



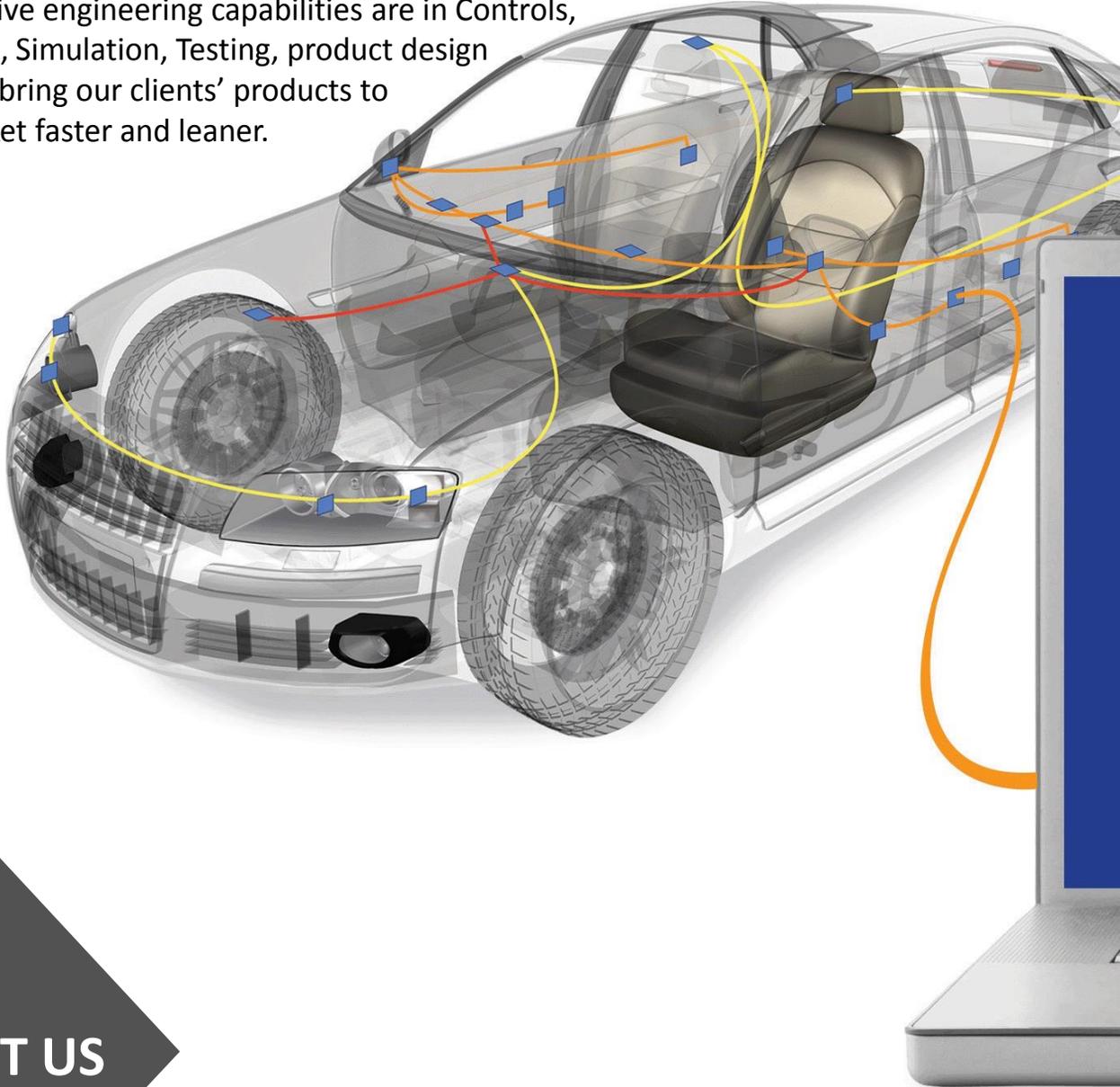
BUSINESS BROCHURE



DORLE CONTROLS
Innovations for Sustainable Mobility

www.dorleco.com

Driven by a passion to empower our customers, **Dorle Controls** offers advanced automotive engineering solutions, consultancy and resources. Our Headquarter is based in Greater Detroit, USA and the Engineering center is located in Pune, India. We head a team of qualified engineers with vast experience in their fields so that our client is ready to face the challenges of the future. Our advanced automotive engineering capabilities are in Controls, Software, Simulation, Testing, product design and CAE bring our clients' products to the market faster and leaner.



