Configurable Machine Vision Software

NI Vision Builder for Automated Inspection

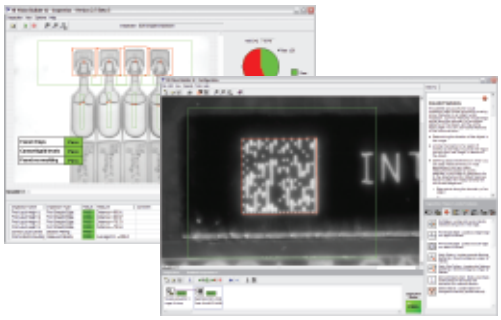
- Configure and deploy complete machine vision applications without programming
- Communicate with PLCs and other industrial devices
- Run as a stand-alone application or use ActiveX to embed into an application
- Extend functionality using NI LabVIEW

NI Vision Acquisition (included)

- Acquires from all NI vision hardware
- Acquires from IEEE 1394 cameras
- Reads and writes image files

Operating Systems

- Windows 2000/NT/XP
- LabVIEW Real-Time

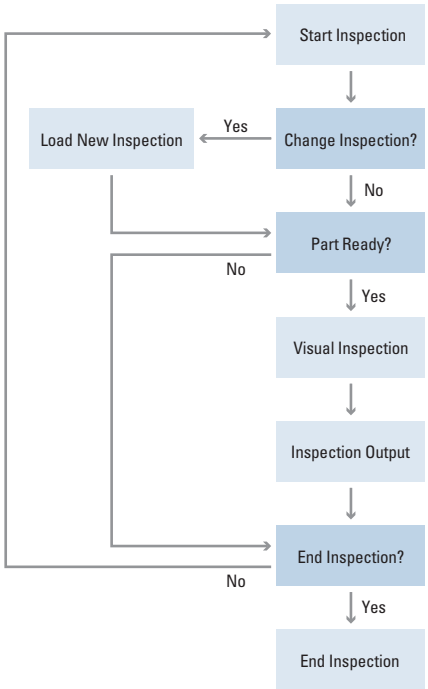


Overview

National Instruments Vision Builder for Automated Inspection (AI) is configurable software for building, benchmarking, and deploying machine vision applications. NI Vision Builder AI does not require programming. A built-in deployment interface is included so you can quickly deploy your inspection, guidance, and identification applications. Also it includes the ability to set up complex pass/fail decisions to control digital I/O devices and communicate with serial or Ethernet devices such as PLCs, PACs, and HMIs.

Run as a Stand-Alone Vision System

Vision Builder AI includes a built-in deployment interface with which you can quickly deploy your application once you have finished configuring and benchmarking.



Integrate into a Larger Application

Use the Vision Builder AI ActiveX component to embed Vision Builder AI inspection into your NI TestStand, LabVIEW, or Visual Basic programs. Use the ActiveX control to develop an operator interface that (remotely) views images and retrieves the results of each run.

Image Acquisition

Choose from several different hardware options within Vision Builder AI for deploying your machine vision application. Whether you prefer low-cost analog cameras; high-speed, high-resolution digital cameras; or easy-to-use IEEE 1394 (FireWire) cameras, NI has an image acquisition device for your needs. In addition, you can deploy your machine vision system using PCI boards, or upgrade to more rugged PXI and compact vision system options.

Simulate Image Acquisition

Vision Builder AI includes capabilities for offline inspection. Test your inspection strategy by loading images from file. Load and save BMP, JPEG, PNG, and TIFF images.

Advanced Decision Making

With the decision-making interface, you can define pass/fail criteria and classify parts. You can set limits for each individual inspection step and also use the intuitive decision-making interface to create complex decision expressions for the entire system. You can route the results of these decisions to digital lines, the user interface, or a serial port.

Benchmark Your Inspections

Use the performance meter to see how fast the application runs. A detailed view of the performance meter helps you identify time-consuming individual steps.

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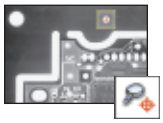
Machine Vision Tools

Vision Builder AI includes all the machine vision tools necessary to build quality control, assembly verification, and industrial inspection applications. Use Vision Builder AI to enhance images, locate features, measure objects, check for presence, and read text and bar codes.

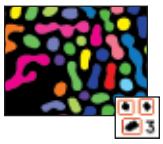


Pattern and Geometric Matching

Learn and locate objects and patterns in your images. National Instruments patented matching algorithms locate patterns fast with very high accuracy. The search algorithm is resistant to noise, blurring, rotation, lighting changes, scale changes, and occlusion.

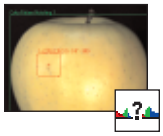
Optical Character Recognition

NI OCR functions use a trainable optical character recognition algorithm specifically designed to identify all types of fonts, characters, and symbols despite poor and inconsistent image quality. Train different types of fonts and symbols including common industrial fonts such as OCR A, OCR B, and SEMI.



