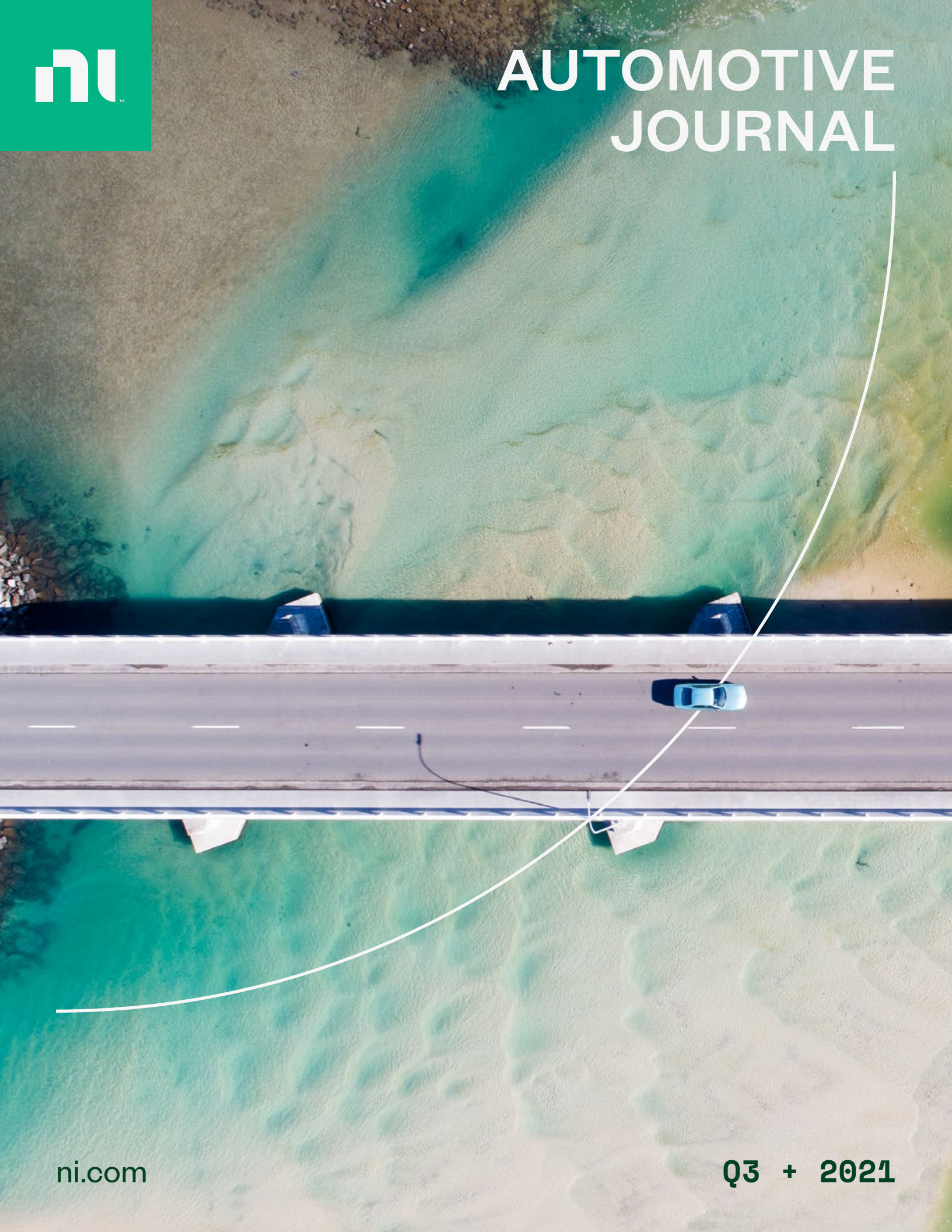
AUTOMOTIVE JOURNAL



ni.com

Q3 + 2021

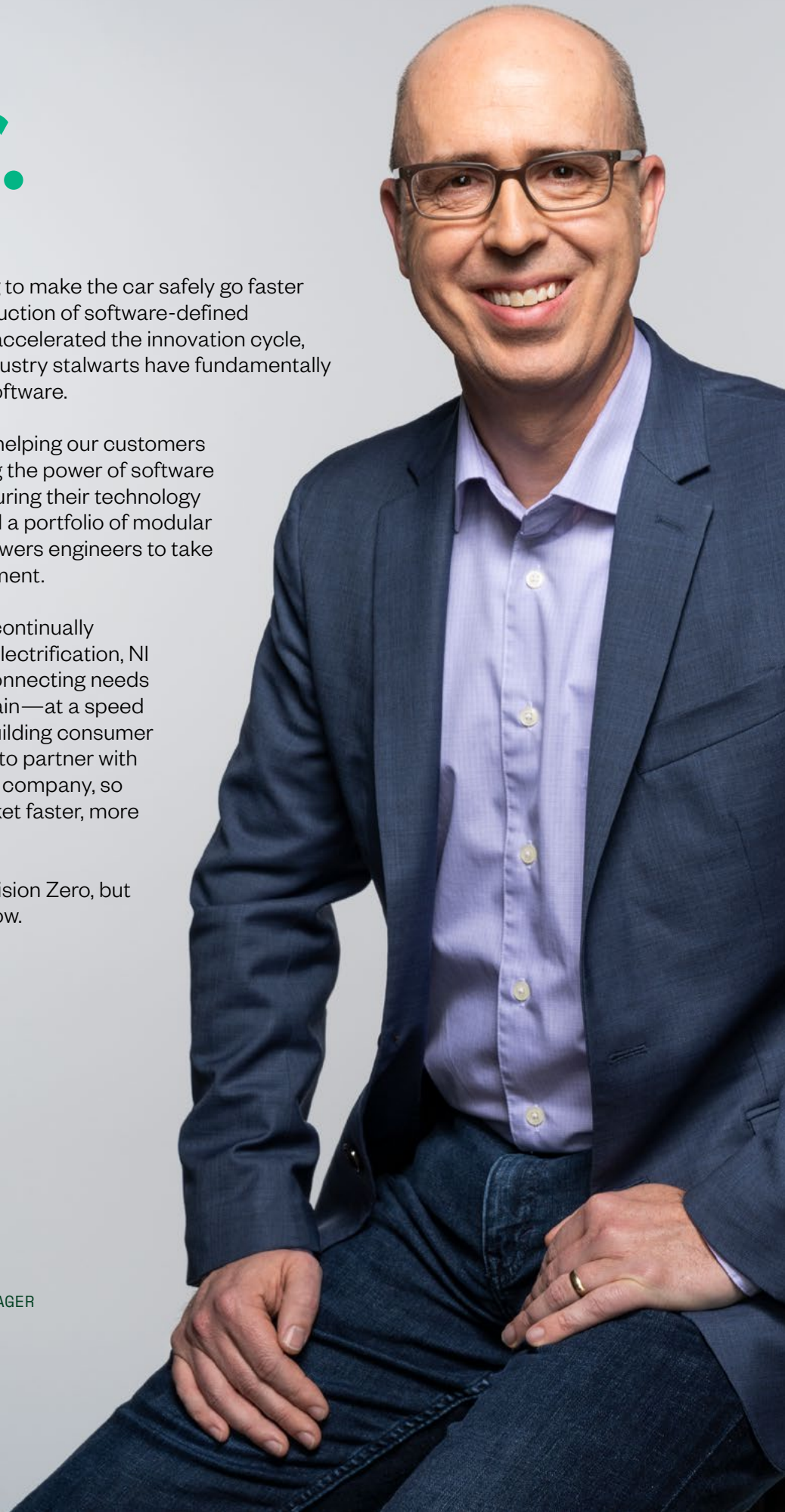
Faster.