ABOUT US

WHO
WE ARE

HIGH
PRODUCTIVITY
MEETS QUALITY
ENGINEERING

Dorle Controls is committed to delivering trusted automotive technology solutions that power high level automotive systems and subsystems. With our efficient engineering that is complemented with a lean operating model, our clients lead the industry with the technological edge. We aim to go beyond satisfaction in all our projects by simplifying processes for suppliers, startups and OEMs. Our clients partner with us to benefit from our innovative automotive engineering solutions and experienced resources.

Production
Software

Technical
Consulting

Research &
Development



EXPERTIZE

WIDE RANGE OF ADVANCED AUTOMOTIVE SOLUTIONS

ADVANCED DRIVER ASSISTANCE SYSTEMS

ELECTRIFIED POWERTRAINS

AUTOMATIC TRANSMISSIONS, DCT & CVTS

CONNECTED VEHICLE ETHERNET

FUNCTIONAL SAFETY - ISO26262

SMART CONTROLLERS

PMBD POWERTRAIN CONTROLS

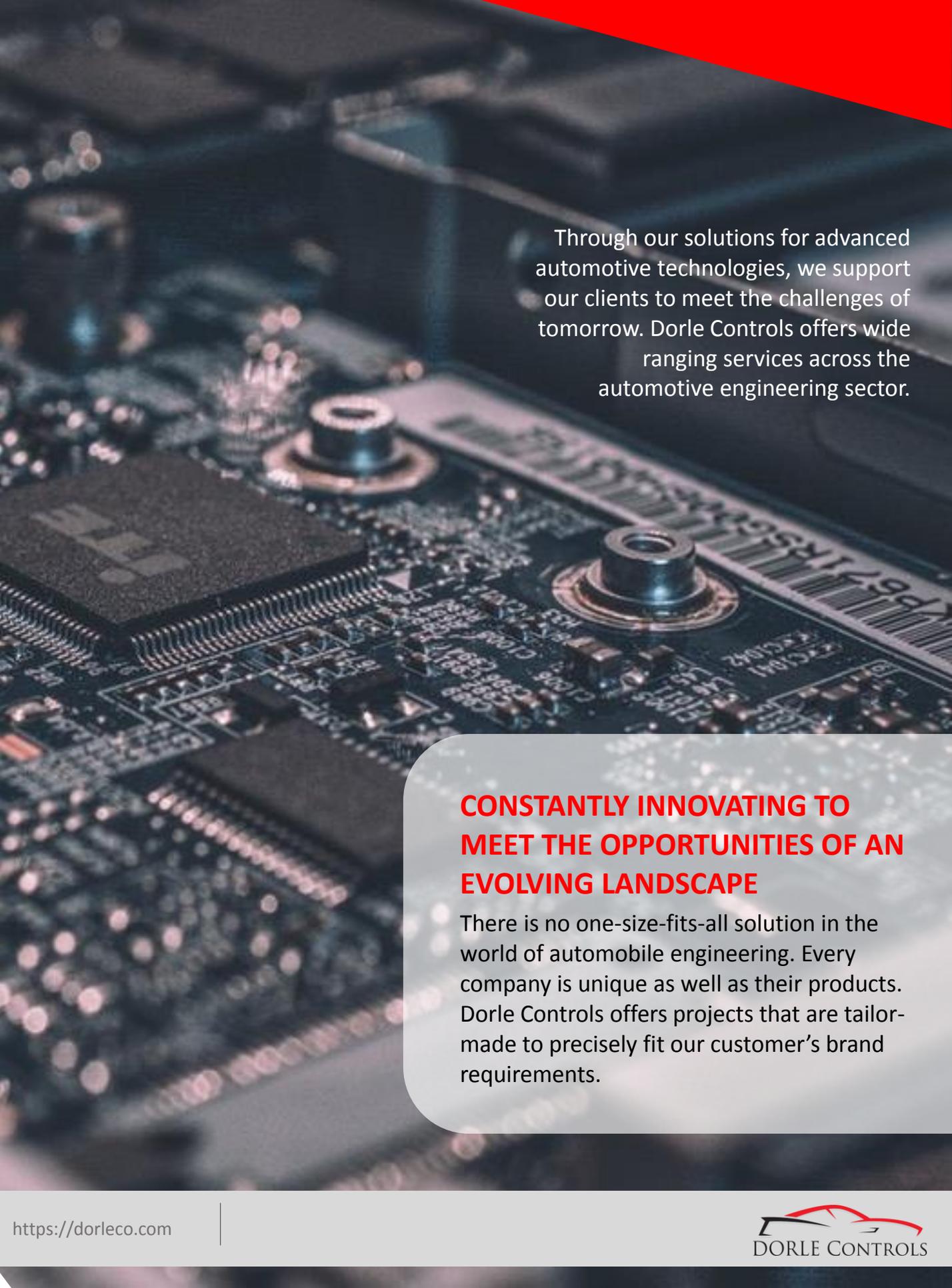
EMBEDDED SOFTWARE

SIL MIL HIL TESTING

PHYSICS BASED SIMULATION MODELING

SYSTEMS ENGINEERING

RAPID PROTOTYPING



Through our solutions for advanced automotive technologies, we support our clients to meet the challenges of tomorrow. Dorle Controls offers wide ranging services across the automotive engineering sector.

