PRODUCT FLYER

NI Smart Cameras

CONTENTS

NI Smart Cameras

ISC-1780, ISC-1781, ISC-1782, and ISC-1783
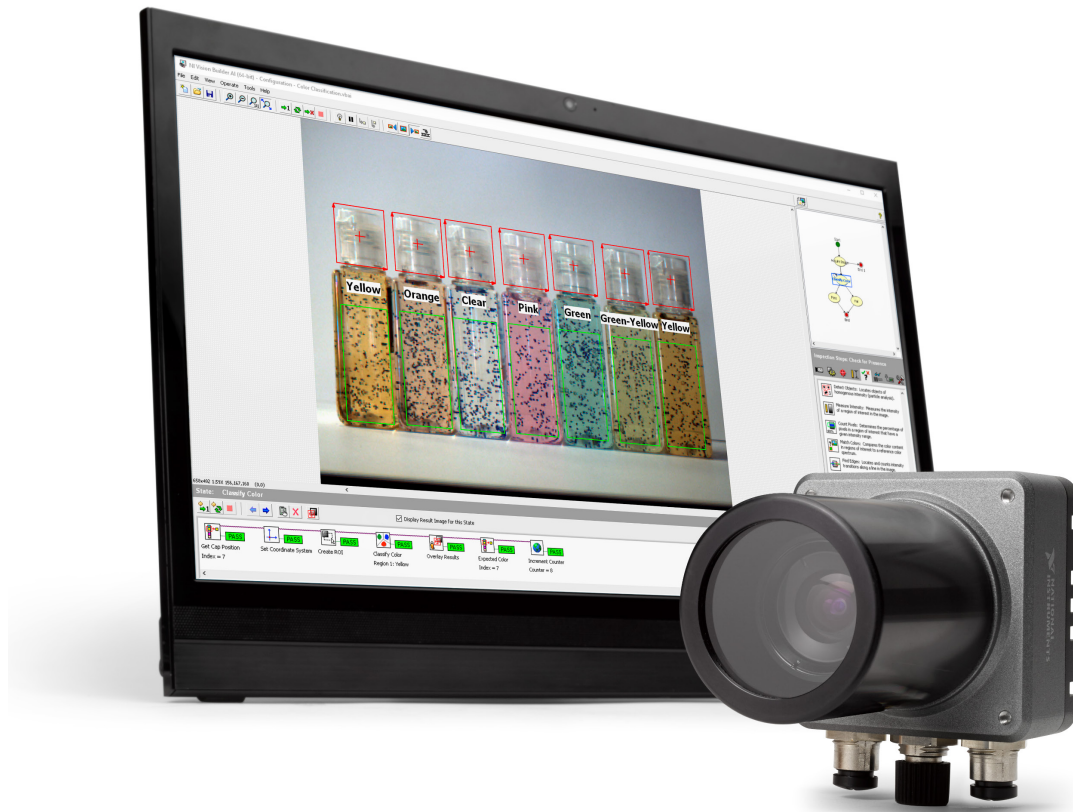
- **Software:** Includes Vision Builder for Automated Inspection

- Powerful dual-core Intel Celeron 1.58 GHz processor

- Dedicated interface for Varioptic Caspian autofocus lens

- Waterproof and dustproof design with IP67 rating, M12 connectors, and lens cover

