TELEDYNE DALSA
Everywhere**you**look™

Pyramid Imaging

BOA INS | BOA IDR | BOA PRO

BOA™

THE SMART CHOICE IN VISION

Get **more vision**

Smart Vision for Automation

COMPLETE VISION SYSTEM

Teledyne DALSA's BOA products are highly integrated vision systems in a tiny smart camera package specifically designed for industrial use. Complete with choice of application software embedded, BOA offers manufacturers a robust and flexible automated inspection system that is easy to integrate and deploy on the factory floor.

BOA VISION SYSTEMS COMPRISE ALL OF THE ELEMENTS OF AN INDUSTRIAL MACHINE VISION SOLUTION:

• Sensor
• Light Control
• Multiple Processors
• I/O – Expandable via PL-200
• Factory communications
• Developer and Operator interfaces

• VISUAL LED INDICATORS
• M12 FACTORY CABLES
• EXTERNAL LAMP CONTROL
• PASSIVE PoE

EXCEPTIONAL PRICE/PERFORMANCE

BOA vision systems are available in a range of resolution and performance models for monochrome and color applications. The BOA 200 model offers the highest performance.

CHOICE OF APPLICATION SOFTWARE

BOA vision systems are available with 3 different software applications:

BOA INS

The standard product is offered with our iNspect Express software. Ideal for both new and experienced users alike, iNspect Express can be quickly set-up to satisfy a multitude of common inspection tasks

BOA IDR

The IDR version is offered with a subset of iNspect Express tools that apply only to Identification, Tracking and associated Verification applications. BOA IDR is a good choice for manufacturers who need to identify product markings for correctness or traceability.

BOA PRO

The PRO version is offered with our coveted Sherlock application software. Ideal for vision integrators, Sherlock provides the flexibility and tools to tackle the diverse range of applications across all industrial segments.

| BOA Fast | BOA50 1.5X Fast | BOA200 4X Fast |

SENSOR	640x480						1024x768						1280x960						1600x1200					
PERFORMANCE	BOA		BOA50		BOA200		BOA		BOA50		BOA200		BOA		BOA50		BOA200		BOA		BOA50		BOA200	
MONO/COLOR	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C
BOA INS	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×		×				×	×
BOA IDR	×		×		×		×		×		×		×		×		×				×		×	
BOA PRO			×	×	×	×			×	×	×	×			×	×	×	×			×	×	×	×

• Pattern Matching
• Precision Measuring
• Identification (1D/2D/OCR)

• Robot Guidance
• Flaw Detection
• Color Verification

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IP67 ENCLOSURE
360° MOUNTING
C MOUNT LENS
PROTECTIVE LENS COVER

VERSATILE, RUGGED AND RELIABLE

BOA's small rugged enclosure and 360° mounting capabilities allow it to integrate easily into existing production lines, machinery or moving equipment. Rated for IP67 deployment, BOA can be installed in harsh or wash down factory environments knowing that heat, vibration or moisture will not affect performance. An optional cover is available that screws over the C mount lens for these applications.

EASY TO INTEGRATE

BOA is offered with panel ready accessories that provide integration convenience, expandability and protection against incorrect wiring. Panel Link products are DIN mountable and support standard M12 factory cabling to minimize costs. Depending on your application, these modules can support single cable applications as well as facilitating Ethernet communication for up to 4 BOA cameras.

PL-100
• Basic I/O module
• Breaks out BOA I/O
• LEDs for visual feedback
• Trigger button for diagnostics
• Offers power on Ethernet for single cable applications

PL-200-IO
• Expansion I/O module
• 8 OPTO Inputs + Trigger
• 8 OPTO Outputs
• 2 OPTO Outputs HS
• 1 OPTO Strobe
• LEDs for visual feedback
• Trigger button for diagnostics
• Offers power and I/O protection to BOA

PL-200-E
• Network switch
• 1 LAN port (no power)
• 1 BOA port (with power)
• 3 LAN ports configurable for std LAN or BOA
• Offers convenient connection between BOA(s) and 3rd party resources