CONSTANTLY INNOVATING TO MEET THE OPPORTUNITIES OF AN EVOLVING LANDSCAPE

There is no one-size-fits-all solution in the world of automobile engineering. Every company is unique as well as their products. Dorle Controls offers projects that are tailor-made to precisely fit our customer's brand requirements.

SERVICES

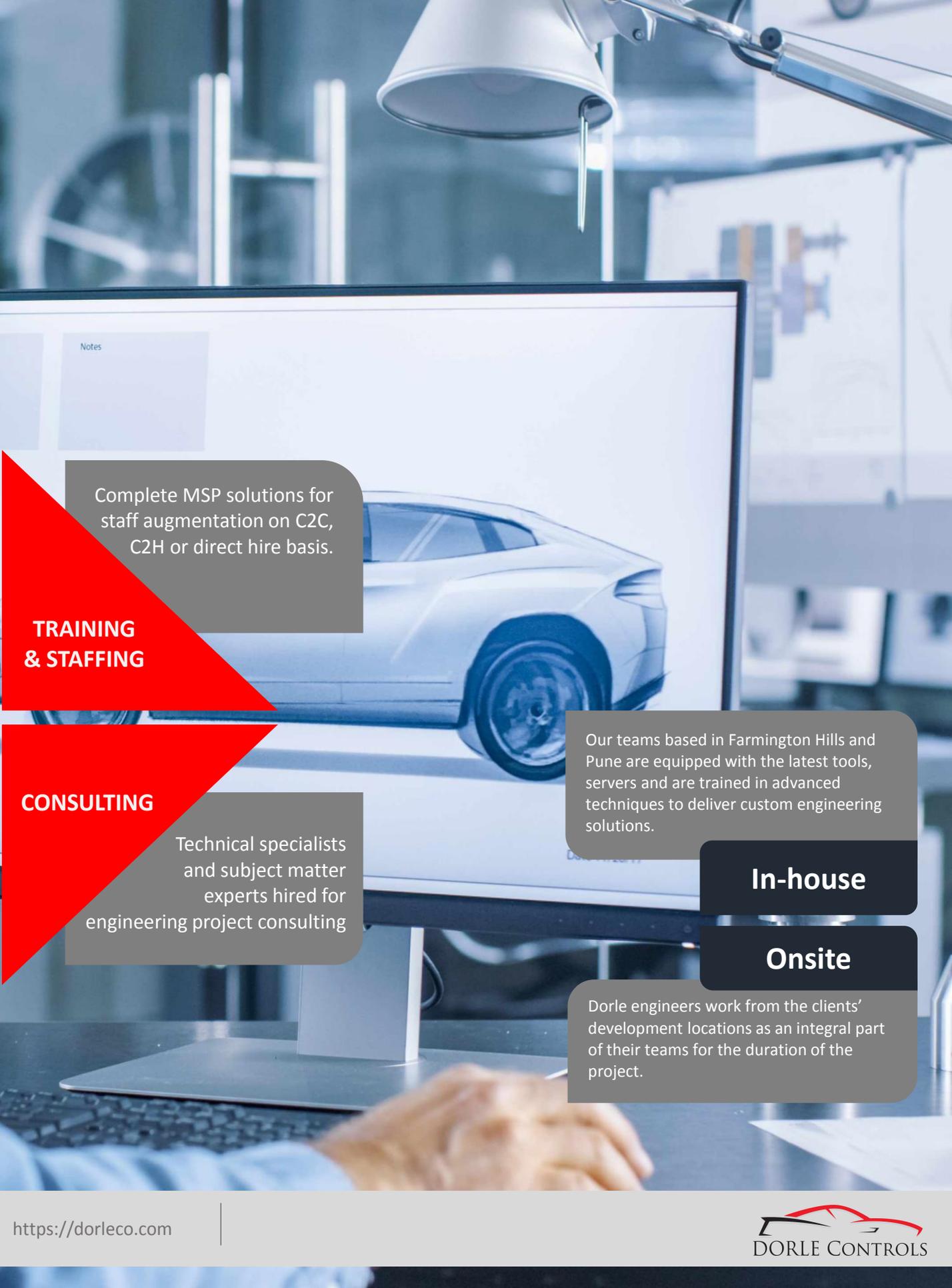
Delivered project based assignments with agile and or V cycle development techniques

**PROJECT
BASED**

Onsite engineering resources to be hired on an yearly basis. We take care of their employment needs viz; admin, immigration, logistics, etc.

