (AXI) allows layered analysis of all solder joints of a PCB within the production process
- Safe detection of critical faults and spatial allocation of the detected defects
- Fast test program generation based on CAD data using a component library
- Predefined test algorithms and classifiers

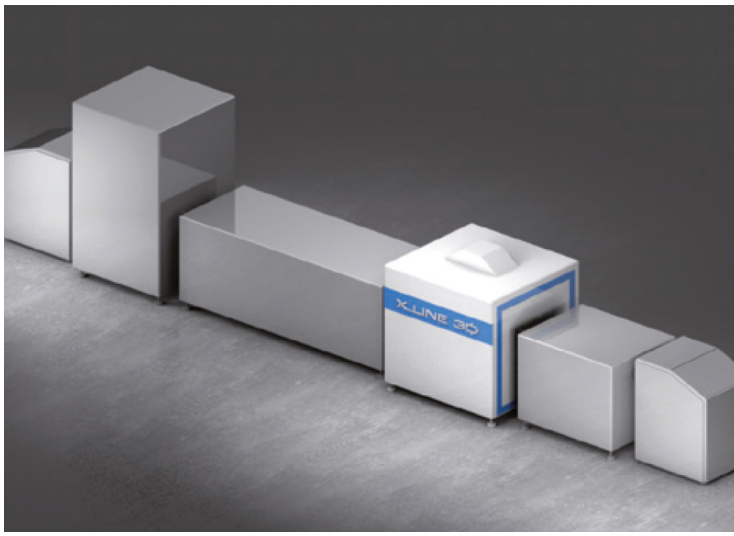
FAULT ANALYSIS

- Powerful analysis software provides the safe evaluation of detected faults
- Detailed examination of the inspection results in various Z-levels
- Clear representation of soldered joints and components via visualisation of selected areas
- Predefined test algorithms and classifiers

Automated X-Ray Inspection
AXOI OptiCon X-Line 3D



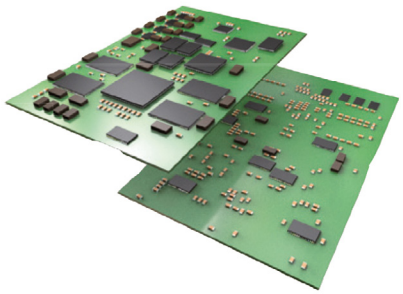
Stand-alone (off-line operation)



Integrated in the production line
(in-line operation)

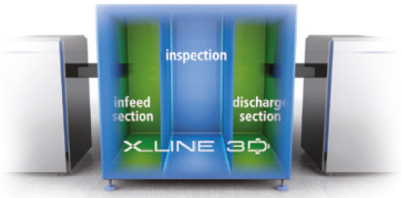
INSPECTION EXAMPLE

Board assembly:	160 mm x 100 mm, assembled on both sides
Components:	509
Package styles:	6 x BGA, 20 x SO, 424 x Chip, 12 x THT
Solder joints:	2977
Resolution:	12 µm
AOI fileds of view:	8



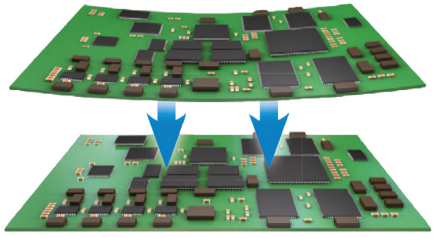
BOARD CONVEYOR SYSTEM

Division of the system in three shielded segments allows for concurrent operation of board handling and inspection operations.



CORRECTION OF BOARD WARPAGE & STABILITY MONITORING

Automatic correction of board warpage allows for precise reconstruction of the board in Z-axis direction



Automated X-Ray Inspection
X-Ray: 2D, 2.5D & 3D

Maintenance and Safety

The OptiCon X-Line 3D uses a shielded, maintenance-free micro-focus X-ray source and a detector with high service lifetime, in-house-developed by GOEPEL electronic. Exchanging the X-ray source or the detector is simple and fast-ensuring minimal down time. The compact system captivates thrugh its extraordinary accessibility. Two service hatches and two doors facilitate the access to all important system components. Redundant safety circuits and perfect radiation protection guarantee utmost safety. The emitted radiation dose is below the detection limit of conventional radiation detectors. Operating the system is therefore totally safe.

3D X-ray Inspection with OptiCon X-Line 3D

Principle of Image Acquisition

The PCB is radiated from at least nine different angles. The resulting images allow for the reconstruction of distinct layers.

