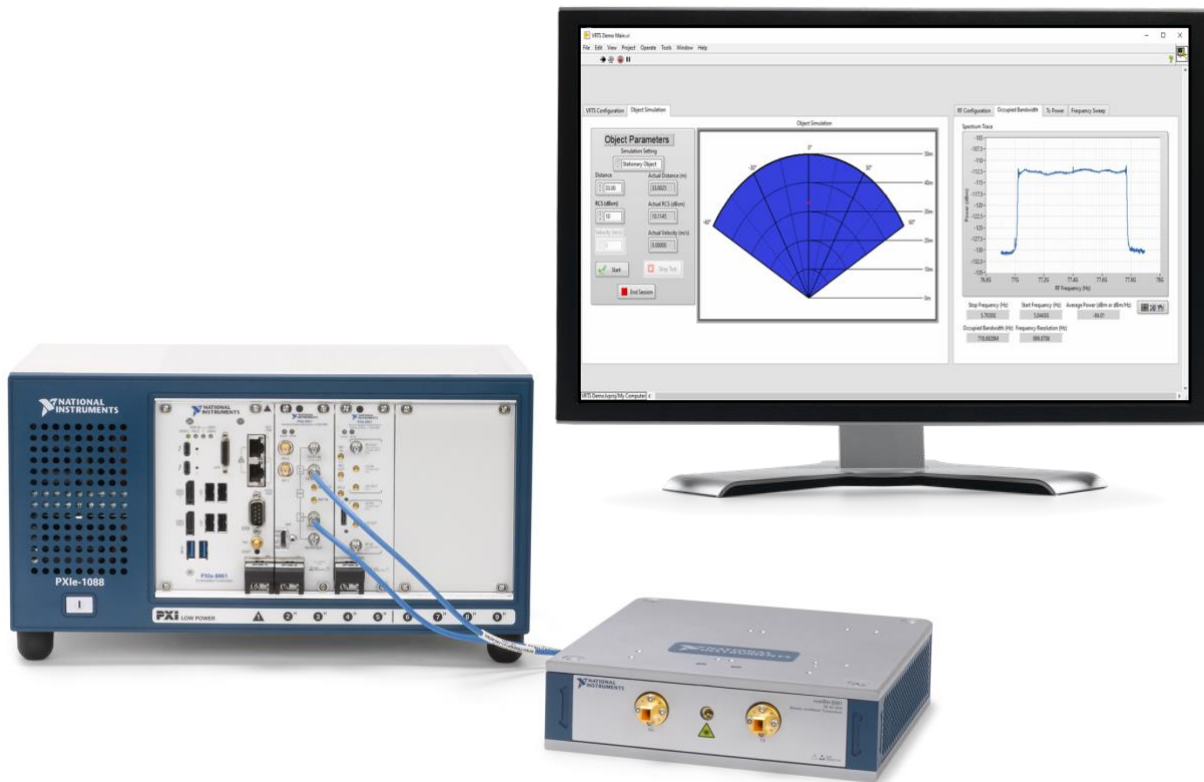# VRTS

Vehicle Radar Test System with 4 GHz of Bandwidth

VRTS Highlights

- **Increase test coverage** with over-the-air object emulation for multiple objects and angles for any type of radar signal, up to with 4 GHz of instantaneous bandwidth

- **Reduce production tester footprint** with vertical and CATR chamber integration

- **Test faster** with parallel object emulation, RF measurements capability, and motion integration for faster field-of-view test

- **Adapt to new requirements** for measurement, angles, objects and other test in the ADAS domain

The NI VRTS offers configurable options to optimize for cost, test complexity, or more demanding requirements.

## Built for Automated Radar Validation and Production Test

The Vehicle Radar Test System (VRTS) provides automated radar measurement and object simulation capabilities for 76-81 GHz radar from 1 GHz to 4 GHz of bandwidth. Engineers can use VRTS in use cases such as:

- High-volume, OTA radar production test
- ADAS HIL and radar validation test
- Reliability, thermal, environmental test
- Radar test in specific ADAS scenarios (e.g., NCAP)
- 77 GHz and 79 GHz automotive radar test
- Beam characterization
- Sensor fusion test for ADAS validation

Radar Test Systems Built on VRTS

The VRTS easily integrates with other PXI hardware as part of comprehensive automotive radar test, or ADAS HIL Test Systems:

- **Better user experience:** NI partners provide customized turn-key software and solutions based on your test requirements for usability and global deployment
- **Smaller footprint:** Vertical chamber integration with PXI instrumentation and motion control to test the full field of view (FoV) with multiple angles of arrival (AoA) in a single tester
- **Faster Test Time:** Built on PXI, VRTS can perform object simulation and radar measurements in parallel without additional delays due to the sensor's motion
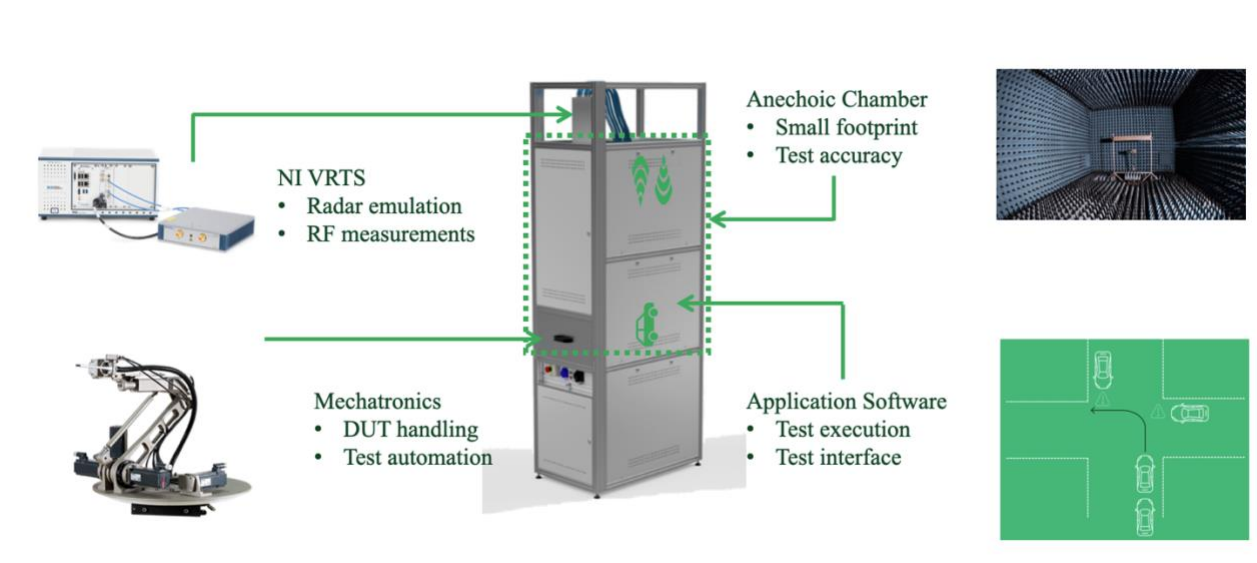
Radar Validation Test System from
Konrad Technologies

Radar Production Test System from
Noffz Technologies

VRTS Hardware

The core components of the VRTS are:

1. PXI controller and chassis with different software and configurations based on test plans and requirements, and NI VRTS API for fast, open programming
2. Variable Delay Generator (VDG) to control the front end and perform the obstacle generation based on user-configured scenarios through optical delay lines.
3. Millimeter Wave Radiohead (mmRH) that acts as the front end to the radar sensor and provides the RF interface inside the anechoic chamber
4. Vector Signal Transceiver (VST) to perform relevant RF measurements across the radar's FoV. It can have one or multiple VSTs depending on test needs for coverage and speed.

Example configuration of VRTS for 1 AoA, up to 2 objects, and measurement capability


Example configuration of VRTS for 2 AoA, up to 4 objects, and measurement capability

Key Performance Specifications

Scalability	1 to 4 simulated objects per radio head* Radio heads can be added for additional AoA
Frequency	75 to 82 GHz Frequency Range supporting 1 GHz and 4 GHz radar Band 1: 76 GHz to 80 GHz. Band 2: 77 GHz to 81 GHz
Distance	Range: Programmable from 2.5 m to 300 m, excluding setup distance. Resolution: 5 cm
Radar Cross Section	Range: 127 dB RCS range with 50 dB of dynamic range Resolution: 0.25 dB
Doppler	Range: 0 to ±500 km/hr Accuracy: ±0.05km/hr Resolution: 0.1km/hr
Measurements	EIRP, phase noise, occupied bandwidth, radiation pattern, beam width, and chirp analysis through NI VST Compatible with 3rd party measurement equipment

*See full specification *for details*
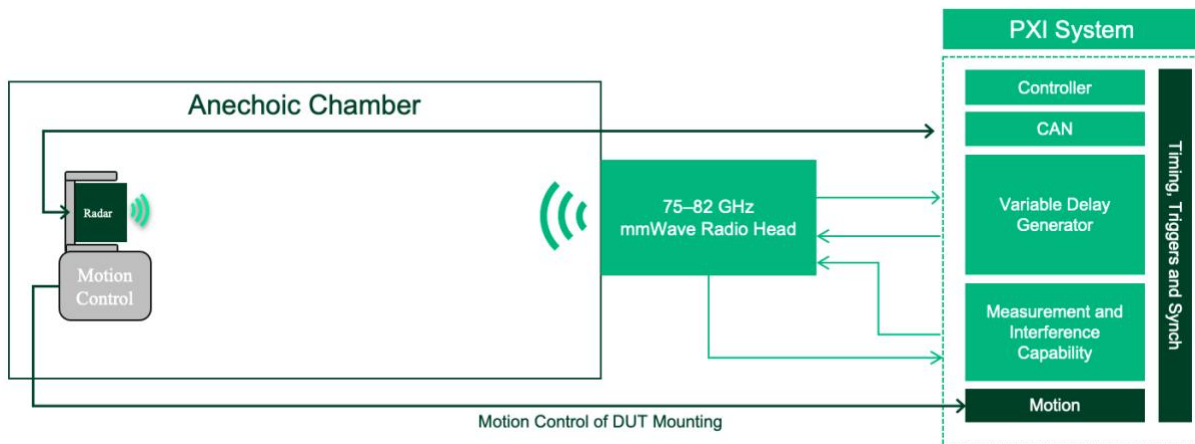
Block diagram of typical configuration of VRTS System that includes object simulation, RF measurements, interference capability, synchronized motion control for full FoV coverage, and CAN communication