**TIME
BASED**

All our standard service packages have their own advantages. With that being said we also offer to mix and match the best in each services in order to customize a service package to maximize the efficacy of the solution for our client's project needs. In many cases, we also design a tailor-made service just to meet our clients' demands.



Complete MSP solutions for staff augmentation on C2C, C2H or direct hire basis.

TRAINING & STAFFING

CONSULTING

Technical specialists and subject matter experts hired for engineering project consulting

Our teams based in Farmington Hills and Pune are equipped with the latest tools, servers and are trained in advanced techniques to deliver custom engineering solutions.

In-house

Onsite

Dorle engineers work from the clients' development locations as an integral part of their teams for the duration of the project.

SUCCESS STORY

Dorle Controls relies on its engineering expertise, made possible by its diverse and talented people. On an average, a Dorle engineer has 12 years of automotive product development experience in his/her domain. They have patents to their name and hold international awards that certify their domain expertise. The deep understanding of technologies in engine systems, transmissions, electrified vehicles, driver assistance systems and vehicle connectivity has proved to be a valuable resource for engineering companies. Dorle's partners get access to this abundant talent pool that can crack the toughest challenges and help find the best technical solutions.

THE CLIENTS WE HELPED:

- ✓ FEV
- ✓ Kinetic Green
- ✓ ZF
- ✓ University of Michigan
- ✓ Mahindra
- ✓ BIV Thailand
- ✓ Cummins
- ✓ AAM

USE CASES

CONSULTING



Developed a physics based simulation model of vehicle, chassis and powertrain for controls design and FE estimation using Simscape / Simulink.

Bottom up component level modeling of engine, transmission, driveline and vehicle dynamics along with idle speed control, shift control and stop-start control were implemented.

The simulation was validated by comparing data and results derived from a datalogger test vehicle. This saved the client from building 10 prototype vehicles.

PROJECT BASED



Developed an alternate fuel control system and software for bus and delivery truck application.

The alternate fuel results in near zero emissions and improve the fuel economy of the vehicle by 5% without any compromise on the performance.

The project was delivered 2 months before the expected delivery date saving 25% of the time and associated development costs.