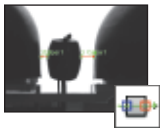
Particle Analysis

Use particle analysis to detect connected regions or groupings of pixels in an image and make selected measurements of those regions. Choose from more than 80 unique measurements that return data in both real-world and pixel values.



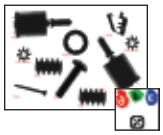
Color Inspection

Color matching quantifies which colors and how much of each color exists in a region of an image and uses this information to check if another image contains the same colors in the same ratio.



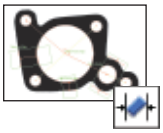
Edge Detection

Use the edge detection tools to identify and locate discontinuities in the pixel intensities of an image. Find edges to align, measure, or detect features in the image.



Object Classification

Classification is a tool for identifying an unknown object by comparing its significant features to a set of features that represent known samples. Applications for classification include part identification, sorting, and inspection.

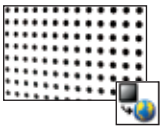


Gauging

You can use dimensional measurement or gauging tools to obtain quantifiable, critical distance measurements – such as distances, angles, areas, line fits, circular fits, and counts – to determine if a certain product was manufactured correctly.

Bar Code Reader

Read 1D bar codes as well as 2D codes like Data Matrix and PDF 417. You can decipher codes applied through ink jets, thermal transfer, laser etching, or dot peen. Use the 2D code readers to verify correct component assembly or identify and trace parts.



Spatial Calibration

Using spatial calibration functions, you can calibrate your image to take accurate, real-world measurements from images, regardless of camera perspective or lens distortion.

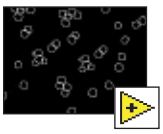
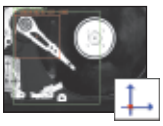


Image Arithmetic and Logic Functions

Operators perform basic arithmetic and logical operations on images. Use operators to add, subtract, multiply, and divide an image with other images or constants. Perform logical operations, such as AND/NAND, OR/NOR, and XOR/XNOR, and make pixel comparisons between an image and other images or a constant.



Coordinate Systems

Set up coordinate systems to ensure that all your measurements move with the object within the field of view.

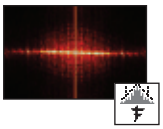


Image Filters and Frequency Analysis

Frequency filters alter pixel values with respect to the periodicity and spatial distribution of the variations in light intensity in the image. Get the frequency representation of an image through the fast Fourier transform (FFT) function, which reveals information about the periodicity and dispersion of the patterns found in the source image.

Image Segmentation

NI vision software comes with several options to segment and partition images into related components. Segmentation is an important part of many imaging applications that need to extract certain features or objects to process them further.

Industrial Communication

From Vision Builder AI, you can control the digital lines on the NI Compact Vision System and PCI-8254R boards or any NI-DAQmx-compatible device, such as industrial digital I/O, to communicate inspection status and results to other industrial devices. You also can communicate with devices using industrial protocols over serial or Ethernet ports and send inspection data, inspection results, or customized data to PLCs, touch screens, or industrial PCs.

Customize Inspections

Vision Builder AI is one of the most flexible menu-based vision software packages and includes several features with which end users can expand and extend the environment to handle most machine vision applications.

- Run LabVIEW VI – you can use this step to call any LabVIEW VI from Vision Builder AI to expand its capabilities. Examples include report generation tools, custom algorithms, communication routines, or virtually any other LabVIEW VI. You do not need LabVIEW installed to use this step.
- You can extend the capabilities of your system by converting your Vision Builder AI script to LabVIEW. Use this code to build a customized user interface or to add more measurement or automation functionality such as motion control and data acquisition.

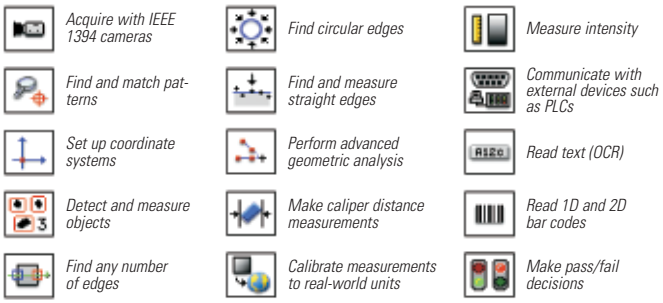


Figure 2. Vision Builder AI features hundreds of functions, some of which are shown above.