- VGA output for viewing inspected images
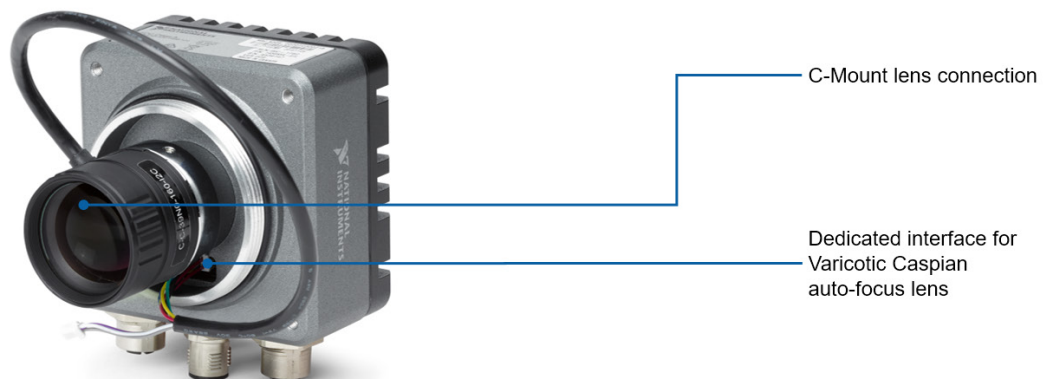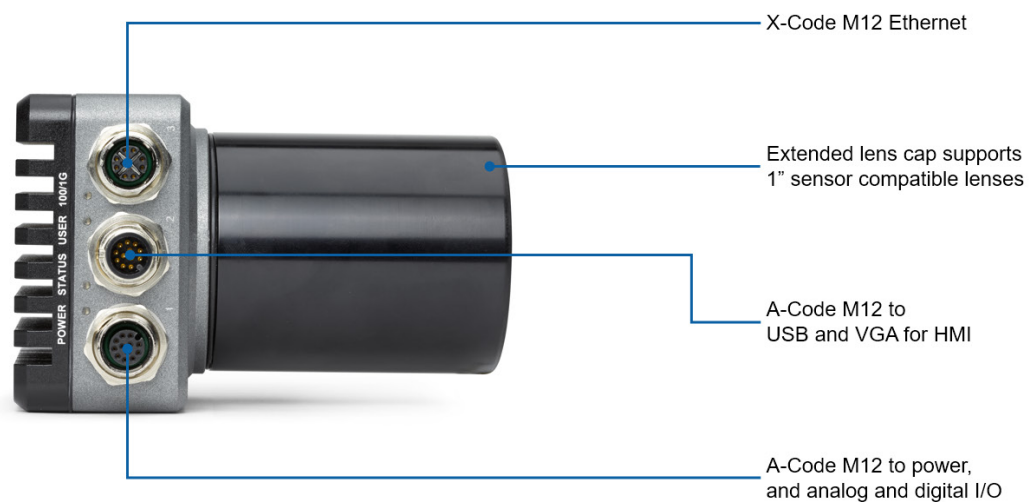
- OS: Windows 10 IoT and NI Linux Real-Time

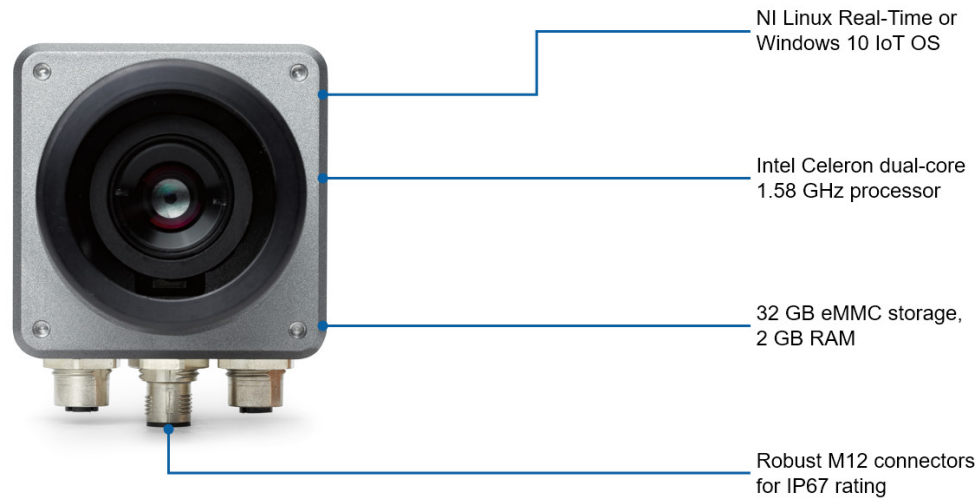## All-in-One Hardware for Image Acquisition and Analysis

Industrial-grade NI Smart Cameras provide high-quality image sensors combined with powerful processors to help you create rugged, all-in-one solutions for machine vision applications. They can tightly integrate with NI vision systems or stand alone. NI ships Smart Cameras with Vision Builder for Automated Inspection software.