An industry that's spent a decade trying to make the car safely go faster is now struggling with speed. The introduction of software-defined capabilities into the car has drastically accelerated the innovation cycle, pressuring organizations to keep up. Industry stalwarts have fundamentally reorganized to embrace the speed of software.

At NI, we've spent nearly half a decade helping our customers do just that—move faster by embracing the power of software to keep pace with technology while ensuring their technology performs as designed. We've developed a portfolio of modular hardware and open software that empowers engineers to take ownership of their test system development.

With our intense focus on the changes continually generated by autonomous driving and electrification, NI is here to help you move faster. We're connecting needs across the entire automotive supply chain—at a speed our competition cannot meet—while building consumer trust along the way. Our commitment is to partner with you to accelerate performance for your company, so you can deliver new capabilities to market faster, more reliably, and more profitably.

There are no shortcuts on the path to Vision Zero, but there is a better way. Let us show you how.



CHAD CHESNEY
SENIOR VICE PRESIDENT AND GENERAL MANAGER
TRANSPORTATION BUSINESS, NI

National Instruments
is now NI.

ni.com

Why the Automotive Industry Needs Data Analytics to Survive Digital Transformation

Digital transformation has disrupted the automotive industry with new technologies and challenges, while recalls are growing in number and cost.

"THE VEHICLE ELECTRIFICATION MARKET IS PROJECTED TO GROW AT A CAGR OF 11.9% TO REACH USD $129.6 BILLION BY 2025."

marketsandmarkets.com, September 2020

From cloud computing and artificial intelligence to electrification and autonomous driving, the automotive industry is evolving at a fast pace as new innovations are introduced every year. The cloud market alone in the automotive industry is forecasted to reach $66.95 billion by 2022, vehicle electrification is expected to hit $126 billion by 2025, and the predicted compound annual growth rate (CAGR) of the global autonomous vehicle market is 18.06% between 2020 and 2025 after being valued at $24.1 billion in 2019.

In today's fast-paced age of innovation and data, automotive manufacturers understand the importance of using data to gain an advantage. They are beginning to adopt technologies that rely on the latest cutting-edge innovations such as AI, 5G networks, and cloud computing. Nevertheless, many companies are still in the early stages of planning and deploying smart manufacturing systems. This is a step in the right direction, but most teams are still focusing on process—not product performance—and analyzing data in silos instead of holistically.

"HYUNDAI'S RECALL OF 82,000 ELECTRIC CARS IS ONE OF THE MOST EXPENSIVE IN HISTORY.... ON A PER-VEHICLE BASIS, THE AVERAGE COST IS $11,000."

CNN Tech, February 25, 2021

Despite impressive technologies, vehicles are still failing, which leads to expensive recalls as a result of blind spots. Most recently, Hyundai recalled 82,000 electric vehicles following reports of battery malfunctions. Though the number of recalled units is considered small, the price per recalled vehicle is one of the most expensive in history at $11,000. Compared with GM's recall of 7 million vehicles due to deadly air bag defects at under $200 per vehicle, $11K is astronomically high.

Attractive Opportunities in the Vehicle Electrification Market

Asia and Oceania are estimated to be the largest market for vehicle electrification as China, Japan, India, and South Korea accounted for 50% of global vehicle production in 2019.[1]

$73.7 BILLION
USD BILLION 2020-E

$129.6 BILLION
USD BILLION 2020-E

11.9% CAGR

The vehicle electrification market is expected to be worth $129.6 billion by 2025, growing at a CAGR of 11.9% during the forecast period.

This market growth can be attributed to stringent government regulations for emissions and fuel economy standards as well as the increase in demand for reliable electrical systems.

Acquisitions, expansion, and investment will offer lucrative opportunities for market players in the next five years The market is also driven by increasing government incentives and promotional policies for electric vehicles. But a slowdown in global vehicle production may restrain the vehicle electrification market.[2]

Blind Spots in Automotive Manufacturing

Automotive manufacturing processes today are filled with blind spots that lead to costly recalls. Adopting the latest technological innovations has led to a decentralized production chain while introducing millions of new components that need to work perfectly together. OEMs have limited visibility into what's going on throughout the entire production chain, which includes their own factories, Tier 1s, and many additional suppliers of mechanical and electronic components and software. Data is unreliable and siloed in manufacturing machines and production lines as well as vehicles' systems and components. Communication between these silos is limited and difficult to analyze for actionable insights. Additionally, this data is often not available in real time, which is critical in time-sensitive situations that require fast decisions. Meanwhile, a defect in a component anywhere along the production line can't be identified and tracked, leading to significantly more issues by the time the vehicle hits the road.

Things are only going to get more complicated as the industry evolves. According to the *Automotive Software and Electronics 2030* report by McKinsey & Company, "The days of OEMs comprehensively defining specifications and suppliers delivering on them may be nearing an end. Neither OEMs nor traditional suppliers are in a position to fully define the technology requirements of new systems. Co-development between OEMs and suppliers is expected to become not just prevalent but necessary."

OEMs, who are aware of the problem, invest massive budgets in simulations and testing processes at the design and manufacturing stages, but they often lack visibility into the quality of the components they are using. At SEMICON Europa 2015, Audi illustrated the scale of the problem by pointing out that with 4,000 cars coming off the line each day, each with 7,000 semiconductor devices, a rate of one defective component per million would still translate into one defective vehicle leaving the production line every hour.