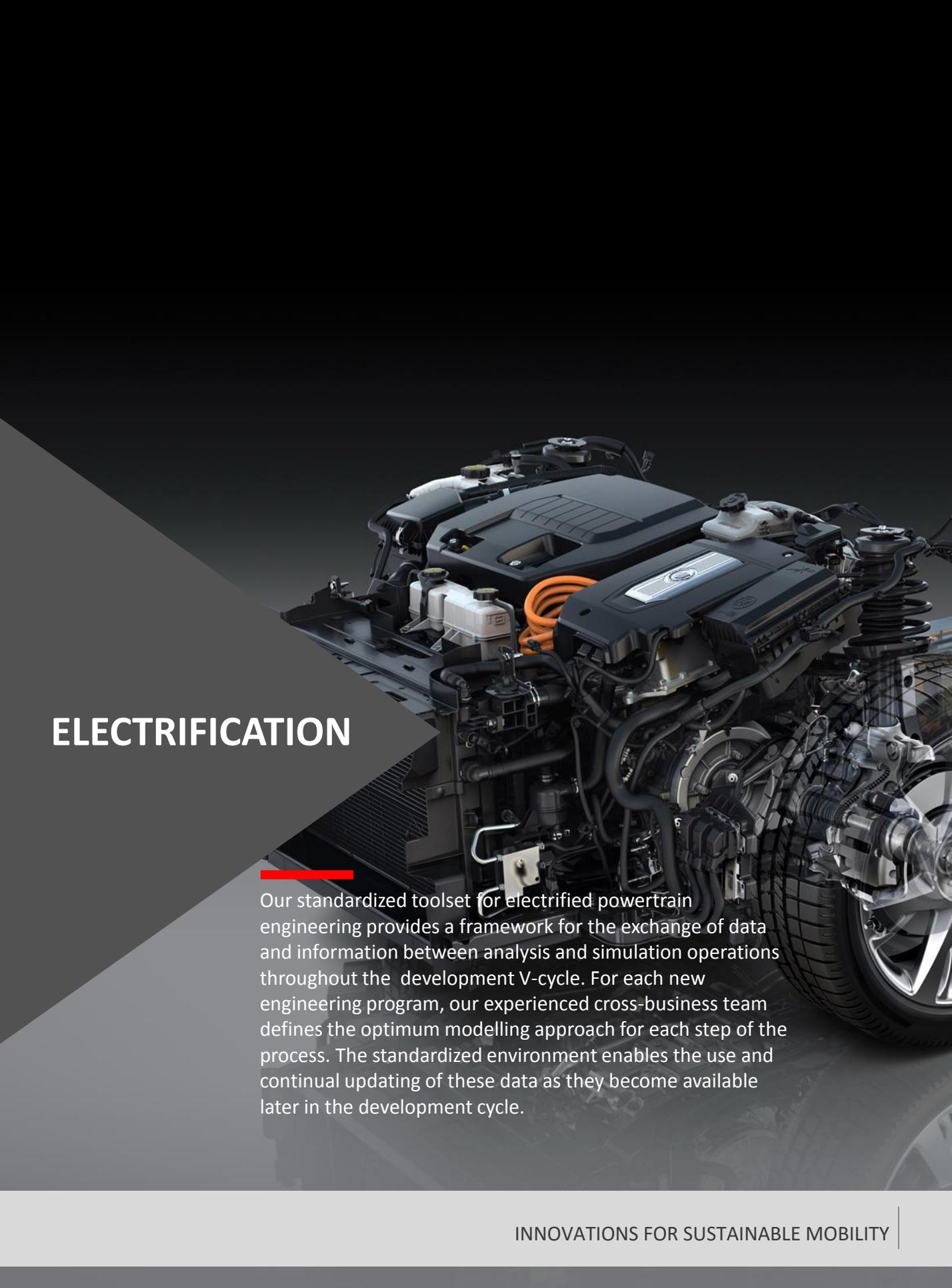
TIME BASED



Developed an automatic transmission line pressure control and drive strategy control strategy for a 10 speed application.

Complete support on requirements generation, physics based modeling for auto-code generation of the controls software, MIL,SIL testing of the software components and validated software release for calibration in vehicle.

The task was completed with 20% fewer resources and within the project timeline to enable the client use the additional time for complex calibration and testing.



ELECTRIFICATION

Our standardized toolset for electrified powertrain engineering provides a framework for the exchange of data and information between analysis and simulation operations throughout the development V-cycle. For each new engineering program, our experienced cross-business team defines the optimum modelling approach for each step of the process. The standardized environment enables the use and continual updating of these data as they become available later in the development cycle.



At Dorle we provide wide range of solutions on electrification as we consider electrification as a fundamental requirement for the future of the automotive industry. Hybridization and electric battery architecture play an instrumental role in passenger as well as commercial applications. The factors that influence the development and application of passenger car powertrain technologies today are more complex than at any time in the history of the automotive industry. Regulatory frameworks in the major international markets are pushing the automotive industry towards a more energy efficient, cleaner and more environmentally sustainable model of transportation.

The increasing electrification of passenger car powertrains – whether through hybridization or substitution with pure battery electric architectures – is essential if US 2025 CAFE and EU targets for 2021 and beyond are to be met. The electrification brings increasing complexity in packaging of the new electrified systems. This will sit alongside a future version of today's combustion engine, which will itself be more complex. A further challenge is with the high-level control systems, which must be calibrated to enable these electrified architectures to deliver a seamless and fully blended experience for the customer.

For an electrified powertrain, many more sub systems are involved to drive the individual functions of a vehicle powertrain, such as acceleration and braking. The functions are delivered by a combination of sub-system behaviors. The product development discipline that exists to supervise and optimize the combination of sub systems for overall powertrain function, is supervisory system engineering. Dorle is active across this area, with the full range of customers, and is supporting the electrification opportunity with research and development in all of the important systems, and in the development of its facilities, people, organization and toolset.

ENGINES

SYSTEMS ENGINEERING

We have an experienced pool of specialist engineers providing designs for full engines systems and individual components. The projects we support range from performance upgrades to complete lifecycle design programs for new production engine families.

PRODUCT DESIGN AND DIGITAL MOCK UP

We offer world-class product design and digital innovation facilities for integration of complete vehicle and engine systems as well as subsystems. We help clients integrate the models for a variety of applications through the optimization of performance, emissions and fuel consumption.

ALTERNATE FUEL ENGINEERING

We provide alternate fuel system development support including the design, simulation, controls and calibration offering expertise in problem identification and resolution, optimization and concept design simulation.

AFTERTREATMENT & INTEGRATION

We provide analysis of catalyst activity to improve aftertreatment systems for all kinds of fuel, including biofuels. We also help clients to integrate engine controls with aftertreatment controls to deliver an optimized system output.