NATIONAL INSTRUMENTS

Table 1. NI Smart Camera Specifications

	ISC-1780	ISC-1781	ISC-1782	ISC-1783
Resolution	640 x 480	1280 x 1020	1920 x 1200	2592 x 2048
Sensor (CMOS)	PYTHON 300	PYTHON 1300	PYTHON 2000	PYTHON 5000
Sensor Size	¼ in.	½ in.	⅔ in.	1 in.
Frame Rate (mono)	292 fps	85 fps	45.8 fps	21 fps
Frame Rate (color)	147 fps	35 fps	19.9 fps	8.6 fps
Pixel Size	4.8 µm x 4.8 µm			
Gain Range	0–19.4 dB			
Shutter Speed	50 µs to 4.2 s (global)			
Processor	1.58 GHz N2807 dual-core Intel Celeron (2.15 GHz turbo)			
OS	Windows 10 IoT or NI Linux Real-Time			
Memory	2 GB DDR3L SDRAM			
Storage	32 GB eMMC			
HMI	VGA and USB 2.0			
IEEE 1588	Yes (software)			
I/O	4 DI (Windows) or 3 DI with 1 dedicated Safe Mode (NI Linux RT), 3 DO, 0–10 V AO			
Lighting	Dedicated 0–10 V lighting control			
Ingress Protection	IP67			
Lens	C-Mount			
Power Consumption	450 mA at 24 V DC or 10.8 W (typical)			
Operating Temperature	0 ºC to 50 ºC			

Detailed View of ISC-178x

NI Linux Real-Time or
Windows 10 IoT OS

Intel Celeron dual-core
1.58 GHz processor

32 GB eMMC storage,
2 GB RAM

Robust M12 connectors
for IP67 rating

X-Code M12 Ethernet

Extended lens cap supports
1" sensor compatible lenses

A-Code M12 to
USB and VGA for HMI

A-Code M12 to power,
and analog and digital I/O

C-Mount lens connection

Dedicated interface for
Varicotic Caspian
auto-focus lens

NATIONAL INSTRUMENTS

Key Features

High-Performance Processor and Sensor Technology
NI Smart Cameras combine the latest in processor and image sensor technology. The ISC-178x smart cameras combine dual-core Intel Celeron 1.58 GHz processors with the latest ON Semiconductor PYTHON CMOS global shutter image sensors. With resolutions ranging from VGA (640 x 480) to 5.3 MP (2592 x 2048), frame rates up to 293 fps, and color and monochrome options, these cameras can be used in a wide range of applications.

Figure 1. The ISC-187x smart cameras offer the latest in image sensor technology.

All-in-One Vision System
NI Smart Cameras are industrial, high-quality image sensors combined with powerful processors to create rugged, all-in-one solutions for machine vision applications. These cameras include connections for Ethernet, digital I/O, VGA, and USB 2.0 to make integrating with other industrial systems simple and straightforward. The cameras also include a built-in lighting controller so you can control lighting directly from the application software. Though you can use NI Smart Cameras with the Vision Development Module, they ship with NI Vision Builder for Automated Inspection (AI), a stand-alone configurable software environment that you can use to easily build, benchmark, and deploy applications for pattern matching, character recognition, presence detection, part classification, and more.

Ready for Harsh Environments
Compact in size, NI Smart Cameras are ideal for space-limited environments. With features such as an IP67 ingress protection rating, rugged M12 connectors, a liquid- and dust-proof lens cap, and shock and vibration ratings up to 50 g and 5 g, respectively, NI Smart Cameras are sure to perform in the harshest of environments.

Leverage the NI Platform
You can connect NI Smart Cameras with NI hardware using LabVIEW or Vision Builder AI. The NI software-centric platform allows the integration of a huge diversity of I/O through USB DAQ, Ethernet DAQ, Ethernet RIO expansion chassis, and more. You can use LabVIEW to program all these for ultimate flexibility, and control DAQ and various industrial protocols from Vision Builder AI for rapid development time and configuration.

