



Launch Vehicle Test and Operations

Aerospace, Defense, and Government

Accelerating Space Program Lifecycles

Vehicle Component Development, Manufacturing, and Integration

Rocket Test and Operations

Operations Insights

NI Hardware

NI Software

ni.com





Accelerating Space Program Lifecycles

NI is dedicated to equipping engineering teams with cutting-edge tools and solutions that accelerate every step in the design, validation, production, and launch of both vehicles and satellites. With a firm commitment to your success, NI is on your side to help you achieve an uncompromising pace and performance.

Achieve a Competitive Advantage in Launch Services

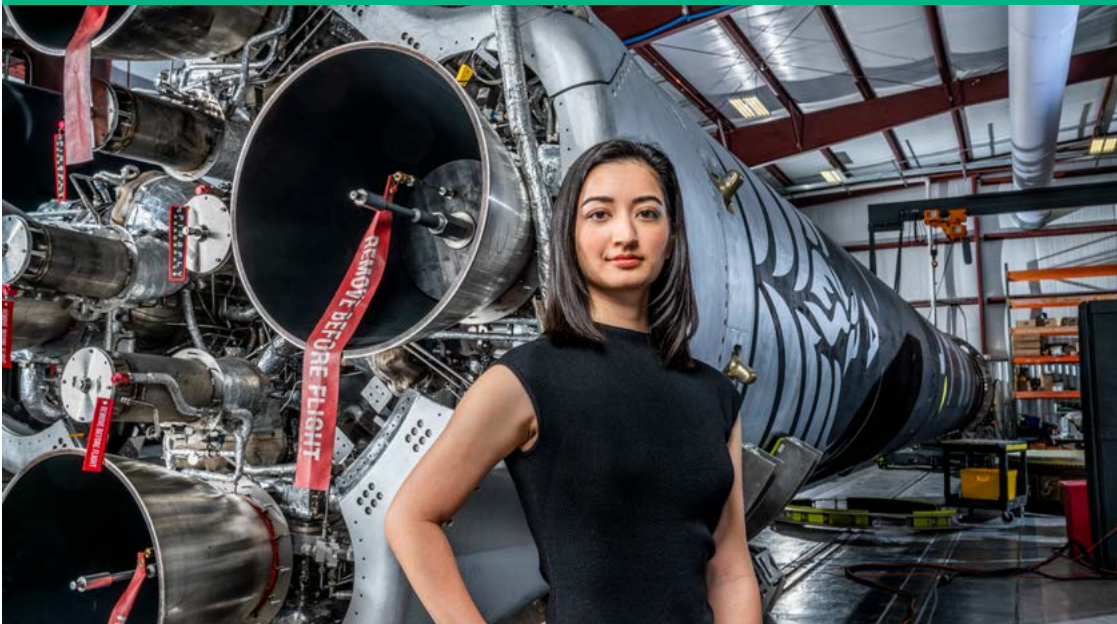
The launch services industry is currently experiencing significant growth among established providers and new entrants. This surge in innovation and competition is primarily fueled by the emergence of new satellite technologies, the growth of public-private partnerships, and the expansion of launch technologies. Innovations like reusable vehicles, groundbreaking rocket engine technologies, and unique launch platforms are forcing engineering teams to operate at an accelerated pace and enhance their efficiency to maintain a competitive edge.



NI Provides Solutions from Design to Launch

Whether your team is embarking on the initial stages of designing the test stand for your rocket engine, strategizing launchpad infrastructure with cryogenic fluid management, or testing vehicle components and integrating systems, NI can help your team achieve accelerated launch timelines. We offer a comprehensive suite of software and hardware solutions that seamlessly connect engineering endeavors spanning the entire spectrum of vehicle design, validation, integration, and launch phases—saving you hundreds of hours and keeping you ahead of the competition.

Vehicle Component Development, Manufacturing, and Integration



A launch vehicle is an intricate system comprising numerous components of avionics, electromechanical, propulsive, structural, communications, sensor, and fluid systems. These components require thorough testing from the

initial design phase to the final checkout stage. With NI's comprehensive suite of solutions, you can seamlessly perform validation, hardware-in-the-loop, and functional test across the entire lifecycle or multiple programs.



Electronics Test

Tests electronic components with specialized test equipment designed to support evolving technology requirements with comprehensive hardware and software solutions for hardware abstraction, test code development, and automation.

Avionics Protocol and Communications Test

Provides comprehensive coverage of PXI-based digital avionics protocol interfaces, catering to the specific needs of launchpads, launch vehicles, and satellite buses. Includes the flexibility to deploy custom protocols and select only the components necessary for your application.