SPECIFICATION	DEFINITION	
Memory	Storage	512MB
	Program	256MB
Image	Sensor	CCD
	Pixel size	3.7µm to 7.4µm
	Resolution	640x480, 1024x768, 1280x960, 1600x1200
	Type	Mono or Color Progressive Scan
	Exposure	22us to 1000ms
	Acquisition	Async Reset, full or partial frame integration
		Up to 100 f/s maximum (application dependent partial mode)
	Lens	C Mount (lens cover optional)
	Lamp	Direct connect (Pwr/Gnd/Strobe)
I/O	Trigger	1 opto-isolated input
		Software trigger via Ethernet or internal timer
	Inputs	1 General purpose opto-isolated
		Expandable via PL-200 Module
	Outputs	2 General purpose opto-isolated
		Expandable
	Strobe	1 dedicated strobe output for LED light source
	Status	Network + 2 application assigned LEDs
Serial	RS232	Flying leads from M12 cable
Network	Ethernet	10/100 BaseT (Supports "Passive Power over Ethernet")
Power	Power	12-30V via I/O or Ethernet
Mechanical	Material	Machined Aluminum with anodize/paint finish
	Mounting	8 x M 4 plus optional mounting block
	Size	44mm x 44mm x 56mm (without lens cover)
Environment	Temp	-10°C (14°F) to 50°C (122°F) Operating (-60°C to 80°C Storage)
	Protection	IP67 with cables attached
	Shock	70 G
Certification		FCC Class A and EU CE

FACTORY FRIENDLY
BOA supports standard Ethernet protocols for interfacing factory devices such as PLCs from Rockwell Automation and Siemens. BOA ensures that data is moved quickly and accurately with minimal integration effort.

In addition, BOA provides serial RS-232 and discrete I/O connections, as well as expandable I/O options. A dedicated strobe output is available for direct light control.

BOA INS

BOA INS is embedded with our intuitive iNspect Express machine vision software. This easy-to-use interface arms new and experienced users alike with field proven tools to satisfy a diverse range of inspection needs. BOA INS offers powerful capabilities that are quick to setup, integrate and deploy on the factory floor.
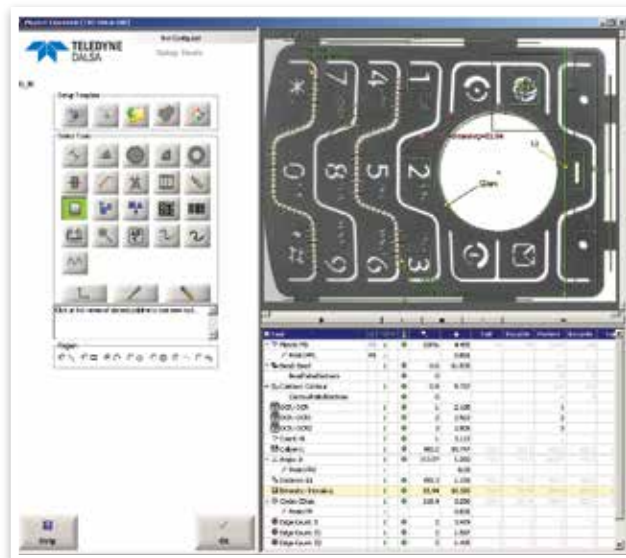
QUICK SET-UP

INTERFACE

• SYNCHRONIZE TIMING
• ADJUST LIGHTING AND EXPOSURE
• CALIBRATE COORDINATE SYSTEM

APPLY

• CLICK AND APPLY INSPECTION TOOLS TO IMAGE
• ASSIGN LOCATORS FOR ALIGNMENT IF REQUIRED
• ADJUST PASS/FAIL TOLERANCES

INTEGRATE

• SETUP COMMUNICATION CHANNEL
• DEVELOP SCRIPTS IF REQUIRED
• CONFIGURE I/O IF REQUIRED

EASY WEB BROWSER SET UP

BOA INS is configured and monitored remotely using an Ethernet connection to a PC. An inspection can be quickly setup using a web browser portal (Internet Explorer 6 and higher) into the embedded iNspect Express application. The web server provides a simple user interface for configuration and access to the iNspect Express application GUI, whose client controls are downloaded to the PC when the connection is initially established.
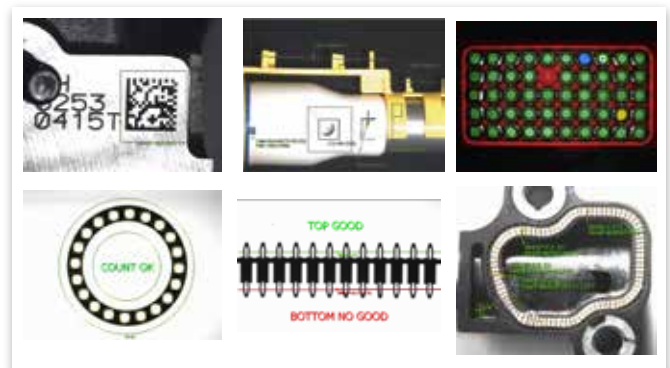
BOA FEATURES