Vision Software

Vision Builder for Automated Inspection

Vision Builder for Automated Inspection (AI) is a stand-alone configurable software environment that you can use to easily build, benchmark, and deploy applications for pattern matching, character recognition, presence detection, part classification, and more. Vision Builder AI offers an interactive menu-driven development environment that replaces the complexities of programming to make the development and maintenance process simple without sacrificing performance or range of functionality.
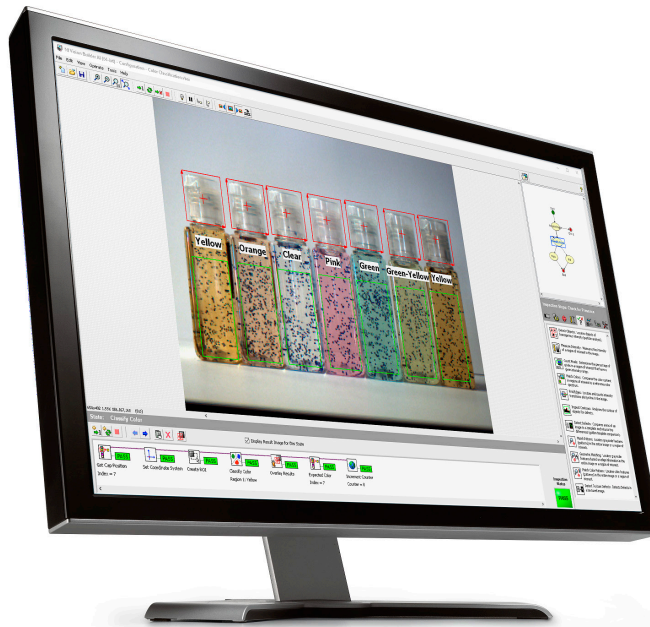

Figure 2. Simplify development with a sophisticated environment.

Vision Builder AI includes the following features:

Faster Development and Deployment – Vision Builder AI allows you to develop powerful machine vision applications. Using the menu-driven environment, you can focus on algorithm development instead of programming.

Advanced Decision Making – With the built-in State Diagram Editor, digital I/O, and industrial communications, you can deploy your Vision Builder AI application into the rest of your automated system.

Fully Tested Toolchain – The scalability of Vision Acquisition Software coupled with third-party camera support provides an open and fully tested infrastructure that saves time and money.

Saved Development Time – Use real data to develop your algorithms. Import or acquire test images directly into Vision Builder AI.

Customizable Algorithms – See the results of each function in your algorithm and tweak your algorithm each step of the way.

Built-In Productivity Tools – Develop algorithms faster with tools for template generation, OCR training, pattern matching, and more.

Vision Development Module

The Vision Development Module offers hundreds of image processing algorithms and acquisition functions that you can use across the entire NI vision hardware portfolio to meet any vision application need. For more advanced imaging applications, the Vision Development Module is the ideal software package. With its comprehensive function library, you can access hundreds of image processing algorithms and machine vision functions to enhance images, check for presence, locate features, identify objects, measure parts, and more. The Vision Development Module offers the most flexibility and low-level function control for developing vision application solutions.

Figure 3. Build highly customized applications with systems in mind.

The Vision Development Module includes the following features:

Build High-Performance Solutions – Use hundreds of functions to develop high-performance vision algorithms to run on CPUs and FPGAs.

Choose Your Programming Language – Program your application in LabVIEW, LabWindows™/CVI, and C/C++.

Design Complete Systems – Expand your application beyond just vision. Incorporate motion control, I/O, and HMIs in your design.

Massive Parallelism – FPGAs are parallel in nature, so they are ideally suited for vision applications. Parallelizing your algorithm decreases processing time, reduces latency, and increases overall throughput.

Infinite Customizability – FPGA-based image processing is implemented pixel by pixel, giving you the opportunity to customize your algorithm to meet your exact requirements.

No FPGA Experience Needed – You can develop high-performance FPGA-based vision algorithms the same way you do for a CPU-based design. You do not need to know traditional FPGA design tools.