SIMULATION AND CONTROLS

Through our fine engineering resources and perceptive consultation processes, our clients get a foothold in the expanding simulation engineering. Using a wide range of CAD and CAE analysis and controls tools, we offer:

- Engine performance modelling
- Mechanical system analysis
- Structural finite element analysis
- Thermal management
- Physics based modeling and controls
- Controls feature development
- Algorithm design
- Embedded software
- AUTOSAR BSW



CALIBRATION

From initial design to comprehensive production calibrations, we prepare engines for the markets in full accordance with relevant legislation. We calibrate engines that use conventional fuels as well as hybrid and biofuel.

IT ALL STARTED WITH η _{engine}

Powertrain control systems for higher efficiency was the expertise upon which the Dorle group was founded. Today, our clients lead the way in engine technology, with our help in areas ranging from design , integration, simulation, controls, CAE and testing across petroleum, diesel and emerging biofuel and gas engine technologies.

TRANSMISSION & DRIVETRAIN

PRODUCT DESIGN & INTEGRATION

Our engineers work closely with clients on concept studies, upgrades, clean-sheet designs and demonstrator programs to design, develop, integrate and validate products.

ELECTRONIC CONTROL SYSTEMS

Modern transmissions require increasing levels of electronic control and calibration to boost performance and fuel economy. Dorle assists clients by providing system architecture concept studies, transmission control systems software, physics based modeling and embedded solutions. We help our clients from designing a new controller driver software to debugging an existing application software for electronic control systems.

SIMULATION AND ANALYSIS

We rely on strategic use of CAE to optimize designs, investigate and resolve problems, and minimize time and cost to market. We use advanced drivetrain modelling and analysis software that provides the foundation of concept and definitive design for all driveline and transmission projects that we undertake.