• Easy setup via web browser
• Flexible tool set for most applications
• User Administration control

• Emulator for offline development
• Direct connect to 3rd party interfaces
• Image logging and playback

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VISION CAPABILITIES

iNspect Express offers a flexible tool set that is appropriate for most applications. Setting up an inspection is simple - select a tool, construct a ROI on the image, open the tool property page and set pass/fail criteria. Any combination or any multiple of tools can be used in a single inspection. At runtime, the outputs from all tools are formulated to render a decision.

CONTOUR TOOL EXAMPLE

Property pages also provide setup and tuning controls for each tool. In the case of the Count Tool, features of interest can be filtered based on size and the tool can be enabled to report size and XY location of all features being counted.

COUNT TOOL PROPERTY PAGE

Complex tools, such as 2D, Barcode, Color meter, Count, OCR and Match have "advanced" settings to provide even greater control and flexibility. These settings are also exposed through the respective tool property page. In addition, one or more image preprocessors can be applied to each ROI to accentuate features being inspected.

SCRIPTING

iNspect Express offers a very capable scripting tool. Scripting offers greater application flexibility by allowing users to define or manipulate system control and integration features. The Script Tool differs from the rest of the iNspect Express GUI in that it supports the use of functions and more traditional programming constructs.

Scripting is not always required for basic applications that only require a pass/fail decision output, but it is widely used for communicating with 3rd party devices over Ethernet or serial RS-232.

The script tool also provides a communication string editor that allows easy formatting of output strings.


STRING EDITOR

FACTORY INTEGRATION

iNspect Express supports digital I/O, Serial and Ethernet communications for interfacing 3rd party equipment and the factory enterprise. Protocols such as Ethernet/IP, Modbus and ProfiNet provide standard languages for connecting complementary factory devices. Image logging functions are available for storing runtime images to a network device.

RUNTIME INTERFACE

BOA cameras run autonomously at runtime and are not typically connected to a PC client. However, in cases where it is desirable to monitor inspection results visually, iNspect Express offers a runtime screen with a generic operator look and feel. Some custom controls are provided.
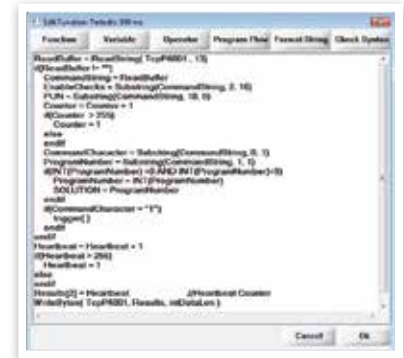
SCRIPTING EXAMPLE

ACCESS ADMINISTRATION

Operator access is an important consideration in factories. iNspect Express provides the capability to restrict or lockout unauthorized users. Similarly, for highly controlled manufacturing environments, such as drug packaging, it is also required to log access and any changes made to the system. iNspect Express can log user access and change information to a secure drive on the company network.

OFF-LINE DEVELOPMENT

iNspect provides a full-featured emulator for offline solution development and debugging. The emulator runs using images stored from the BOA camera. A solution developed in the emulator can be uploaded and run on the camera.

MULTI-LANGUAGE READY

The standard operator interface provided with the product is available in various languages such as English, Chinese, French, Italian, Japanese and Spanish.
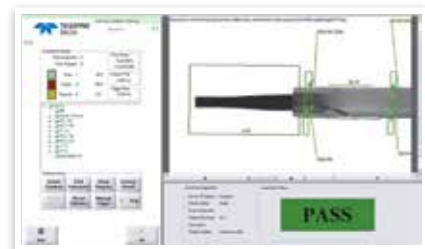
BOA IDR

ID READER AND VERIFICATION TOOL

BOA IDR offers a version of iNspect Express software that has been streamlined for identification and tracking applications. It provides tools for barcode, character and pattern identification or verification. BOA IDR allows manufacturers to combine these core tools to ensure that all product markings are correct when they leave the factory floor.