Vision Assistant

One of the challenges of developing software for machine vision applications is that vision algorithm development is, by its very nature, a repetitive process that requires multiple iterations of testing, adjusting function parameters, and retesting until the software satisfies the application requirements. This can be especially troublesome when using FPGAs for image processing because the traditional approach to FPGA development can slow down innovation due to the compilation times required between each design change of the algorithm. To address this challenge, the Vision Development Module includes a tool called the Vision Assistant.
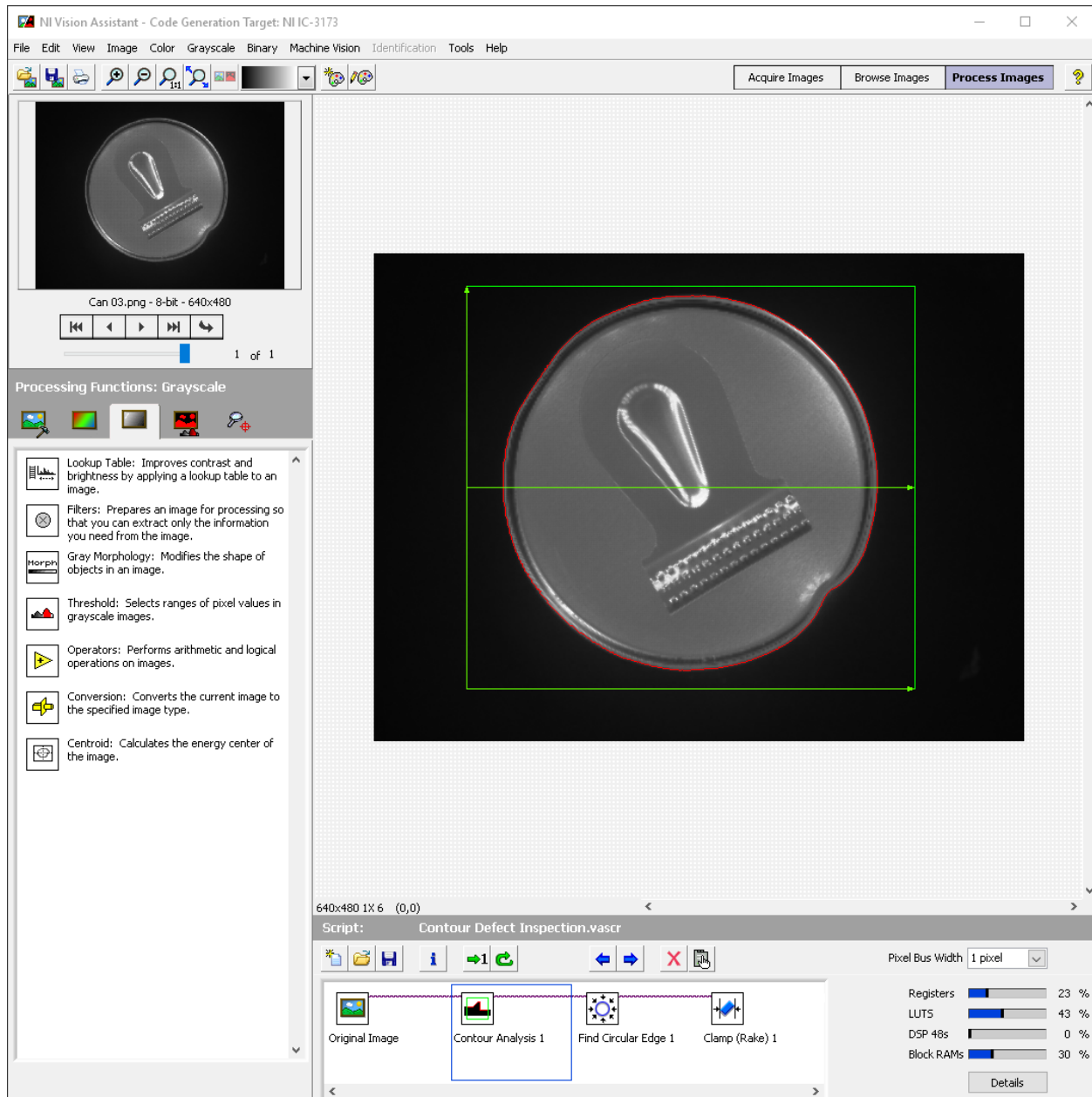

Figure 4. Developing an algorithm in a configuration-based tool for FPGA targets with integrated benchmarking cuts down on the time spent waiting for code to compile and accelerates development.

The Vision Assistant is an algorithm engineering tool that simplifies vision system design by helping you develop algorithms for deployment on either the CPU or FPGA. It provides a configuration-based approach to building vision algorithms like you can with Vision Builder AI. Load or acquire sample images and see the results of each processing step as it is configured to rapidly prototype your machine vision algorithm. It also provides the necessary benchmarking tools to gauge the performance of the algorithm. In addition, you can use the Vision Assistant to test the algorithm before compiling and running it on the target hardware while easily accessing throughput and resource utilization information.