Benefits of 3D X-ray Inspection

- safe inspection of PCBs with components on both sides
- reconstruction of arbitrary layers
- spatial assignment of detected faults
- rapid and comfortable inspection programme generation through use of a unifi ed library

Fields of Application

- 3D X-ray inspection in in-line production
- inspection of PCBs with components on both sides
- qualitative inspection of all solder joints (e.g. BGA, QFN)
- check for component presence, offset and shorts
- measurement of voids in different layers
- inspection of complex board assemblies with superimposed soldering layers and assembled heat sinks (integrated power electronics)
- measurement of the hole-fi ll in THT/THR solder joints
- inspection according to IPC-A-610 requirements

2.5D X-ray Inspection

Principle of Image Acquisition

Superimposed solder joints (e.g. top and bottom side of the assembly) are optically separated in the projections by means of angular radiography.

Disadvantages

- huge programming effort for assemblies with components on both sides due to manual parameter setting for all acquired images
- no unifi ed library available
- long inspection duration

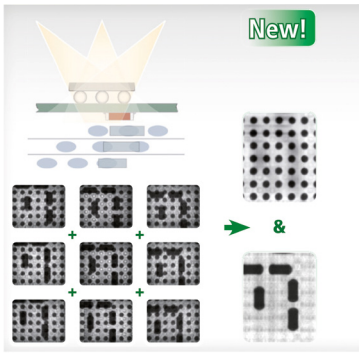
2D X-ray Inspection

Principle of Image Acquisition

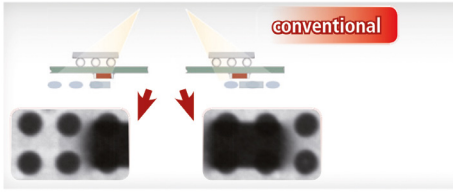
Assemblies are radiated through orthogonally.

Disadvantages

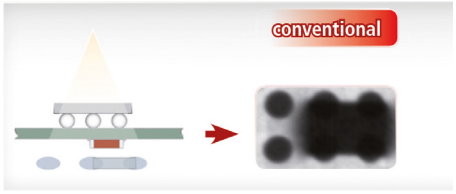
- superimposed solder joints (e.g. top and bottom side of the assembly) can't be inspected
- insuffi cient information about the quality of BGA solder joints
- no spatial assignment of detected faults



Different projections of a board with components on both sides during 3D X-ray inspection

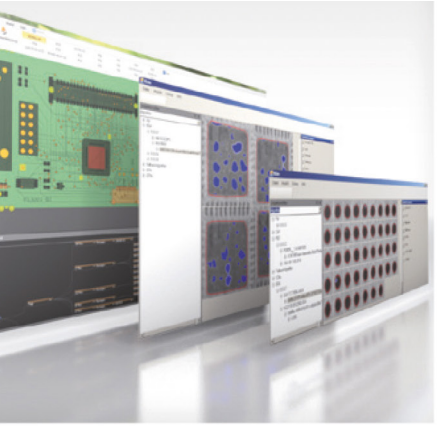


Optically separated solder joints by means of angular radiography using 2.5D X-ray inspection

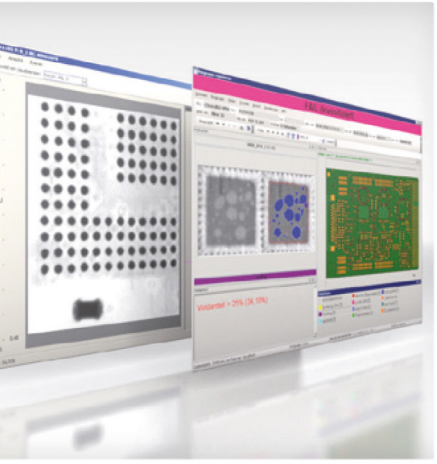


Optically separated solder joints by means of angular radiography using 2.5D X-ray inspection

AXOI Automated X-Ray Inspection
System Software OptiCon XI-PILOT

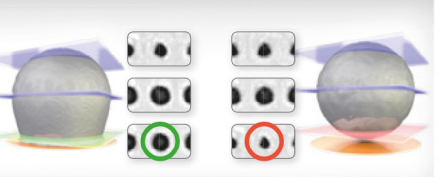


OptiCon XI-PILOT software interface



Repair station and analysis software

Statistical evaluation and SPC module



Detection of an un-soldered BGA ball in various layers of the solder joint

INTELLIGENT SOFTWARE CONCEPT RAISES THE BAR –
AXI/AOI PROGRAMMING FEATURING THE SAME USER INTERFACE

- system software OptiCon XI-PILOT
- off-line programming software
- repair station software
- analysis software
- statistics software
- SPC software