Using Data to Identify and Prevent Blind Spots

Industry 4.0, also called the fourth industrial revolution, involves automation and data analytics, that is, smart technology, in traditional industrial and manufacturing practices. Production processes today create vast amounts of data, which need to be collected, connected, and analyzed to identify when a component is not working as it should. Typically, automotive companies use data analytics for the production process, with a focus on production and capacity-related metrics such as throughput. For example, many factories are looking to use data to implement predictive maintenance to maximize equipment uptime. The assumption is that if the machines are all working OK, the products will also be OK.

NI's experience working with automotive Tier 1 suppliers shows that subtle interactions between components caused by minor variations in the manufacturing process can cause significant issues later on. Many of these issues can be identified only by approaching the problem holistically, which means collecting and modeling the data across manufacturing silos while using end-to-end tracking to ensure that data is reliable and without gaps. Once the data can be efficiently collected, it needs to be analyzed and translated into machine and product insights, so the focus can expand from the machines to the products. That's also where AI and machine learning technologies come in. They enable real-time analysis of big data and automated decision-making processes. This opens the door to truly "smart" manufacturing for which data analytics can drive actions on the manufacturing floor in real time.

Eliminate Blind Spots with NI

If you're already thinking about data and analytics, that's the right first step. Now it's time to ensure you have real-time access to a holistic data set and are using it to make product, not just process, optimizations. This is the only way to prevent increasingly costly recalls in an ever-evolving automotive landscape.

NI provides OEMs with an end-to-end AI and big data analytics platform that is fully equipped with the tools they need to generate actionable product insights. Operating on premise or as a cloud solution, NI's platform integrates directly into OEM systems and machines throughout the supply chain. It acts as a unified data model by bridging the different data sources and collecting the data in one place for analysis. By deploying AI-powered big data analytics, OEMs can automate smart decision-making, shorten time to market, streamline manufacturing processes, and significantly reduce recalls.

Author

ELIJAH KERRY
CHIEF OFFERING MANAGER,
ENTERPRISE SOFTWARE, NI

[1] THIS MARKET REPRESENTS THE VEHICLE ELECTRIFICATION MARKET EXCLUDING THE 48 V VEHICLE MARKET.

[2] MARKETSANDMARKETS.COM, VEHICLE ELECTRIFICATION MARKET.


BUS
ONLY
BUS
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New Solution Meets Evolving Radar Test Needs for Automated Driving Systems

As new radar technologies are developed to meet the ever-increasing demands for autonomous driving, test technologies must scale accordingly. Wide aperture automotive radars are gaining traction due to higher resolution capabilities, and they present a challenge for tests due to long far-field ranges. But a new solution addresses this challenge with a small-footprint radar test system that offers complete radar sensor testing with object simulation and RF measurements.

The Challenge of Radar Sensor Validation and Production Test

Radar technology for automotive applications continues to gain new footholds in advanced driver assistance systems (ADAS) and automated driving systems (ADS) functionality. With rising safety interests and expectations, automotive radar sensors are playing a central role in delivering environment perception for ADAS and ADS functionality. For this role at the heart of autonomous driving capability, automotive radar technology is evolving rapidly beyond multimode capabilities to include high definition; multiple input, multiple output (MIMO); and wide aperture radars with longer ranges, higher resolution, and longer far-field distances. The wider apertures and longer far-field distances pose new challenges for existing validation and production tests of the sensors and require next-generation test capabilities. To address these challenges, Microwave Vision Group (MVG), Konrad Technologies (KT), and NI partnered to develop the MVG KT CATR RTS solution consisting of the MVG Compact Antenna Test Range (CATR) integrated with the KT Vehicle Radar Test System (VRTS) built on the NI platform.

Benefits of the MVG KT CATR RTS

The MVG KT CATR RTS offers full radar test capabilities (object simulation and RF measurements) with a small footprint of about 1 m in length. This small footprint dramatically reduces the amount of space occupied on the production floor and, ultimately, the overall cost of tests for radar sensors with long far-field distances. Pursuing its commitment to deliver innovative and time-saving RF measurement solutions for product research and development, MVG is excited to offer its expertise and vision to support the advancement of the autonomous car and road safety. The MVG CATR technology, which extends the Little Big Lab product range, is the result of many years of experience in the design and development of innovative antenna measurement solutions. It reflects MVG's expertise in building compact systems that allow for cost-effective and accurate measurements in a controlled environment.

CATR Basics to Overcome Test Challenges

Antenna measurements in the far field require a uniform plan wave to illuminate the device under test (DUT). To achieve this uniform plane wave illumination, a very large distance between the antenna and the measurement source antenna is usually required. Compact ranges use a source antenna, which radiates a spherical wave, in conjunction with one or more reflectors to collimate this spherical wave into a plane wave over a specified test zone called the quiet zone. In this quiet zone volume space, amplitude and phase variations occur below predefined thresholds, approximating a plane wave. Based on the geometrical-optical principle, the parabolic reflector needs precision in its design to achieve expected performance in a wide frequency range, from low frequencies where the compact range reflector is only a few wavelengths in size to very high frequencies where the reflector can reach hundreds of wavelengths. Consideration must also be given to the feed horn, and its positioning relative to the reflector, as well as the absorber layout and separation distance between the absorbers and the reflector in the anechoic chamber. This shorter distance allows a compact range system to be conveniently located near test or integration facilities. By

placing the system in a shielded anechoic chamber, interferences from external sources can be eliminated. The enclosed system is equally protected from weather conditions, and confidential information is better secured. Careful analysis of requirements and implementation of the appropriate compact range system within an efficiently sized anechoic chamber can result in a high-performance test zone and optimized test results.

The Mini-Compact Range and chamber assembly is designed to enable cost-effective testing of microwave and millimeter wave antennas, with a quiet zone diameter up to 0.2 m. The system provides a portable, accessible test tool for small antenna designs. It is particularly well suited for high-frequency antenna measurements and production testing. A complete system (RF, vector network analyzer, controller, camera, ventilation, PC, and so on) can be powered up with one single touch. The collimation system consists of a DUT holder, an offset reflector, and a feed horn antenna to offer a 0.2 m cylindrical quiet zone volume with an amplitude taper of less than 1 dB at the edges of the quiet zone.

FIGURE 01

CATR technology is designed to offer full over-the-air radar test capabilities with a small size and economical cost.

"We are particularly pleased to combine the technology of our CATR systems with KT's radar test systems and NI's technology in order to provide the automotive industry with a solution that is perfectly suited to test high-definition and long-range radar sensors and that meets the test challenges of advanced driver assistance systems evolution."