BOA IDR APPLICATIONS

- Part validation and verification (1D, 2D)
- Part traceability (1D, 2D)
- Error proofing (2D, OCR, Pattern)
- Date, lot, product code validation (OCR)
- Printed text verification (OCR, Pattern)
- Label presence and placement (Pattern)
- Label validation (1D, 2D, OCR)
- Cap presence and placement (Pattern)
- Pattern verification (Pattern)
- Tamper proofing (Pattern)
- Robot guidance (Pattern)

EASY TO SET UP, READY TO RUN

The embedded IDR application can be quickly setup and deployed using a standard web browser interface . No software installation is necessary, except for the fully functional emulator that supports offline development and debugging.

ACCESS CONTROL

The IDR software includes user administration tools to help customers achieve system validation f or 21 CFR Part 11. This includes password access control and data logging to a complimentary application running on a networked device.

1D BARCODE VALIDATION
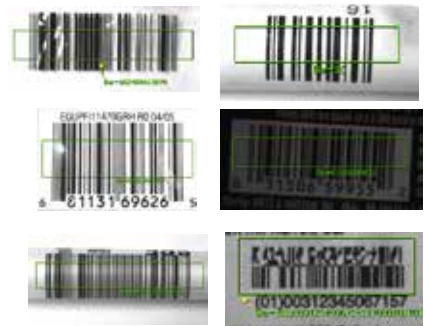
UPCA, UPCE, EAN8, EAN13, CODE39, CODE93, CODE128, CODABAR, BC412, ITF, POSTNET, PLANET, PHARMACODE, GS1, RSS-14, GRADING TO ISO 15416

2D MATRIX VALIDATION AND VERIFICATION

DATA MATRIX, QR CODE, MICRO QR, PDF417
LEARN MODE FOR DIFFICULT TO FIND CODES
GRADING TO AIM DPM, ISO 16022, ISO 15415

The 2D Matrix tool can tolerate normal variations in code appearance due to poor contrast and background inconsistencies. 2D includes a trainable search feature for locating degraded codes printed on challenging surfaces.

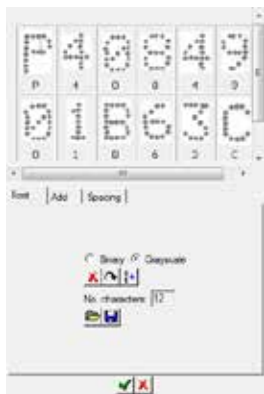## PRINTED TEXT VALIDATION AND VERIFICATION

TRAINABLE BINARY AND GRAYSCALE COR, DARK OR BRIGHT CHARACTERS FIELDING, MULTI-LINE SUPPORT, SLANTED TEXT SYMBOLS

OCR is typically used to verify date and lot codes on labels, but it can be used to verify any printed string of characters or symbols. The OCR tool compares each printed character against trained patterns to look for a match. The tool scans through the pattern library until it finds a match that meets or exceeds an expected score. After matching all characters, the tool compares the actual and expected strings to render a result. The tool reports the match score for each pattern which can be used as a measure of print quality.

OCR FONT TRAINER

MORE THAN JUST AN ID READER

ID verification applications are not limited to reading barcodes or printed text. In some cases, it is also necessary to verify a logo or other distinguishing mark on the part. BOA IDR includes a flexible pattern matching tool for such applications. The match tool can also report the XY position of the located pattern.

AREA AND EDGE BASED PATTERN RECOGNITION, REPORTS SCORE (% MATCH), LOCATION AND ROTATION FIND FEATURES FOR VERIFICATION OR ALIGNMENT

