Radar Target Simulator and Testing in Validation & Production

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With over 20 years of expertise in automation engineering...

...we provide solutions for automated testing needs.

- LV 124 Automotive Testing
- Industrial Automation
- RF / Radar Automotive Testing

- Over 50 customers worldwide
- Over 20 years NI Alliance Partner
- Over 450 testing solutions in use
- 2 technical innovation awards
- Over 10 products for automated testing
Common needs for testing

- Faster development of test scenarios
- Higher entry-level point for system developers
- Quick adjustment to new requirements
- Scalability for new DUT types
- Time synchronisation
- Continuous monitoring
- Faster error mining and analysis
- Reduction of the amount of produced data
- Money and time constraints
- Relevant data visualization for all company levels
- Reusability of existing resources
- Integration of products for flexible use case and better maintainability
- Integration capabilities for newest technology trends
- Connectivity for IoT / Industry 4.0
- Reusability of resources for all product testing levels
- Money and time constraints
RTStand – open HiL platform

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RTStand – open HiL platform

- Modular HW design
- PlugIns for IoT
- Modular RTStand Library
- LV 124 solutions
- RTStand User Interface
- Radar/RF solutions
RTStand – open HiL platform

Why do we need Radar / RF solutions?
Autonomous driving brings many advantages...

... but the robustness and safety requirements also need a lot more complex test scenarios for all stages of ECU testing...
Sensors in autonomous driving

**Radar 77/79 GHz**
- Responsible for cross traffic alerts, adaptive cruise control and collision warnings

**Radar 24GHz**
- Responsible for blind spot detections

**Lidar**
- Responsible for pedestrian detection, collision avoidace and emergency breaking

**Camera**
- Responsible for traffic sign recognition, surround view, lane departure warning and parking assistance

**Gateways**
- Responsible for communication and central computing within a vehicle network system

**Ultrasonics**
- Responsible for parking assistance and collision warnings

**Light systems**
- Responsible for visibility and visual warnings
Radar testing

Radar 77/79 GHz
Responsible for cross traffic alerts, adaptive cruise control and collision warnings

Radar 24GHz
Responsible for blind spot detections
Challenges for Radar testing

**Development:**
- Characterization of radar sensors and coverages
- Analysis of chirp linearity
- Spectrum, EIRP power & frequency analysis

**Validation & Functional testing:**
- Simulation of dynamical driving scenarios (e.g. overtaking, reeving, following etc.)
- LV 124 / LV 148 compliance

**Production:**
- Several targets over the whole distance range
- Sensor calibration
- Distance to target in mm precision
- Target size with a precision < 1dB
- Bandwidth and power measurements
- < 30s cycle times

**24 / 77 / 79 GHz:**
- Support of all bands

- Non-linearities in the chirp cause distance and speed effects in the radar
- Higher radar resolution distinguishes better between multiple targets
- The better the power, the better the detection range

- LV 124 / 148 tests: checks the Radar behavior under various driving circumstances – critical validation norm

- Low cycle times allow higher production figures
- Precise calibration ensures correct Radar functionality

- 24 GHz technology is still used in various vehicle classes
- 24/77 GHz Band is highly regulated worldwide
- The future belongs to the 79 GHz technology
Partnership for Radar testing

Point of contact
Automated testing solutions
RF Adapter

Radar Target Simulator
24 & 77 GHz
Solutions for Radar testing

WKS Informatik

perisens GmbH

24/77 GHz Radar Target Simulator
NI VST technology
RTStand RF Analysis
HiL platform
Solutions for Radar testing

- **24 GHz Radar Target Simulator**
  - Full bandwidth support
  - Minimum range between the RTS antenna and the Radar sensor: ca. 50cm
  - Simulation range: 5-100m typical, more also possible
  - Range increments: 10cm or lower
  - Doppler simulation
  - Dynamic range: 60 dB typical
  - Simulated target: one moving target or several static targets

24/77 GHz Radar Target Simulator + NI VST technology + RTStand RF Analysis + HiL platform
Solutions for Radar testing

- Combination of: signal generator, signal analyzer, high-speed digital interface, and user-programmable FPGA in a single PXI module

24/77 GHz Radar Target Simulator + NI VST technology + RTStand RF Analysis + HiL platform
Solutions for Radar testing

- Support of both 24 and 77/79 GHz Radar Target Simulators
- **FMCW Chirp analysis with linearity evaluation** – 2GHz bandwidth with 1kHz accuracy
- Spectrum, EIRP power, frequency and frequency deviation displays
- Chirp overlay displays
- Continuous and snapshot modi
Solutions for Radar testing

- **Open platform** - from development, over validation to production tests
- Power measurements, bandwidth measurements, frequency and out-of-band (OOB) measurements as well as signal/jitter measurements for determining the radiation characteristic
- **Reporting of production figures** such as shift management and yields
- **LV 124 / LV 148 tests**
- Integration of RTStand RF Analysis for chirp and linearity analysis
- **Support of both 24 and 77/79 GHz Radar Target Simulators**

24/77 GHz Radar Target Simulator + NI VST technology + RTStand RF Analysis

HiL platform
Integration

Development tests

Validation & Functional tests

Production/EoL tests

24 GHz → WKS → 77/79 GHz

24 GHz

Validation & Functional tests

Production/EoL tests

77/79 GHz
NOFFZ Solution UTP 6010 with RF Adapter
System Layout of Automated Line with UTP 6010 & RF Adapter UTP 5060 & UPT
9085 Portal System
Want to learn more?

Our websites:

www.wks-informatik.de
www.rtstand.com
www.tube-analyzer.com

Our social channels:

https://www.linkedin.com/company/wks-informatik-gmbh
https://www.youtube.com/user/WKSinformatikTV

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