Gianni Barone
Sales Director, MVG

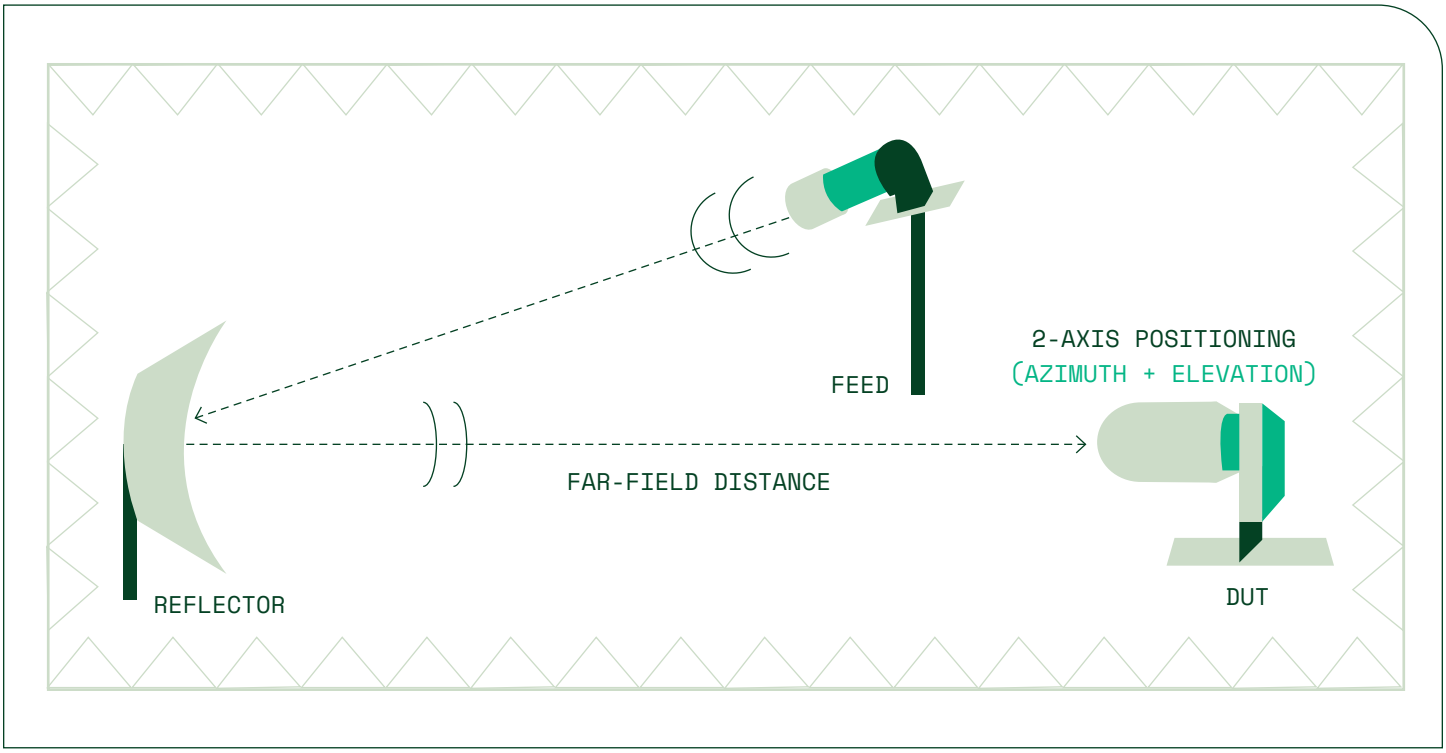

FIGURE 02
CATR chambers provide the far-field conditions needed for test while using a fraction of the physical space traditional radar test systems require.

Scalable KT Vehicle Radar Test System Built on the NI Platform

The KT VRTS, a tried-and-tested radar test system built on the NI Vehicle Radar Test System (VRTS), is used for radar validation and production test applications globally. With a modular approach, KT has developed multiple hardware and software subsystems that can be deployed to RTS applications. With a single user interface, users can implement scenario-based object simulation and RF measurements for functional evaluation of radar sensors. Scenarios with simulated object ranges from 2.5 m to 300 m at 5 cm resolution can be implemented with a point-and-click interface quickly and efficiently. Object range, velocity, and RCS (or reflected power) for simulated objects can be controlled dynamically for single and multiple objects for several angles across the field of view (FOV). Simultaneously, RF measurements like operating frequency, occupied bandwidth, signal-to-noise ratio (SNR), and chirp analysis can be initiated from a configuration window. The KT VRTS presents bistatic and monostatic front-end options depending on the test plan requirements for a specific sensor. NI's VRTS architecture provides separate transmitter and receiver chains for the RF signal from the sensor, to perform object simulation on the variable delay generator, and RF measurements on the NI Vector Signal Transceiver (VST) in parallel.

Customization for Your Test Requirements

The MVG KT CATR combines the full breadth of features in the MVG CATR chamber and the KT VRTS platform to offer a complete test solution for high-definition and wide aperture radar sensors with long far-field distances. Test system offerings include options for custom application programming interfaces to automate test plans, rotational movement options for scalable validation test plans across the FOV, high-throughput DUT loading options for production test applications, and custom service plans to support end-user radar test needs.

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DIRECTOR, GLOBAL BUSINESS DEVELOPMENT, ADAS
KONRAD TECHNOLOGIES (KT)

Introducing A³DAS to easily monitor ADAS compliance to functional safety requirements.

LHP and Konrad Technologies are excited to announce a revolutionary vehicle-to-lab (V2L) automated ADAS testing solution. The Advanced, ASIL, and Automated Driver Assistance System (A³DAS) offers a simulation and measurement-based test environment for evaluating an ADAS and vehicle functions' compliance to functional safety standards before costly road tests. With A³DAS, you can decrease your time to market for ADAS functions while ensuring functional safety compliance.

LHP

Defines requirements and test cases with state-of-the-art functional safety workflows and tools for any safety standard like SOTIF or EuroNCAP.

WATCH THE FULL A³DAS SOLUTION DEMO
lhpes.com/adas-system

lhpes.com

konrad technologies

Provides premium HIL and measurement-based test automation tools for radar, camera, ultrasonic, and LiDAR sensors.

konrad-technologies.com

Electronic Control Unit Functional Test

Most innovations in vehicle comfort, safety, connectivity, and efficiency are powered by electronic control units (ECUs). As the complexity of ECU functionality increases, so does the difficulty of ECU test. Driven by rapidly changing consumer demands, the timelines to test these ECUs are getting tighter, making it more difficult to design, develop, deploy, and maintain end-of-line functional testers on deadline and throughout their life cycles.

Customer Needs

01
Meet your test milestones, launch dates, and quality expectations.

02
Streamline your operations from development to maintenance.

03
Deploy testers globally and ensure maintainability.

04
Forecast capital expenditure and operating expense budgets for several years.

NI Solution

01
Meet testing needs faster with preconfigured, customizable production test systems for powertrain, body, and chassis ECUs.