FLEXIBLE INTEGRATION

BOA IDR offers all of the integration capabilities that are available in BOA INS. This includes discrete I/O, RS-232 and Ethernet supported factory protocols such as Ethernet/IP, Modbus and ProfiNet. In addition, BOA IDR supports the iNspect Express scripting tool for advanced integration needs.
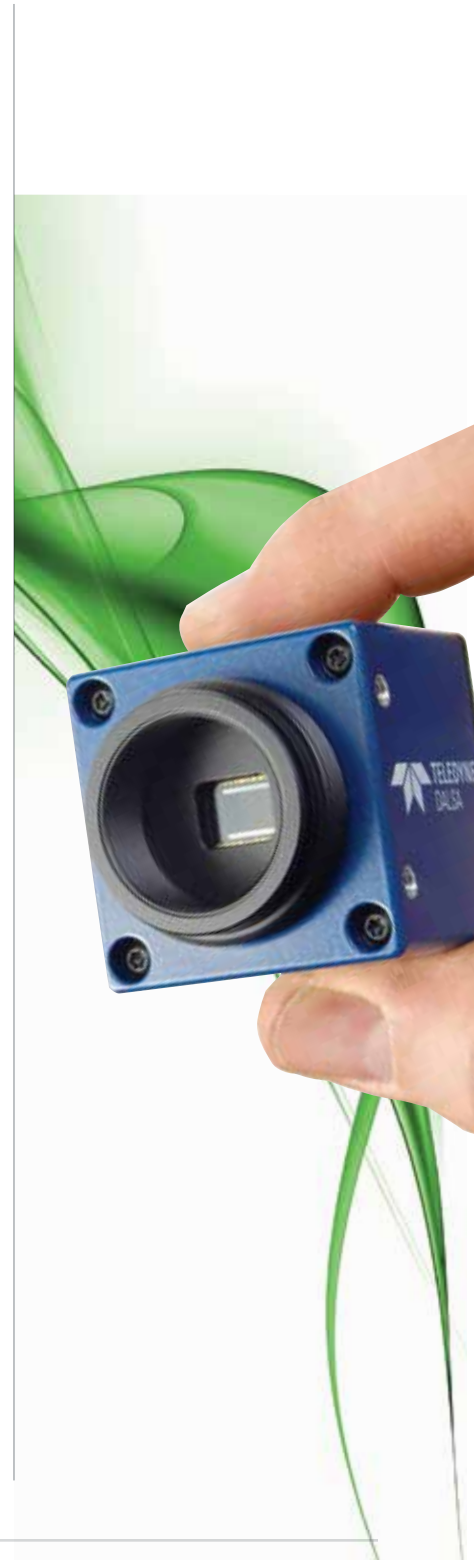
BOA PRO

BOA PRO is embedded with Teledyne DALSA's advanced machine vision software Sherlock. A recognized leading software tool, Sherlock offers design flexibility and inspection capabilities to satisfy a diverse range of industrial applications. Sherlock's spectrum of applicability allows users to standardize on a single deployment platform to support their current and future inspection needs.

SHERLOCK EMBEDDED

Sherlock Embedded has been specifically designed for the BOA PRO vision system. The software includes a client design interface, installed on a PC, that communicates with the server or engine embedded on the camera. During development, images from the camera are fed directly to the Sherlock GUI and commands from the program are executed directly on the camera. This methodology optimizes the user design experience whilst providing an accurate representation of runtime performance. A secondary interface is available through a standard web browser for device setup, runtime monitoring and firmware updating.

DESIGN ENVIRONMENT
The Sherlock Embedded design environment is comprised of multiple configurable windows that can be moved or resized to support custom layouts that suit user preferences. Windows can also be docked with other windows or hidden if not required.

SOLUTION MANAGEMENT
Open and save solutions, start and stop inspection. Single-step debug operations.

IMAGE WINDOW
Displays image during setup and live image at runtime. Images are acquired from BOA or from image files in emulation mode.

IMAGE WINDOW CONTROLS
Load, acquire, save and zoom images. Select Region-Of-Interest shapes and apply image preprocessors and algorithms.

INSTRUCTION TOOLBAR
Provides quick access to commonly used instructions. These include acquisition, subroutine creation, program steering, conditional statements and scripting.