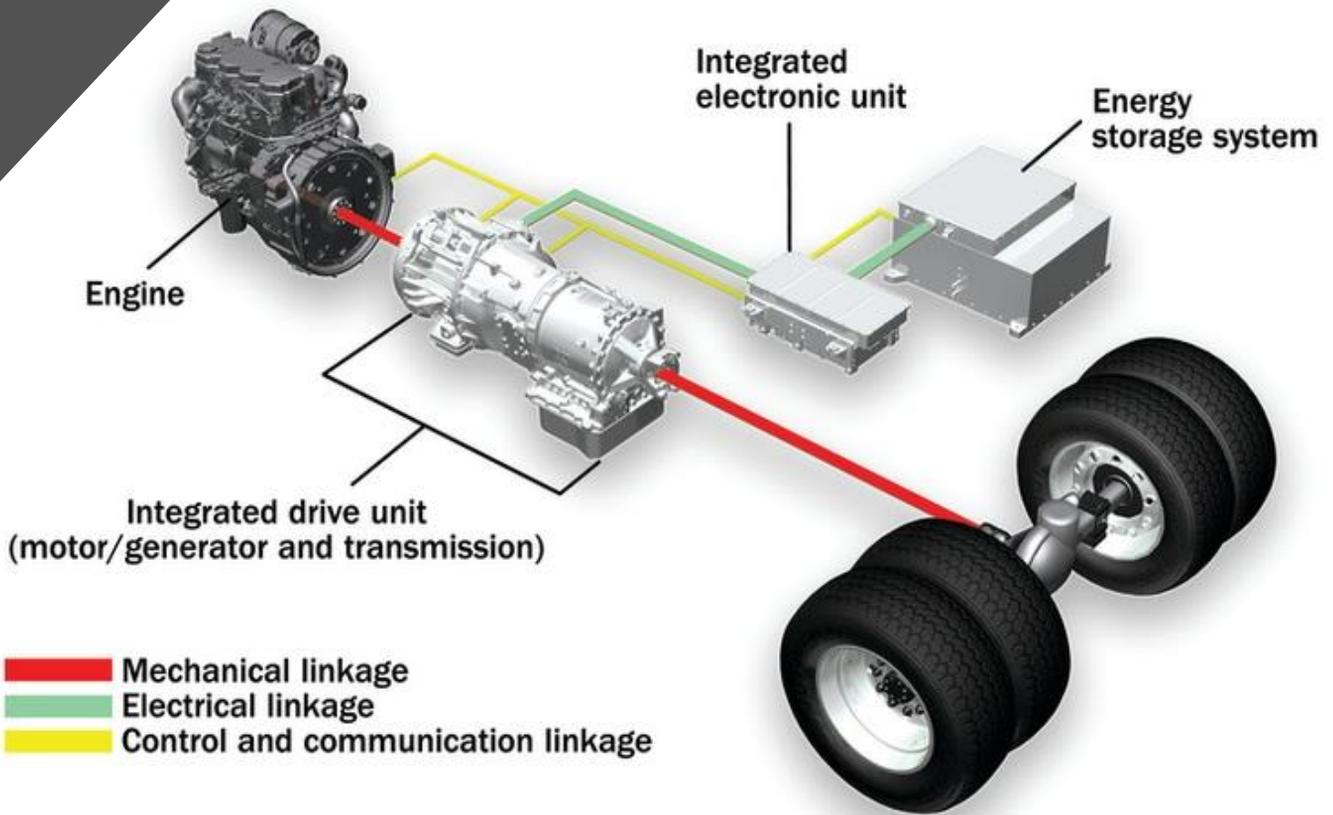
TESTING & VALIDATION

We offer fully supported test plans on our specialized in-house facilities, which include SIL, MIL and HIL test benches. We also provide data loggers for in vehicle testing for real life validation. We tailor each test plan to the requirements of the individual client. Whether it's testing a current product or optimizing product performance and durability during development, we offer a comprehensive plan and a competitive timeframe.

Dorle engineers design, develop and test the control systems for new transmissions and differentials customized for client applications. Our expertise covers a wide range of modern transmission systems and technologies, from conventional transmissions, CVTs, DCTs to electric and hybrid solutions.



HYBRID & EV

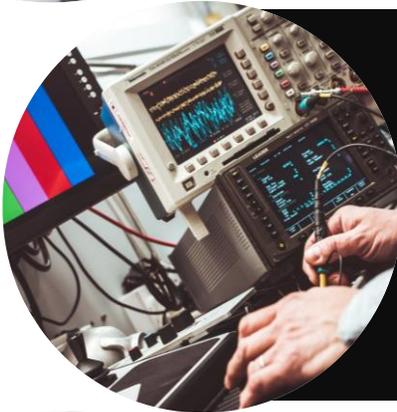


"We have helped to deliver projects in this fast-growing sector, offering extensive prototype controls software design, systems modeling and simulation, production software and calibration and testing on benches and in vehicles".



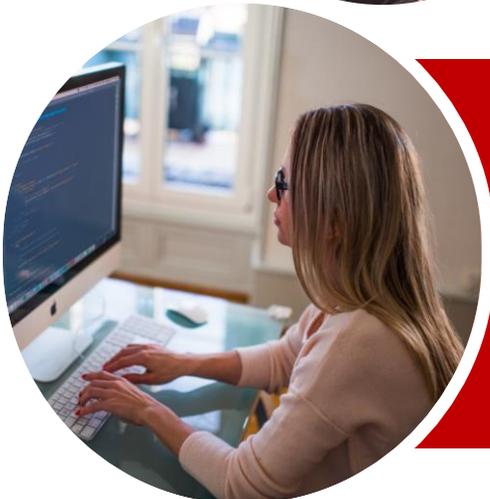
FUNCTIONAL SAFETY

Our engineers are skilled in the application of safety analysis techniques required by safety standards such as ISO 26262 and MISRA, and provide control system software, training, leadership and guidance, and design reviews at all project stages.



TESTING AND VALIDATION

We develop any given propulsion system configuration for hybrid and electric vehicles for characterization and testing of embedded control systems in a virtual environment. High-voltage batteries can be tested at cell, module and pack level on HIL.



SOFTWARE

We use commercially available simulation software tools throughout the development process and can model and analyze any specification of hybrid and electric propulsion system. Dorle's expertise in software development for electronic control systems also includes the latest functional safety techniques, such as ISO 26262.