Flight Software and HIL Test

Validates launch vehicle control system software and hardware with agile hardware-in-the-loop test systems that can be scaled to test individual components up to fully integrated vehicles—and leveraged throughout the product lifecycle.



Static and Structural Test

Provides a streamlined approach to design and deploy large-channel-count test systems encompassing static measurements across various domains, including structural and environmental tests with reference architecture. By leveraging tools such as FlexLogger™ software, NI CompactDAQ, and TSN, you can significantly shorten the design cycle from months to days.

Telemetry and Control

Enables design, test, and operation of deployed telemetry and control systems, both on-vehicle and on the ground, with a range of RF communications platforms. Choose from a wide range of options, from software defined radios ideal for prototyping to calibrated instruments for testing.

CASE STUDY

RFA Is Revolutionizing Rocket Development

Rocket Factory Augsburg (RFA) used NI test tools to obtain results, facilitating rapid adaptation of designs and hardware with remarkable agility and flexibility. By leveraging the capabilities of our tools, RFA achieved faster iterations and test loops, accelerating their development processes to new heights.



We see tremendous opportunities in front of us, both for our company and all the customers we serve. NI plays a key role in helping us realize those opportunities.



—DR. STEFAN TWERASER
CEO, ROCKET FACTORY AUGSBURG



PHOTO CREDIT: ROCKET FACTORY AUGSBURG (RFA)





Rocket Test and Operations

A new launch vehicle platform often starts at the engine and the launch control systems used to operate the engine in both the test stand and the launchpad.

Rocket Engine Test

Provides a modular, reliable, high-performance solution to the challenges presented by a distributed control system. Uses LabVIEW™, PXI, CompactRIO, NI CompactDAQ, and SystemLink™ software to enhance the coordination of control systems within complex operations such as rocket facilities.



Launch Site Operations and Monitoring

Provides high-reliability and real-time control and monitoring capabilities specifically designed for extreme launch operation conditions.



CASE STUDY

NASA Software for Rocket Engine Testing

The NASA Data Acquisition System (NDAS) is a LabVIEW-based software application. It offers adaptability to accommodate various hardware differences, making it suitable for integrating with any propulsion test stand or facility Data Acquisition System (DAS) hardware differences.



Using LabVIEW and advanced technologies helped us with an innovative and large-scale software development effort and maximized the reusability of the software source code.



—PHILLIP HEBERT, SR., NASA
JOHN C. STENNIS SPACE CENTER





Operations Insights

In order to maintain a competitive advantage, aerospace and defense organizations must continuously enhance their processes. Improvements in areas such as time to market, operational efficiency, first-pass yield, and overall manufacturing quality are paramount.

Operational Intelligence and Product Analytics

By integrating valuable product performance insights derived from test operations data with machine and process data, NI enables real-time analysis and drives intelligent actions uniquely tailored to each product.

Hardware



C Series

The C Series hardware platform can be used for measurements distributed around a test facility, as well as distributed control and processing for control systems.

For rugged and modular performance, engineers can rely on NI CompactDAQ. Engineers select NI CompactDAQ chassis based on communication interfaces such as USB, Ethernet, or wireless, and the desired number of module slots (four or eight). NI CompactDAQ offers reliable performance while maintaining a reasonable cost, making it suitable for applications with many channels. Additionally, NI CompactDAQ can operate effectively in challenging environments, with temperatures ranging from -40°C to 70°C , 5 g vibration, and 50 g shock.

When it comes to instrumenting and controlling distributed test cells and critical infrastructure, the CompactRIO systems are ideal. They feature a local processor running embedded NI Linux Real-Time OS and a user-programmable FPGA. Furthermore, CompactRIO systems are designed rugged to withstand demanding engine test environments, with operating ranges from 0°C to 55°C , 5 g vibration, and 50 g shock.

PXI

PXI is a PC-based industrialized system that combines PCI Express electrical bus features, a modular chassis, and I/O synchronization technology with user-defined or application-specific test software. PXI is an open industry standard governed by the PXI Systems Alliance, comprising more than 70 test companies worldwide. As one of the pioneer companies involved in forming PXI, NI has emerged as a recognized leader in PXI test and measurement devices. Instrumentation available in PXI/PXI Express form factor includes:

- Analog and digital I/O
- Digital multimeter
- Oscilloscope/digitizer
- Waveform generator
- Switch and timing/synchronization
- Source Measure Unit (SMU)
- Programmable DC power supply
- Electronic load
- Instrument control and synchronization
- FPGA processing boards

LabVIEW

LabVIEW is a graphical development platform that empowers engineers to create customized test solutions tailored to their specific needs. With an extensive array of features, LabVIEW provides thousands of analysis functions, configurable display elements, and drivers for seamless integration with instruments and data acquisition equipment. Additionally, this platform offers connectivity to other programming languages and protocols, allowing engineers to leverage existing resources and expand the capabilities of their test systems.