02
Test faster and reduce floor space with parallel testing capability for up to four ECUs, yielding higher throughput with fewer testers.

03
Keep your testers running with test station health monitoring tools, the Field Diagnostic Tester, and ECU Test System Maintenance Software.

"NI's ECU Test System is the only system we could find in the market that met our aggressive schedule for deploying production testers for our ECUs. Everything, from the initial configuration to delivery at our site to the bring-up service, was significantly faster, so we had more time to focus on our test plan implementation and make our project successful."

Wenfeng Wu
Site Industrial TDE, Valeo Interior Controls

NI ADVANTAGE:

- FASTER: Get a functional test system with the I/O and parallel test capability you need for a range of powertrain, body, and chassis ECUs out of the box.
- LEANER: Deploy and operate end-of-line testers efficiently with the help of NI services, training, and ECU Test System Maintenance Software.
- RELIABLE: Reduce downtime risk with improved maintainability, global service programs, and simpler repairs and hardware exchanges.

Where does the time go when building ECU production test systems?

Discover which tasks might prevent you from meeting your launch data when building ECU functional test systems.

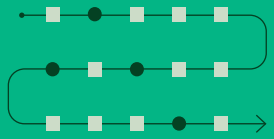
Design

of time spent in cabling, logistics, and documentation

- 12% Cabling
- 26% Ordering and logistics
- 15% Documentation and training

Deploy

34% of tasks are not directly related to the test plan implementation



- Scheduling and planning
- Procuring
- Documenting
- Assembling

Maintain

$20k-$50k average cost per minute of downtime to the automotive industry

- 23% Downtime due to Human Error*
- 75% Reduction in incident repair time with the right service program

* www.businesswire.com/news/home/20171108006370/en/Human-Error-Common-Unplanned-Downtime-Manufacturing-Sector

VISIT NI.COM/ECUTS FOR MORE INFORMATION.

KEY SPECIFICATIONS	
Core Rack Options	ESD (IEC 61340-5-1), RAL 7035 paint 24U (ECUTS-16000) and 40U (ECUTS-16001) form factors available Power input: 200–240 V (1-phase, 50/60 Hz) PDU DC output: +12 V, +24 V
Software	OS: Windows 10 ECUTS Software Suite: Includes software for test plan implementation, interactive debugging, signal routing and managing, and system maintenance
Power Supply Options	200 W (20/36/60 V), 400 W (20/36/60 V), and 800 W (20/36/60 V)
Modular Instruments	High-performance PXI chassis and quad-core controller Configurability for up to 16 additional PXI instruments and I/O modules such as digital multimeter, source measure unit, power supply, scopes, function generator, isolated AI/AO, and DIO
Automotive Communications	CAN, LIN, RS232, GPIB, Automotive Ethernet
PXI Pin Switch	2-wire; support for up to four each 4x64, 8x32, or 16x16 matrix modules to create matrices of 4x256, 8x128, or 16x64, respectively Electromechanical relay, 60 V/2 A (60 W) 1-wire (64x1), 2-wire (32x1), or 4-wire (16x1) multiplexer also available
Load Switching and Management	8 A, up to 96 ch with current measurement 30 A, up to 24 ch with current measurement 5 A, up to 192 ch with current measurement Space for either external load or electronic load (eLoad) 100 W (60 V/20 A) 8 ch or 350 W (60 V/40 A) 4 ch
Mass Interconnect	Virginia Panel Corporation (VPC) 9025, 25 slots, tray optional
Field Diagnostics Tester	Performs automated continuity testing on all predefined slots and pins; performs other diagnostic functions for maintaining the system operations

ASHISH NAIK
BUSINESS DEVELOPMENT GLOBAL GROUP MANAGER FOR ADAS/AD, NI

Supporting the Consumer's Road to Vision Zero

Vision Zero sets an ambitious goal to eliminate automotive collisions, emissions, and congestion. That ambition will require navigating many of the enabling and prohibiting influences that are putting pressure on the path forward. This includes infrastructure, policy, regulation, global collaboration supply chain dynamics, and adjacent industries. Let's not forget how critical the money is that's driving the innovation. Today, I've invited Paul Gadd, deputy director of Innovate UK, to discuss the influence that funding has on the path to Vision Zero.

ASHISH NAIK: INNOVATE UK PLAYS A UNIQUE ROLE IN HELPING TO SUPPORT THE AUTOMOTIVE CONSUMER. CAN YOU TELL US MORE?

PAUL GADD: Innovate UK helps fund business-led innovation, ultimately looking to drive economic benefits. By sharing the costs, we enable businesses to take on higher risk, higher reward projects. Businesses that take on more risk grow faster and contribute back to the economy through higher employment and taxes. We're here to increase economic activity, but we also look for social and environmental benefits. We strongly align with the UK government's priorities—this includes Net Zero with the significant social benefits but also huge economic opportunity. There are no shortcuts on the path to Vision Zero; we're here to make sure that funding isn't limiting innovation.

AN: GOVERNMENT PLAYS AN IMPORTANT ROLE, PARTICULARLY WITH POLICY AND DRIVING STANDARDIZATION. FOR EXAMPLE, THE EU'S HORIZON EUROPE PROGRAM AND THE GERMAN RESEARCH FOUNDATION ALLOCATE A LOT OF FUNDING TOWARD TRENDS LIKE AUTONOMOUS DRIVING AND ELECTRIFICATION. HOW DO YOU ENVISION INNOVATE UK HELPING TO ACCELERATE NOT ONLY THE FUNDAMENTAL RESEARCH BUT ALSO THE PATH TO INDUSTRIALIZATION?

PG: Our role at Innovate UK is to understand and invest in the future, working with industry, government, and academia. We do this through our Inspire, Involve, Invest approach. Inspire is understanding the global opportunities and UK strengths and highlighting the opportunities for innovation that produce the largest return on investment. Involve is working with industry, government, and academia to make connections and build communities and clusters around these opportunities. Invest is investing alongside industry in these innovation opportunities to allow those risks to be taken and bring forward the future.

This summer, we are publishing our vision of UK transport in 2050 and outlining key areas and steps needed to achieve this. We're drawing on recognised source

material and using our own insight informed by government partners and industry consultations. As we reflect on the pace of change for this forecast, we're doing it in an open-book manner, so people can see our work and help improve it as we update them regularly. We intend this vision to be a thought leadership piece, helping people visualise the future system and, therefore, the future opportunities. Alongside a study on international capabilities and other inputs, we'll use this to make our own investments, and we hope it will inform others.