Vision Builder AI Development Toolkit

Machine builders, integrators, and advanced users can use the Vision Builder AI Development Toolkit to develop professional looking custom steps that provide functionality not already included in Vision Builder AI. For example, you can develop a custom step that drives a camera or other hardware not currently compatible with Vision Builder AI. You also can create a custom step to include a customized image-processing algorithm. You can distribute custom steps in addition to the released version of Vision Builder AI, providing your users with a customized Vision Builder AI package.

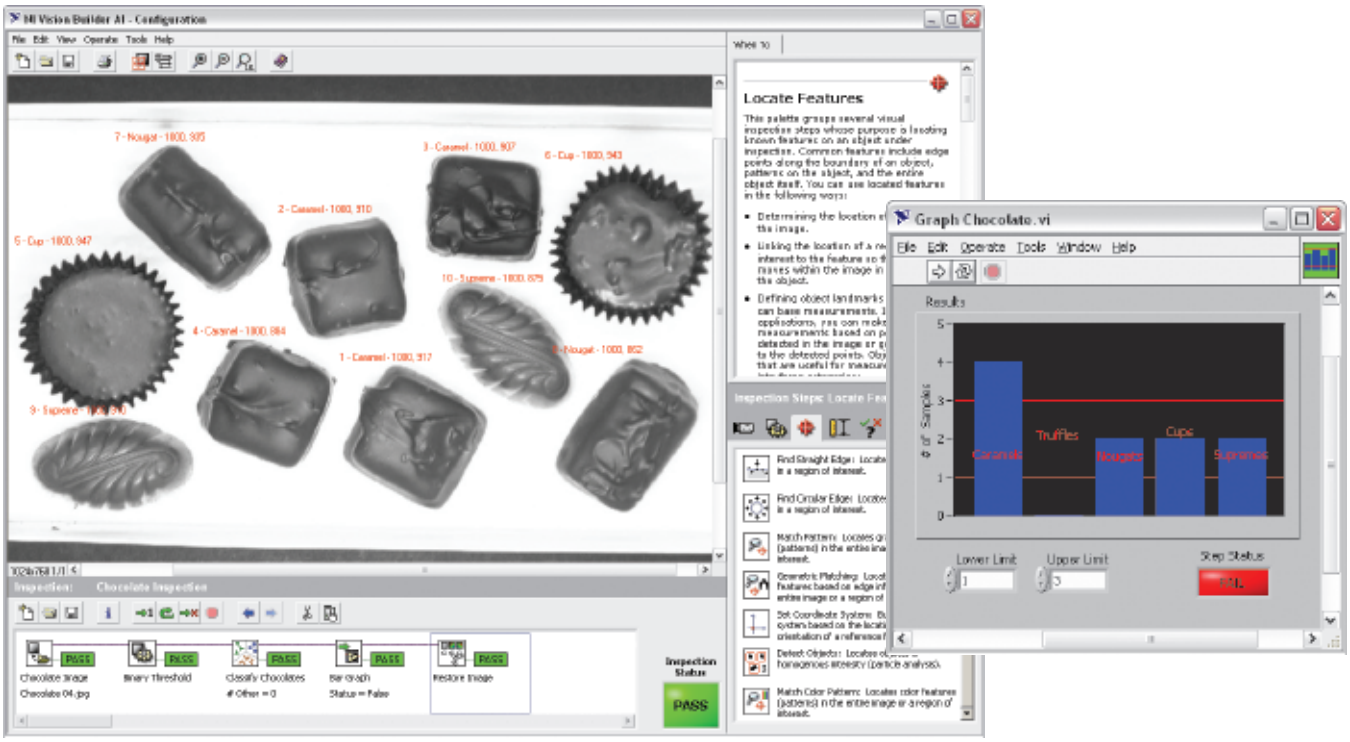
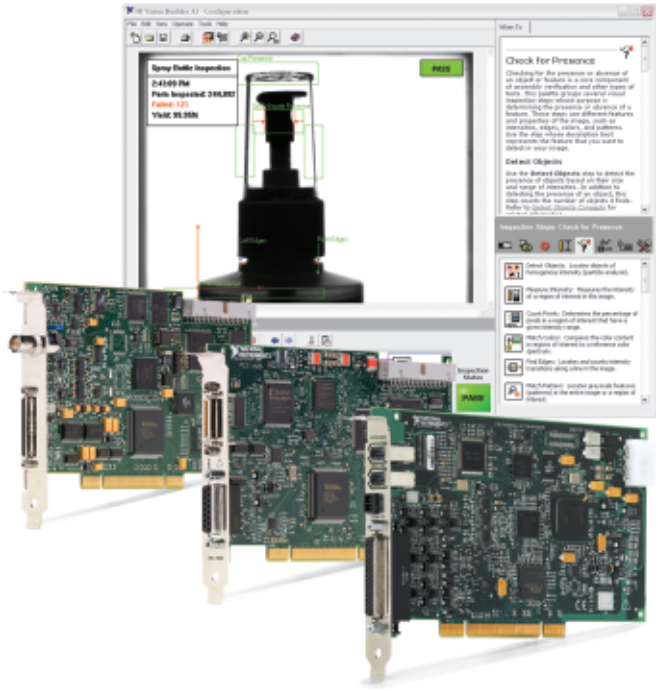


Figure 1. Use the Call LabVIEW VI step to expand the report generation capabilities of Vision Builder AI.