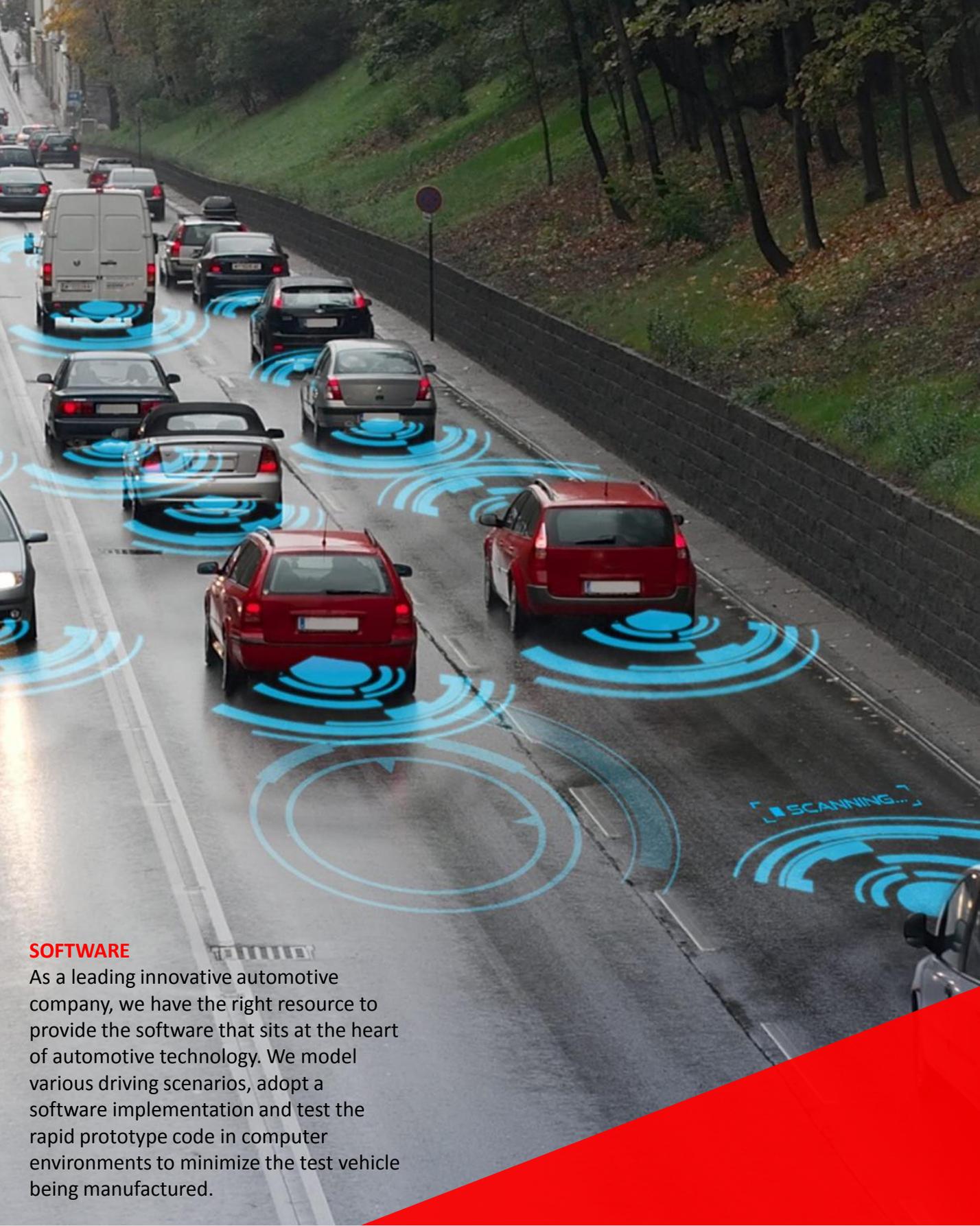
ADAS

AUTONOMOUS VEHICLES

Dorle is at the forefront of this new age, helping clients to develop proven, realistic solutions. Technology driven trends such as autonomous driving, electrification and connected vehicles are transforming business models and supply chains across the automotive sector, with opportunities and implications for the entire market. The use of advanced connectivity can help car makers increase fuel efficiency, by optimizing the route of the vehicle over the complete estimated travel.

SIMULATION AND TESTING

Dorle's multi-faceted team utilizes the latest, custom vehicle-simulation tools to analyze proposed technologies and model how they would behave in real world driving scenarios. Our team is working on a number of new connectivity, platooning and ADAS systems simulation and testing projects at and beyond level 3 in the US to help drive the technology through the early stages.



SOFTWARE

As a leading innovative automotive company, we have the right resource to provide the software that sits at the heart of automotive technology. We model various driving scenarios, adopt a software implementation and test the rapid prototype code in computer environments to minimize the test vehicle being manufactured.

SCANNING...

WHY US

OUR PARTNERS GET:

- ✓ Intuitive, on demand and quality engineering at fingertips.
- ✓ Patents and Award winning individuals
- ✓ Premium services at non-premium prices
- ✓ Reduced go-to-market times
- ✓ Keep niche skills in-house

360-degree controls software development & integration capabilities for electric and autonomous vehicle systems.

OUR USP

NUTS-N-BOLTS

We have designed and integrated complete electric prototype vehicles including mechanical, E/E, thermal and software control systems for 3W, 4W and multi-axle applications.

We collaborate with automotive companies of all shapes and sizes to deliver projects and engineering services focused on sustainable mobility.

ARE WE RIGHT FOR YOU?



LOCATIONS

CORPORATE OFFICE - USA

*28175 Haggerty Road
Novi, MI 48377*

ENGINEERING CENTER - INDIA

*Plot No. 7, Shivaji
Cooperative Housing Society,
SB Road, Pune 411016
Maharashtra, India*

CORPORATE OFFICE - CANADA

*2280 Olympia Dr,
Windsor, Ontario
Canada*




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