PROPERTY/WATCH WINDOWS
These windows provide parametric control and status of program events. All resources in Sherlock have properties, including acquisition, tools and system control.
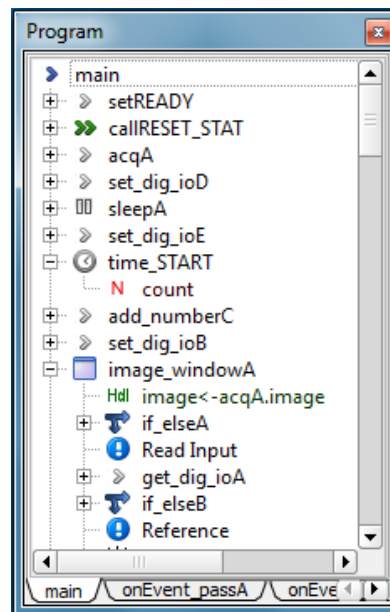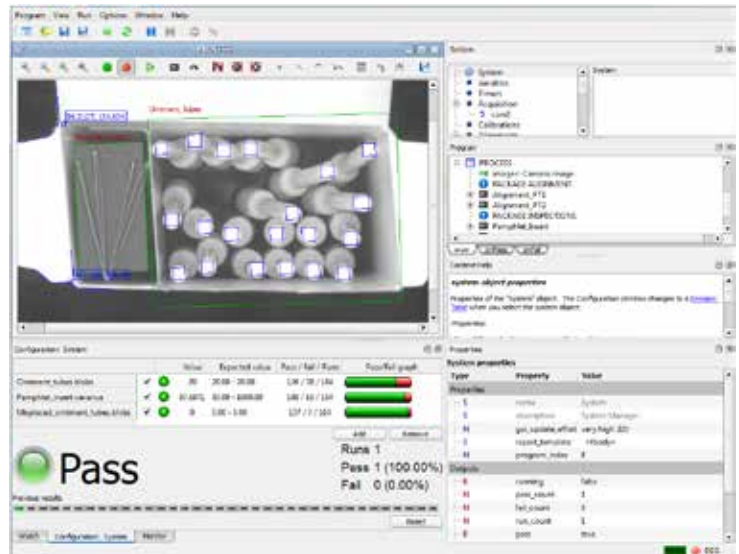
PROGRAM WINDOW
The "Program" window displays the sequence of algorithms, instructions or actions that define the inspection. The program is constructed as the user graphically applies preprocessors and tools to regions of interest on the image. The output from these tools feed formulas, program control and I/O actions that are selected from a comprehensive instruction list. A program can consist of a single or multiple interconnected subroutines.

CONFIGURATION WINDOW
A multi-purpose configuration window is provided to setup complex tools, edit scripts and view digital I/O waveforms. When 'System" properties are selected, the configuration window becomes a results panel with support for pass/fail tolerances editing.

SHERLOCK VISION CAPABILITIES

Sherlock provides a comprehensive set of vision tools and capabilities that can be applied to applications across all industries. Sherlock's extensive library of instructions, preprocessors and advanced algorithms can be combined in a variety of ways to solve simple or very demanding tasks. Maximum design flexibility is provided to allow users to customize algorithms, construct scripts and develop operator interfaces.

TOOL FLEXIBILITY

In Sherlock you select a shape to define a Region-Of-Interest (ROI) and then select preprocessors and tools supported by that shape. Each ROI is in effect a self contained processor which can take inputs or generate outputs to other parts of the program.
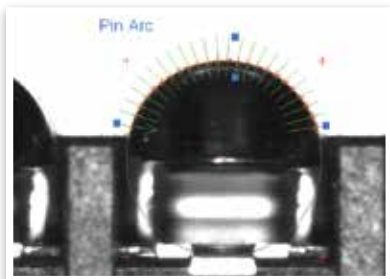
The arc ROI in this image is used to extract points along the surface of a solder ball on a printed circuit board. These points can be used, for example, to calculate the ball radius or find irregularities along the ball surface.
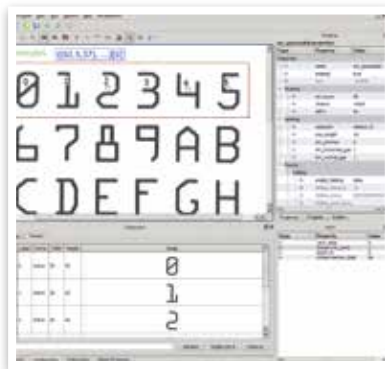
SCRIPTING

Sherlock's JavaScript based scripting tool, complete with drag and drop instruction editing, allows you to develop custom formulas for in-line and background operations.

MODEL TRAINING

Special tools require you to train models, such as search patterns or character fonts. The configuration panel in Sherlock makes this easy.

SYSTEM RESOURCES

Sherlock provides system resources to meet most application needs. Setup wizards are provided to assist with core functions such as Alignment and Calibrations.

Communication with 3rd party devices and networks is supported through standard factory protocols such as Ethernet/IP, Modbus and ProfiNet. Connections are quickly established by manipulating parameters in the associated resource property page.
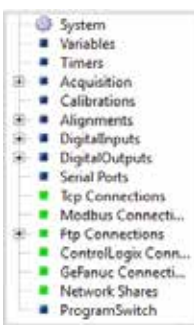
IMAGE LOGGING

Image logging is supported via a connected client or by FTP to a network connected drive. Multiple image formats are supported.