Save up to 25 Percent with Vision Builder AI Hardware Bundles



For significant savings, you can purchase Vision Builder AI bundled with one of three frame grabber options. With these bundles, you can acquire images from analog, FireWire, and Camera Link cameras. The hardware in each bundle is described below.

The NI PCI-1410 four-channel analog frame grabber is suitable for standard and nonstandard cameras. The PCI-1410 is recommended for megapixel analog cameras (JAI CV-A1/A2, Sony XC-HR70, and more) or standard resolution cameras (RS-170, NTSC, CCIR, PAL, and more) when image quality is paramount.

The NI PCI-1426 low-cost Camera Link image acquisition board works with any base-configuration Camera Link camera. The PCI-1426 has isolated digital I/O accessible through a 15-pin D-Sub connector for integrating triggers, encoders, and pulse generation into your application.

The NI PCI-8254R has multiple FireWire ports and 29 digital I/O lines, and is reconfigurable with LabVIEW FPGA. You can access the digital I/O lines for synchronizing vision components such as cameras, triggers, and lights. You also can use quadrature encoder inputs, product selection lines, pulse generation, and general-purpose digital I/O for communicating with the other industrial components such as actuators, pneumatics, and PLCs.

National Instruments vision software includes hundreds of image processing and analysis functions. A subset of the tools available in the Vision Development Module and Vision Builder AI is shown below.

	NI Vision Acquisition Software	Vision Builder for Automated Inspection	Vision Development Module
		Configurable software	Programming libraries
Continuous acquisition	✓	✓	✓
Triggered acquisition	✓	✓	✓
Camera configuration	✓	✓	✓
Trigger output	✓	✓	✓
Full frame-rate display with overlays	✓	✓	✓
Write and read image files	✓	✓	✓
Write and read AVI files	✓	–	✓
Image manipulation tools	–	✓	✓
Image filters	–	✓	✓
Image arithmetic	–	✓	✓
Image logic functions	–	✓	✓
Morphology	–	✓	✓
Region-of-interest tools	–	✓	✓
Particle analysis	–	✓	✓
Object classification	–	✓	✓
Gauging	–	✓	✓
Pattern matching	–	✓	✓
Geometric matching	–	✓	✓
Distortion calibration	–	✓	✓
Real-world measurements	–	✓	✓
1D and 2D bar code readers	–	✓	✓
Coordinate systems	–	✓	✓
Complex and fourier analysis	–	✓	✓
Optical character recognition	–	✓	✓
Color matching	–	✓	✓
Color pattern matching	–	✓	✓
Instrument reader	–	–	✓
Performance benchmarking	–	✓	✓
LabVIEW VI generation	–	✓	✓
C code generation	–	–	✓
VB code generation	–	–	✓
Customizable user interface	–	–	✓
Integration with motion control	–	–	✓
Integration with data acquisition	–	–	✓
Industrial communication protocols	–	✓	✓

Table 1. NI Vision Software Products

Ordering Information

NI Vision Builder for Automated Inspection 778649-01
NI Vision Builder AI Bundle with
PCI-1410 779494-01
PCI-1426 779495-01
PCI-8254R 779493-01
NI Vision Builder AI Development Kit 779343-03

BUY NOW!

For complete product specifications, pricing, and accessory information, call (800) 813 3693 (U.S.) or go to **ni.com/vision**.

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NI offers service programs that provide automatic upgrades to your application development environment and higher levels of technical support. Our service programs ensure that you always have the latest advances in productivity and receive live, on-demand access to NI applications engineers through phone and e-mail to assist in developing your solutions. Service programs are cost effective and simplify software purchasing as an annual, fixed cost, making it easier to plan and budget than intermittent individual upgrades. You also receive discounts for our training courses and materials. For details, visit **ni.com/ssp**.

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- Upgrades purchased separately
- Support by NI applications engineers, R&D engineers, partners, and community members through online Developer Exchange
- Access to Knowledge Base, example code, troubleshooting wizards, solutions, and white papers

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- Automatic upgrades included
- All the benefits of Basic Service
- Support by NI applications engineers through direct phone or e-mail access
- 10 percent discount on training courses and materials

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- All the benefits of Standard Service
- Support by NI senior applications engineers through direct phone or e-mail access with extended hours of operation

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2005-6018-221-101