The OptiCon XI-PILOT system software is an open concept for a maximum fault-coverage and optimised adaptation to future component packages and manufacturing requirements. Automatic X-ray and optical inspections are programmed using the same user interface. The supplied component library, which complies with IPC standards, is linked with inspection algorithms and serves as the basis for the inspection of all common component packages. The measured values and features extracted by the algorithms will be automatically classifi ed, resulting in minimum programme generation time.

Once the initial acquisition of all required X-ray images has been completed, the entire inspection programme generation and library adaptation can be done in the office using offl ine programming software. The repair station software features a vivid visualisation of detected faults in different representations. Linked to this repair station software there is a powerful analysis software, which allows for viewing of all faults of a component in distinct layers. The statistics software, equipped with pre-defi ned fi lters and the possibility to create userdefi ned filters, enables the fast detection of main faults as well as an objective evaluation of production quality and throughput. The settable warning and action limits of the SPC module, as well as trend analyses allow for taking predictive measures before an actual fault occurs.

Rapid Inspection Programme Generation
through Effective use of Libraries

Due to the reconstruction of components and solder joints layer-by-layer, test programme generation and actual inspection processes are executed with geometrically calibrated, distortion free imaging of the actual inspection objects. This enables a rapid and effective inspection programme generation based on CAD data and the use of a component library with pre-defi ned inspection algorithms and classifi ers. Component packages, which are not included in the supplied component library, can be comfortably created using the integrated CAD editor.

Reliable Failure Analysis through Vivid Visualisation

For reliable assessments of detected faults at the verifi cation or repair station, the original X-ray image of the solder joint will be complemented by an image, which has been analysed by software algorithms and marked with colours. In addition, a powerful analysis software is available that aids the user in assessing the fault in different Z layers. The 3D visualisation of selected areas facilitates the vivid presentation of solder joints and components.

Maximum Fault-Coverage at Outstanding Inspection Speed

The comprehensive 3D X-ray inspection permits analysis of all solder joints of an assembly layer-by-layer in-line with the line speed. This ensures a reliable detection of critical fault types and the spatial assignment of the recognised faults.

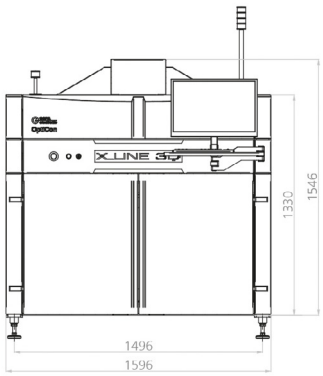
AXOI Automated X-Ray Inspection
Technical Data

MODELS

Version	OptiCon X-Line 3D X10 OptiCon X-Line 3D X40

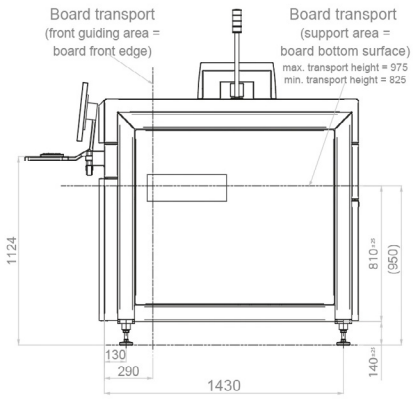
X-RAY TECHNOLOGY

Tube type	maintenance-free, sealed microfocus X-ray tube
Tube voltage	max. 130 kV
Tube power	max. 39 W
Detector type	multi angle detector real-time image acquisition from different viewing angles
Grey scale resolution	12 bit
Resolution	variable: 6 µm – 24 µm*
3D inspection method	digital tomosynthesis
3D inspection speed	OptiCon X-Line 3D X10: up to 10 cm²/s OptiCon X-Line 3D X40: up to 40 cm²/s
Calibration	geometric and grey scale calibration, automatic stability monitoring[1]
Z-axis adjustment	adaptable geometric magnifi cation by means of motorised height positioning of the tube
X-ray protection	according to German Radiation Protection Ordinance (RöV), three segments, shielded, zero emission