USER ADMINISTRATION

There are two access ports into BOA PRO. The first is through the Sherlock Embedded client interface and the second is through the web browser. Both ports support password protection. BOA PRO provides image backup and restore utilities.

For applications that don't require an HMI, but do require occasional monitoring, the BOA PRO web server provides a run monitor screen that is semi-customizable from the system property page.

ADDITIONAL RESOURCES

The BOA PRO web server provides a portal into the device whereby users can obtain camera status and interact via network commands. In addition to runtime monitoring, the web interface supports FREE firmware upgrading.

OFF-LINE EDITING

BOA PRO provides a full-featured Sherlock Embedded emulator for off-line editing and evaluation. The emulator cycles through static images which may be logged to the client from the online camera.

BOA NEXUS Smart Bridge

BOA NEXUS works in conjunction with BOA smart cameras to expand their information sharing capabilities. It allows users to quickly realize a runtime monitoring system that will display inspection images and application specific information from multiple BOA cameras. The operator interface can be displayed on a standard monitor using the BOA NEXUS hardware, thus eliminating the need for expensive HMIs. BOA NEXUS offers a convenient means to setup and maintain BOA cameras online and supports methods to collect and share information between cameras, system components and the factory enterprise.

CPU: 1.8GHZ DUAL CORE ATOM
STORAGE: 40GB SOLID STATE DRIVE
OS: WINDOWS 7 EMBEDDED

- Display interface eliminates the need for expensive HMIs
- Convenient access for online setup and maintenance
- Supports results and runtime image logging
- Tracks user access and changes to solution files
- Simplifies camera network setup
- Manages access to cameras with dissimilar firmware versions
- Supports isolated or bridged network configurations

NEXUS NAVIGATOR

The NEXUS navigator program is launched by clicking on the desktop icon. It provides easy access to setup, control and emulation programs associated with BOA INS and IDR cameras. The Navigator is an interface that provides convenient access to BOA utilities and programs that assist with setup, runtime and maintenance aspects of BOA installations.

VISUALIZATION OPTIONS

BOA hardware does not provide a direct connection to a display. Runtime visualization, if required, has to be performed by software over Ethernet. To help facilitate this need, Teledyne DALSA provides the following options (supported by NEXUS and PCs):

iDISPLAY APPLICATION

iDisplay is a Win32 program installed on NEXUS that will discover BOA cameras and provide display from up to 8 devices. iDisplay is only compatible with the INS or IDR versions of BOA.

iMONITOR APPLICATION

iMonitor is accessible through the BOA web server or NEXUS. This application provides image and results to the operator for runtime monitoring. Like iDisplay, it is only available for the BOA INS and BOA IDR models.

BOAVIEW APPLICATION

BOAView is a licensed application that runs on compatible WinCE based HMIs, such as Advantech, Allen Bradley and Siemens. BOAView can display from up to 6 BOA cameras. BOAView includes a configuration utility for discovering and selecting cameras for display.

CUSTOM DISPLAY

Users that have very specific display requirements have the option of developing their own operator interface. All versions of BOA offer an API and examples to help with this development. BOA PRO is more advanced and offers an ActiveX control.

OTHER ACCESSORIES

BOA vision systems are offered with all the complementary accessories needed to integrate an automated inspection system.

CABLES

BOA is electrically interfaced to the factory through standard M12 cables. Full functionality is achieved using 3 cables:

Ethernet M12-8M to RJ45
I/O M12-8M to open
Lamp or Serial M12-5M to open

Single cable configurations are possible by supplying power inside the Ethernet cable. We call this "passive power over Ethernet". The PL-100 or the PL-200-E are recommended for these configurations.

COVERS & MOUNTING

Lens protector covers are available that screw directly over the lens. These covers protect the device from moisture during wash down applications and offer protection against tampering or accidental lens adjustment. Lens covers have replaceable polycarbonate windows and come in two sizes.

BOA provides mounting holes on each surface of the camera. Use of 2 holes is normally adequate to secure the camera. Mounting brackets are also available secure the camera horizontally and vertically if needed.

LIGHTING OPTIONS

Application lighting needs vary considerably making it impossible to develop a "one size fits all" solution. For this reason we opted to support external lighting for BOA. The 5-pin lamp connector on the camera can supply 24V power and strobe control to most popular LED light sources. For users who prefer an integrated light solution, we provide a few options that mount directly to the camera.

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