AN: BRINGING THE CONSUMER ALONG ON THE JOURNEY WITH US IS SO POWERFUL. THAT EDUCATION AND VISUALIZATION WILL BE INCREDIBLY VALUABLE TO HELP ILLUSTRATE THE OUTCOMES THAT AUTONOMY CAN PROVIDE, RATHER THAN FOCUSING ON AUTONOMY AS THE OUTCOME. DO YOU HAVE ANY EXAMPLES OF HOW YOUR WORK CAN DRIVE SPECIFIC IMPROVEMENTS?

PG: We work closely with the Centre for Connected and Autonomous Vehicles (CCAV) and, building on thought leadership from CCAV, Innovate UK, and industry, we involved the community and invested to make the UK one of the leading locations to develop and deploy CAVs. Over the past five years, £230 million has been invested into 81 collaborative research and development projects involving over 200 organizations. A further £200 million has been invested in the creation of eight CAV testing facilities. These investments target specific outcomes such as operating safely on public roads or focusing on security or the business model. This investment, alongside a support network, has created a thriving CAV community.

Companies that have benefited include Arrival, which has grown from 50 to 1,000 employees, received investment from Hyundai and Kia, and recently floated with a valuation of $13 billion, and Oxbotica, a spin-off of the University of Oxford, that recently completed a $47 million investment round. The funding can help share financial risk, but it also inspires collaboration like Arrival working with Axa insurance or UPS developing the relationship and helping build confidence before an order for 10,000 vehicles. Or Oxbotica working with the University of Greenwich or Transport for London to ensure the solutions deployed not only work commercially but also benefit the city and wider society. We're here to partner with companies and help them on their journey, through inspiration, involvement, and investment.

AN: AS A UK NATIONAL MYSELF, I HAVE ALREADY EXPERIENCED THE CONTINUED IMPACT THAT INNOVATE UK IS HAVING. THE KEY HAS BEEN THAT YOUR PROJECTS FOCUS NOT ONLY ON THE INCREDIBLE ENGINEERING BUT ALSO THE REAL USE CASE FOR CONSUMERS BEHIND IT. YOUR WORK WITH GOVERNMENT, LEGISLATION, INDUSTRY, AND ACADEMIA BRINGS THIS ALL TOGETHER TO MAKE AN ENGINEERING IMPACT ON US, AS CONSUMERS. SPECIFICALLY, ON AUTONOMY, I SEE THE EFFORTS TO CHANGE THE MINDSET OF EVERYONE TO FEEL COMFORTABLE AROUND AUTONOMY. THIS IS SPECIAL TO ME BECAUSE IT PROVIDES OPPORTUNITIES TO CELEBRATE WITH FRIENDS AND FAMILY THE ENGINEERING PURPOSE AND THE CLEAR EVERYDAY IMPACT THIS WILL HAVE ON OUR REAL LIVES. THANK YOU FOR YOUR ROLE IN THAT, PAUL.

PAUL GADD
DEPUTY DIRECTOR, INNOVATE UK

A²B Network Simulation and Testing

Road noise cancellation, personal audio zones, telematics systems, and A/V conference room systems are some of the most common audio challenges infotainment test engineers face. They demand more expensive microcontrollers and external memory, which increases system complexity and test times. The Automotive Audio Bus (A²B®) from Analog Devices is an emerging technology that helps overcome these challenges. It is increasingly used in head units, high-fidelity audio speakers, audio amplifiers, microphone arrays, vibration sensors, and actuators.

Customer Needs

01
Reduce system complexity, costs, and cable harnesses, which is especially important for an electric vehicle's weight and range.

02
Run extensive audio signals and communications test across the development, validation, and production phases.

03
Process high-speed multichannel audio data in real time.

04
Support different audio interfaces such as analog, digital, and external audio.

NI + NOFFZ Solution

01
DESIGNED FOR FAST, OUT-OF-THE-BOX SETUP: Configure networks quickly using the examples and templates in Analog Devices SigmaStudio® and NOFFZ ITD 1024 Management Utility.

02
SUITABLE FOR ALL PHASES: Use individually in the lab or integrate it into test systems.

03
OPTIMIZED FOR AUTOMATED TEST: Run for more than 24 hours even if the host PC loses the connection.

"While designing the Infotainment Test Device, I was looking for a COTS device to integrate that would provide real-time signal processing, FPGA, and memory. The NI Single-Board RIO device not only fulfilled these needs but also offered a very small size, which is extremely important for a small final product and final integration in test racks."

Nikita Prorekhin
A²B Test Solutions R&D, NOFFZ Technologies

NOFFZ ITD 1024 INFOTAINMENT TEST DEVICE

INFOTAINMENT TEST DEVICE ITD 1024 ADVANTAGE:

- Generates and captures up to 32 audio channels in real time by using NI Single-Board RIO devices featuring integrated FPGA, CPU, and storage.
- Seamlessly integrates into test systems with libraries for NI LabVIEW with TestStand support and .NET as well as the SCPI API for other programming languages.
- Simulates master, slave, and end nodes in a complex A^{2}B network.

KEY SPECIFICATIONS:

- Local and phantom power (up to 300 mA) support for slave nodes
- Node-level I^{2}C device handling
- 32-bit multichannel time division multiplexed (TDM) generator/recorder; 16 output and 16 input channels
- 24-bit multichannel in/out audio codec with TDM interface; 8 input and 8 output channels

Accelerate the Path to Vision Zero Together

> On May 18, NI hosted Automotive Pulse to bring together a hand-selected group of automotive leaders to discuss key strategies for accelerating the path to Vision Zero, including zero collisions, zero emissions, and zero congestion.

To kick off this two-hour event, Ashish Naik, business development global group manager for advanced driver assistance systems (ADAS) and autonomous driving (AD) validation at NI, welcomed everyone with his opening keynote. His keynote guest speakers during the session were Colin Harty, verification and validation (V&V) manager at Jaguar Land Rover; Sam Abuelsamid, principal research analyst at Guidehouse Insights; and Prith Banerjee, chief technology officer at Ansys. Their conversation focused on how "shift left" is impacting vehicle development and test while accelerating the path toward Vision Zero. They also emphasized that there are no shortcuts to achieve Vision Zero. To view the opening and closing keynote presentations, visit YouTube.

After Naik's keynote, the audience split into three breakout sessions on the following topics: expanding left and what is keeping us from minimizing the use of prototypes, leading through change by establishing a new way forward in highly dynamic times, and mastering the role of data for digital transformation by achieving zero blind spots.