System Delivery and Services

NI VRTS Integration Partners across the world provide turn-key solutions from the mechatronics and DUT handling, to test development and integration with Manufacturing Execution Systems. These partners have expertise in radar testing, product lifecycle management solutions, and integrating the NI platform to deliver solutions that meet your exact application requirements.

NI offers services to ensure the maximum uptime and reliability of VRTS Solutions such as traceable calibration and 24hr replacement around the world.

NI's enterprise software portfolio provides product analytics and test operations to improve product outcomes, test result correlation, operational efficiency, and overall product quality.
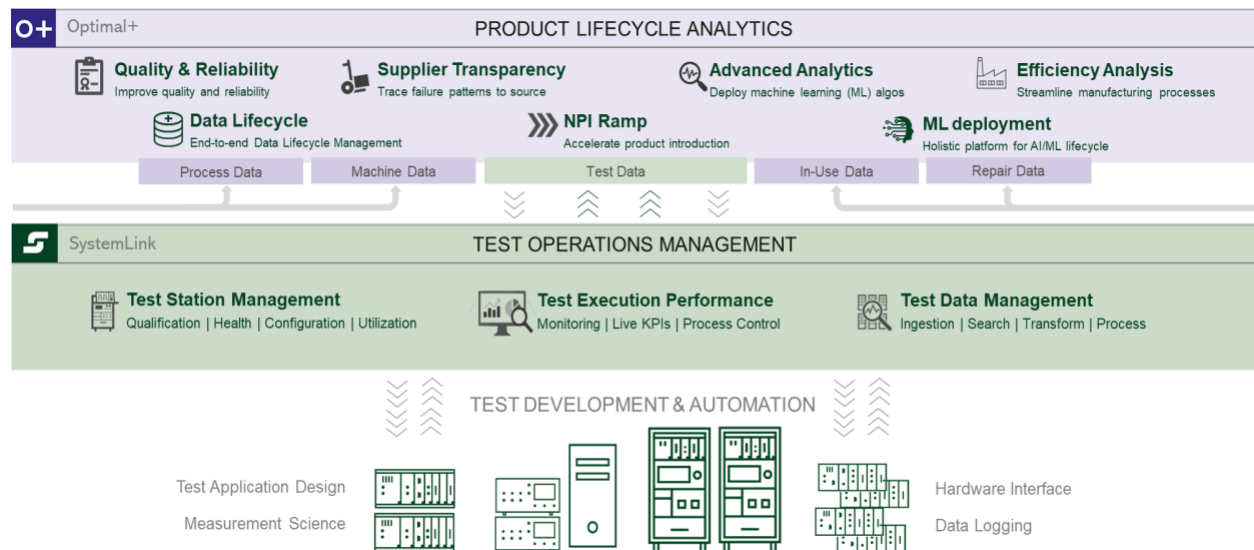
Drive Actions
at the Edge

Realtime Visibility
across the Organization

Transform from Reactive to
Predictive Management

O+ Optimal+ — PRODUCT LIFECYCLE ANALYTICS

Quality & Reliability — Improve quality and reliability
Supplier Transparency — Trace failure patterns to source
Advanced Analytics — Deploy machine learning (ML) algos
Efficiency Analysis — Streamline manufacturing processes
Data Lifecycle — End-to-end Data Lifecycle Management
NPI Ramp — Accelerate product introduction
ML deployment — Holistic platform for AI/ML lifecycle

Process Data | Machine Data | Test Data | In-Use Data | Repair Data

S SystemLink — TEST OPERATIONS MANAGEMENT

Test Station Management — Qualification | Health | Configuration | Utilization
Test Execution Performance — Monitoring | Live KPIs | Process Control
Test Data Management — Ingestion | Search | Transform | Process

TEST DEVELOPMENT & AUTOMATION

Test Application Design
Measurement Science

Hardware Interface
Data Logging

NI's enterprise software includes SystemLink for test operations management and Optimal+ for product lifecycle analytics

Contact your account manager or to learn more about how NI can help you increase product quality and accelerate testing timelines at info@ni.com