Once you are satisfied with your algorithm, you can use the Vision Assistant to generate LabVIEW or C code ready for deployment on your choice of hardware controller. Then you can easily modify the generated code to integrate it with other parts of your system.
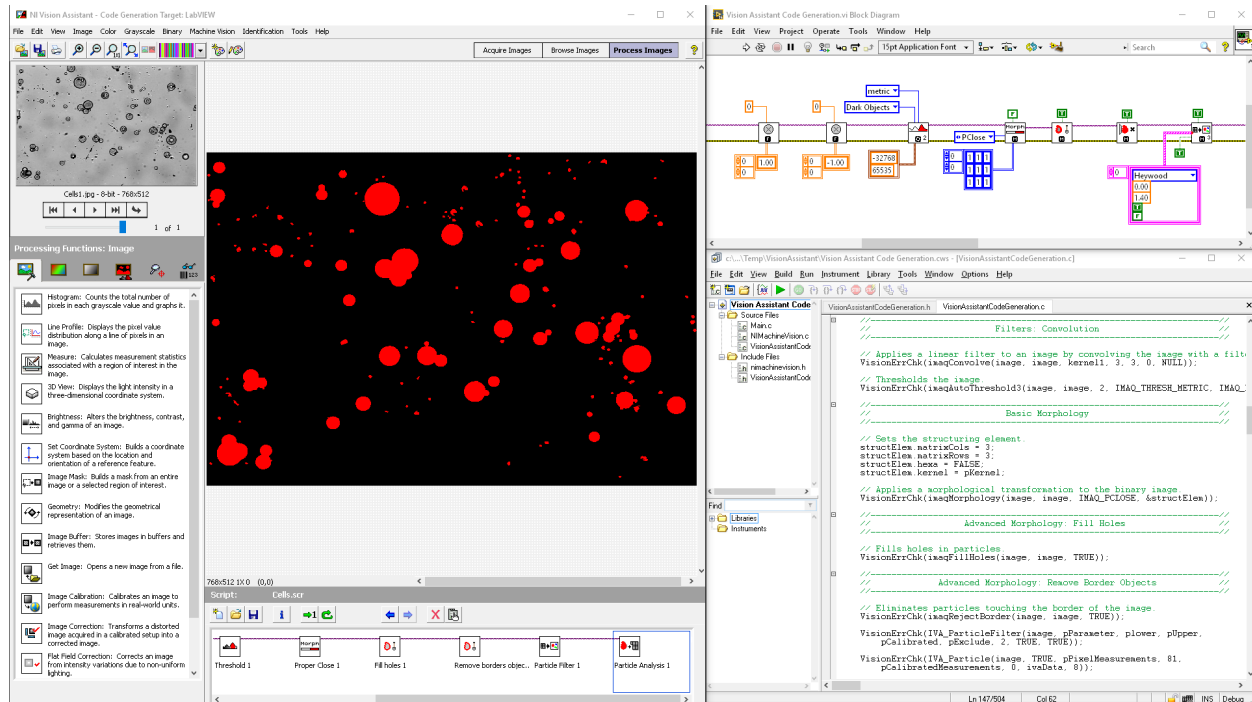

Figure 5. Use Vision Assistant to generate LabVIEW or C code.

Hardware Services

All NI hardware includes a one-year warranty for basic repair coverage, and calibration in adherence to NI specifications prior to shipment. PXI systems also include basic assembly and a functional test. NI offers additional entitlements to improve uptime and lower maintenance costs with service programs for hardware. Learn more at ni.com/services/hardware.

	Standard	Premium	Description
Program Duration	1, 3, or 5 years	1, 3, or 5 years	Length of service program
Extended Repair Coverage	•	•	NI restores your device's functionality and includes firmware updates and factory calibration.
System Configuration, Assembly, and Test[1]	•	•	NI technicians assemble, install software in, and test your system per your custom configuration prior to shipment.
Advanced Replacement[2]		•	NI stocks replacement hardware that can be shipped immediately if a repair is needed.
System Return Material Authorization (RMA)[1]		•	NI accepts the delivery of fully assembled systems when performing repair services.
Calibration Plan (Optional)	Standard	Expedited[3]	NI performs the requested level of calibration at the specified calibration interval for the duration of the service program.

[1]This option is only available for PXI, CompactRIO, and CompactDAQ systems.
[2]This option is not available for all products in all countries. Contact your local NI sales engineer to confirm availability.
[3]Expedited calibration only includes traceable levels.

PremiumPlus Service Program

NI can customize the offerings listed above, or offer additional entitlements such as on-site calibration, custom sparing, and life-cycle services through a PremiumPlus Service Program. Contact your NI sales representative to learn more.

Technical Support

Every NI system includes a 30-day trial for phone and e-mail support from NI engineers, which can be extended through a Software Service Program (SSP) membership. NI has more than 400 support engineers available around the globe to provide local support in more than 30 languages. Additionally, take advantage of NI's award winning online resources and communities.

2 January 2018