Expansion Left

We are far from expanding left because most of the V&V process is still implemented through lab-based and road testing. The desired future state is to drastically reduce road testing to minimize cost, increase coverage, and speed up the development process. Therefore, increasing virtual testing and simulation accordingly is the key to achieving this while lab-based testing stays flat compared to the current state.

But the question remains: "What are the main obstacles preventing organizations from expanding faster and further left?" The impediments include a lack of fidelity in models and simulation environments; the technology simply doesn't feel ready yet. Moreover, change management and the drive toward shifting left (front loading) the test strategy are sometimes barriers themselves. Additionally, the complexity of the simulation and modeling toolchain as well as building the workflow is slowing down development.

Leadership through Change

New processes are often created because organizations are operating in silos and not looking left or right. This is magnified by startup mentalities, which are encouraged nowadays in larger organizations. Overcoming these barriers calls for common interfaces within the industry and an outside perspective from the test supply chain.

Companies need to understand their value currency, which involves knowledge of capital expenditures (CapEx) versus operating expenses (OpEx). They also need to know when they can justify a shift in these expenses based on cost savings throughout the organization. Amidst all, the relationships between OEMs and Tier 1 suppliers are challenged, leading to a strong opportunity amongst Tier 1s and other vendors to develop common platforms to solve this. Platforms developed out of building blocks (LEGO® brick analogy) do provide these capabilities, but they first need to be defined and implemented (Who and how to create the LEGO bricks?), and then they need clear governance in terms of checkpoints.

Zero Blind Spots

Though more data is inevitable, we lack purposeful action to address the data we already have. The key question is, "What will be done based on the data, and are we prepared to do it?"

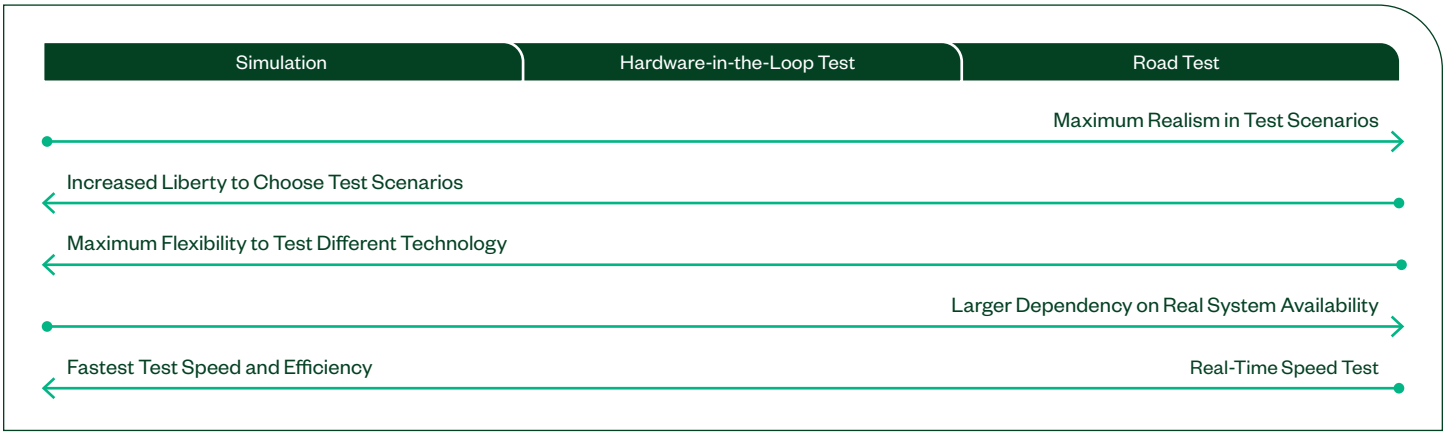


FIGURE 01

Shifting left: This continuum shows the trade-offs and benefits of testing at different stages. Warwick Manufacturing Group, The University of Warwick, 2018.

A "data trust" and "data proprietary" issue is encompassing the whole supply chain; it currently requires companies to re-create the data that commonly exists elsewhere. Overcoming this situation can speed up development and shorten time to insight in the field. Doing so requires companies to start a conversation about this issue so it becomes a well-understood business case between and within those companies. One solution might be specifying repeatable and verifiable data collection methods to streamline data capture and analysis.

Collaboration

No single company can solve these challenges alone; it takes collaboration and partnerships to turn these problems into opportunities. One of NI's key principles is to act as a connector to bring together smart people, ideas, and technology.

Through the acquisition of Optimal+, NI has strengthened its expertise and technology portfolio significantly to partner with companies throughout the whole supply chain to mitigate challenges like the data trust and proprietary issue and their associated risks.

NI's recent acquisition of monoDrive, a former NI Partner and a leading innovator in the area of high-fidelity simulation in the ADAS and AD spaces, and NI's strong partnership with Ansys are more examples of collaboration to ensure our joint customers' competitive edge.

Deepening relationships with key NI Partners including OPAL-RT for electric vehicles and Konrad Technologies for ADAS and AD validation applications highlight further areas for amplified collaboration that can lead to shorter times to market.

Remember the words of Henry Ford: "Coming together is the beginning. Keeping together is progress. Working together is success."

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The cost of correcting safety defects grows exponentially as the product development cycle progresses. To achieve superior test coverage and detect anomalies earlier, electronic control unit (ECU) and body electronics manufacturers in transportation industries can perform closed-loop feedback testing with hardware-in-the-loop (HIL) simulation. You can easily add hardware and reconfigure software by leveraging an open, cost-effective Genuen HIL test system that uses NI's comprehensive, modular ecosystem. Tackle complex, cutting-edge engineering challenges with NI technologies such as deterministic FPGA timing, RF wireless communications, and commercial off-the-shelf loading and switching circuitry.