TestStand™

TestStand is a ready-to-run test management software designed to help engineers quickly develop and execute test routines from test plans. With TestStand, engineers can build test sequences that integrate code modules written in a variety of programming environments, including LabVIEW, C/ C++, .NET, and Python. The software also provides extensible plugins for reporting, database logging, and connectivity to other enterprise systems. Furthermore, TestStand enables engineers to deploy their test systems to production effortlessly, thanks to its easy-to-use operator interfaces.

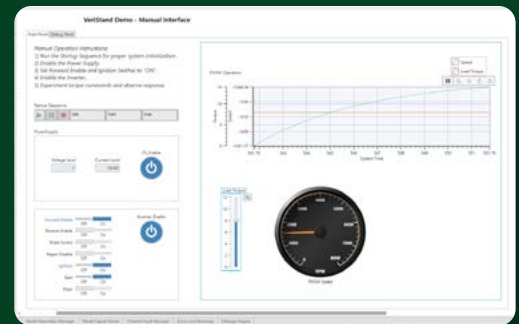
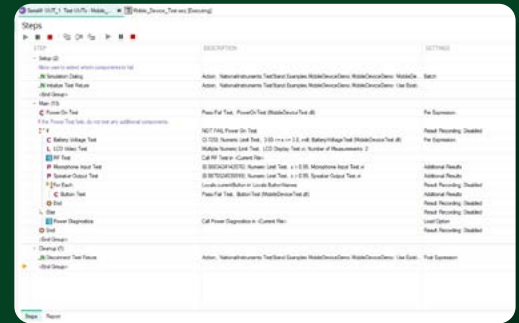
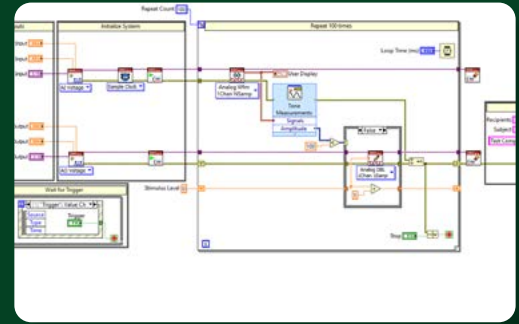
VeriStand™

VeriStand software validates hardware and performs embedded software tests for hardware-in-the-loop applications. The software offers comprehensive features that accelerate the product development lifecycle with model integration, real-time stimulus generation, and an extensible software environment. VeriStand also provides a user interface to simplify I/O channel configuration, data logging, and stimuli generation. Additionally, VeriStand delivers a complete view of your HIL system with graphical elements that allow you to control configurations and display runtime results easily.

SystemLink

SystemLink is an intelligent systems and data management environment designed for engineering use cases and connects the test facility to the rest of the organization. This software combines focused applications and data services that accelerate time to knowledge and time to market by leveraging comprehensive real-time information. From engineering teams to enterprises, SystemLink helps organizations achieve peak performance.

Software



NI Services and Support



NI provides several services and support options to help ensure your short-term and longer-term success with our products. We've partnered with many aerospace and defense companies to offer extended, long lifecycle support that can span decades. You can select from NI's array of services and support options to design a system management approach that meets your budget, risk, and resource needs.



Hardware Services

Minimize downtime, reduce maintenance costs, and simplify logistics with our world-class repair, calibration, sparing, and long-life system service programs for hardware.



Training and Certification

Enhance productivity by developing 50 percent faster and spending 43 percent less time on code maintenance with our online, classroom, and on-site training courses. Also, validate your expertise with NI certifications.



Technical Support

Get started with NI products faster or troubleshoot challenging issues by contacting NI applications engineers who are ready to help you via phone and email.



Consultation and Integration

Leverage our extensive network of NI Partners and systems engineers for assistance with prototyping, feasibility analysis, consulting, and systems integration.



Software License Programs

Streamline NI software management by accessing multiple levels of training, technical support, and tools through your software license.



Technical Resources

Access volumes of self-help information at ni.com, including application tips, example programs, and developer communities.



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Engineer
Ambitiously.