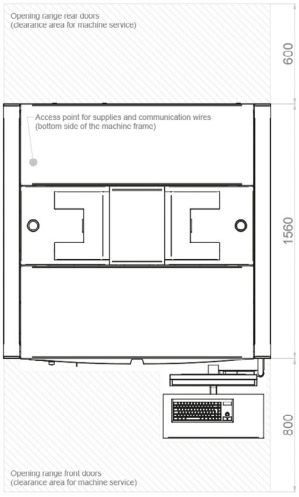
OPTICAL IMAGE ACQUISITION TECHNOLOGY

Resolution	10.5 µm
Field of view	42 mm x 42 mm
Lens	telecentric (pixel adapted lens)
Lighting	multi-spectral lighting, selectable from blue to IR



BOARD HANDLING

Transport height	850 mm – 950 mm ± 25 mm
Width adjustment	automatic
Board size	max. 450 mm (L) x 400 mm (W)2 / min. 60 mm (L)3 x 50 mm (W)
Board thickness	0.5 mm – 5 mm
Board support width	≥ 3 mm
Board weight	≤ 1.5 kg
Board warpaged	automatic compensation
Component clearance	bottom side: 65 mm / top side: max. 40 mm*
Handling time	approx. 5 s (concurrent loading/unloading and inspection)



SYSTEM

Line interface	SMEMA, Siemens
System supply	230 VAC, 1 kVA, 6 bar compressed air, < 20 Nl/min*
Typ. power consumption	< 700 W (average)
Dimensions	1596 mm (W) x 1540 mm (D) x 1470 mm (H, basis device) / 1720 mm (H, device including tube tower)
Weight	approx. 2.5 t

PILOT 6

A well-balanced Software Concept

The OptiCon PILOT software provides powerful functions for component recognition, solder joint and short inspection, OCR, colour verification as well as solder paste inspection.

In addition to the intelligent component recognition based on automated characteristic extraction from real images, the solder joint quality is determined by a complex grey value analysis using a range of illumination types.

PILOT 6

Maximum failure detection through multiple inspection methods and verification of inspection depth

Efficient virtual programming for external generation and optimization of test programs

Individually adaptable test functions and library entries

SmartGuide

Test program generation – easy as handling a smartphone ...

Clear and easy user guidance from data import to final inspection

Extremely easy and fast test program generation without AOI knowledge

fully operable via touch screen

Reference-Database

The integrated reference database guarantees safe and documented fault detection at optimised false call rate. It enables the storage of previously detected faults and their verification after test program modifications. In case of inconsistent results after a program check, all corresponding parameters will be displayed. Likewise, the reference database serves as storage for PASS examples to ensure the stability of optimised test programs.

OptiCon PILOT Software

Ease of use • inspection • reliability • flexibility

Data import	of various formats (Gerber, Pick-and-Place, ODB++,etc.) for flexibility and ease of use
Component library	with numerous packages; adaptable for product specific applications
Inspection functions	for IPC compliant quality assurance and layout independent inspection
Efficient inspection	for low volume production based on fast program generation and comfortable optimization
Operator guidance	with smartphone-like interface for easy test program generation even for inexperienced users
Unified management	of AOI/AXI/SPI data for joint failure verification, statistics and MES communication
Maximum fault coverage	based on a wide range of inspection functions including detailed coverage reports

PILOT 6

AOI , AXI and SPI networking

PILOT Connect

Networking all the inspection data from automatic optical, X-ray and solder paste inspections

Repair station with a clear representation of the AOI, AXI and SPI test data at a glance

Opportunities for process analysis and optimization

Interfaces via ME and traceability systems

Integration with external systems possible

Integrated user management for all related systems and software modules

Extremely easy and fast test program generation without AOI knowledge

Convenient data maintenance tools

OptiCon PILOT Connect
all data at a glance

Supporting operators	Use at verification and repair stations All data from the AOI, AXI and SPI test systems is visible at a glance It is possible to fully assess errors
Targeted checking	Comprehensive, automatic system checking of ambiguous errors Better assessment due to additional data capture
Process analysis and optimization	Analysis, optimization and monitoring of the manufacturing process through statistical evaluation of the linke inspection data
Flexible use of different database systems	Connection to different database systems such as MySQL, MSSQLServer and Oracle Database
Integrated user management	Access to all computers and services that you are authorized for with a single log-on
Common use of CAD data	Comprehensive system use of imported CAD data for creating the test programs

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VE-05/2015