Customer Needs

01
Expedite development before the physical product assembly is complete.

02
Apply electrification that needs high-speed, deterministic monitoring (FPGA).

03
Expand and adapt to new application challenges.

NI + Genuen Solution

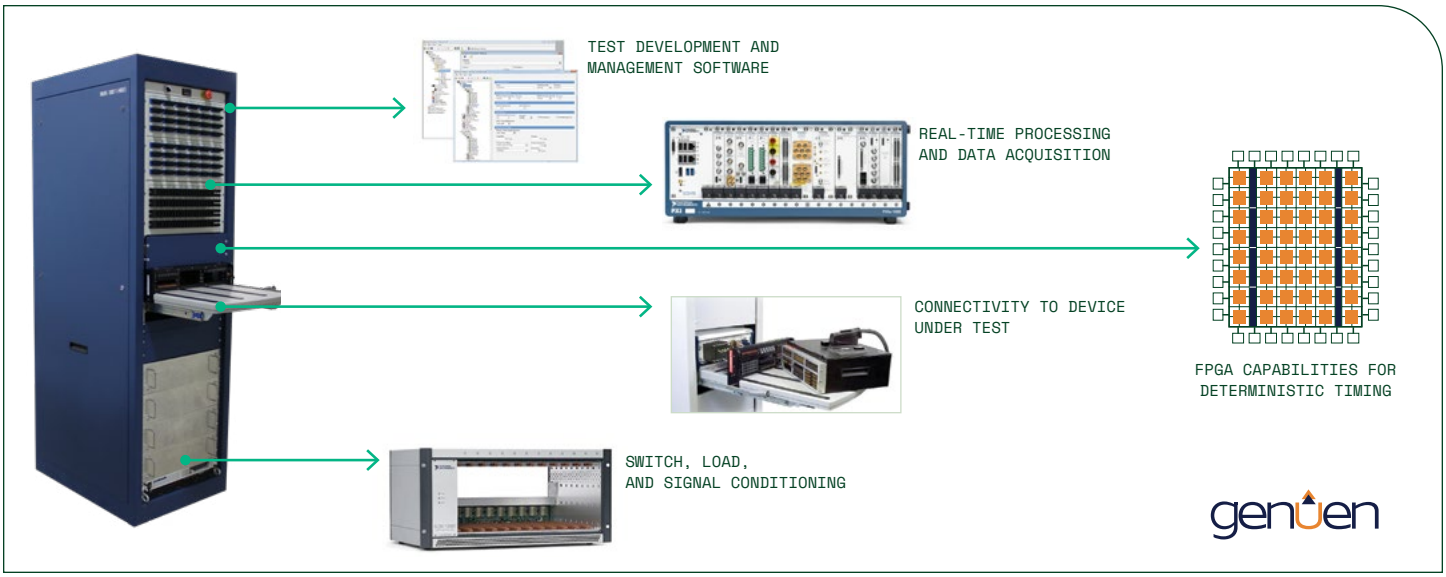
01
Improve test repeatability and achieve superior test coverage to detect anomalies earlier in the development cycle.

02
Reduce the time and complexity required to perform even the most advanced tests with a standardized system.

03
Easily add new hardware and reconfigure software to meet new application challenges.

THE NI + GENUEN ADVANTAGE:

- HIL SOLUTION LIBRARY AT YOUR FINGERTIPS
  Find a cost-effective solution for your simulation testing needs by selecting from a vast library of previously developed signal paths.
- SINGLE POINT OF CONTACT FOR HIL SOLUTIONS
  Streamline your simulation with a state-of-the-art test system from a single point of contact that knows your application inside and out.
- ADVANCED TECHNOLOGY READY FOR ANY CHALLENGE
  Position yourself at the forefront by testing with proven tools and cutting-edge technology to solve the latest challenges in your industry.



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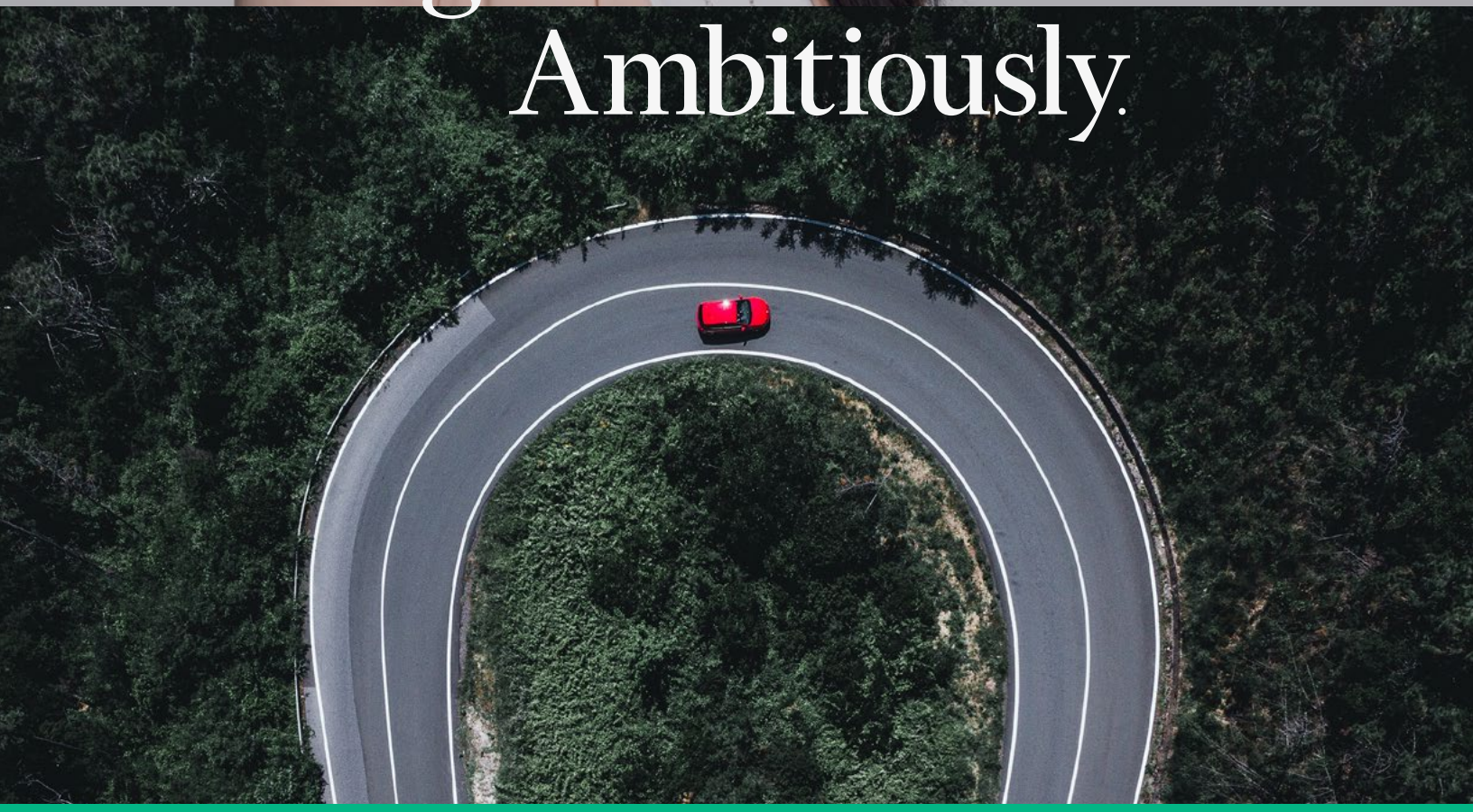

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