

# 36

## Ways a Virtual-First Mindset Accelerates Product Development

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# Why having a **Virtual-First Mindset** Matters

Virtual prototyping enables you to simulate digital representations of products and systems, facilitating the design, testing, and validation of components and systems in areas such as:

- **Product Performance** - Ensuring vehicles and components are safe and structurally sound to survive a variety of conditions.
- **Smart Manufacturing** - Get confidence in your manufacturing processes before you even start.
- **Vibroacoustic Performance** - Addressing the interior and exterior acoustic challenge.
- **Virtual Validation** - Using Virtual Reality technology to explore new product concepts from a worker and operator perspective.

Virtual prototyping offers numerous advantages over traditional physical modelling methods, including reduced development time, enhanced safety, improved product quality, boosted sustainability through reduced physical testing, and enhanced manufacturing efficiency.

In today's market, having a virtual-first mindset will give you with a competitive edge, unlocking the potential for faster innovation and more efficient product launches.

Read on to discover **36 Ways to accelerate your product development.**

## Looking for a shortcut?

**Product Performance Simulation Solutions**



**Vibroacoustic Performance Simulation Solutions**



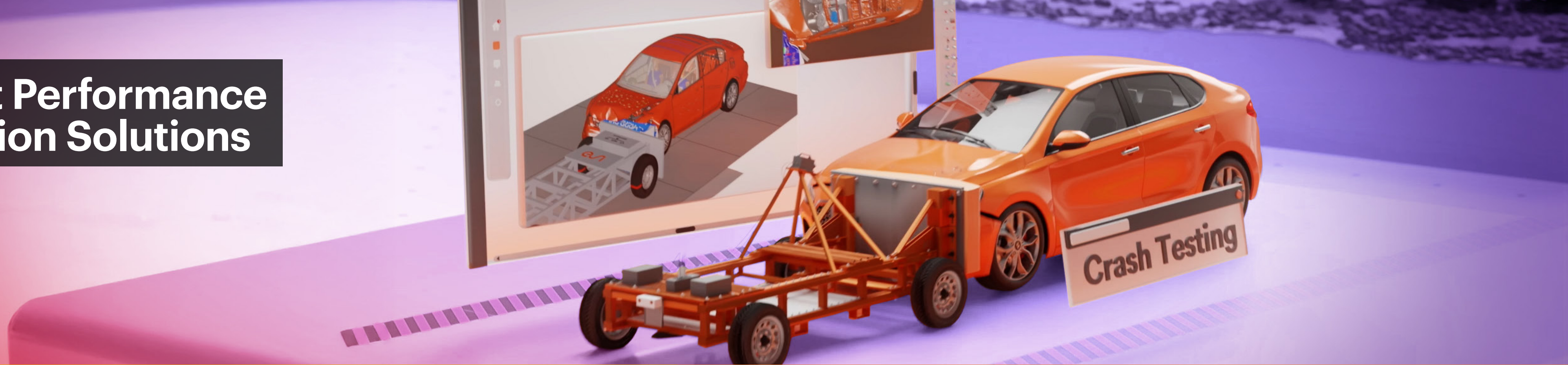
**Smart Manufacturing Simulation Solutions**



**Virtual Validation of Human Centric Processes**



# Product Performance Simulation Solutions



01

Optimize vehicle design to **enhance passenger protection** and help achieve Vision Zero goals.

02

Model and analyze the crashworthiness of vehicle structures and components to **ensure compliance** with safety regulations.

03

Evaluate the strength of components under various dynamic loading conditions to improve both structural integrity and reliability.

04

Analyze **handling, stability, and ride comfort** to enhance the driving experience and meet performance expectations.

05

Optimize the design of **vehicle seats** to maximize passenger comfort and safety while minimizing weight and space requirements.

06

Accurately predict the real-world behaviour and safety integrity of vehicles in their as-manufactured states through the **chaining of performance and manufacturing simulations**.



Airbag Development

## Product Performance Simulation Solutions

07

Assess the potential impact to a vehicle and its battery system due to **exposure to water**, including damage caused by water crossing or internal water ingress.

08

Analyze accurate fluid/structure interaction to **optimize airbag folding and deployment**.

09

Predict **battery safety, energy management, range, and performance** under a variety of conditions.



Environmental Noise

## Vibroacoustic Performance Simulation Solutions

10

Manage interior noise by analyzing the **effectiveness of sound packages** against road, tire, wind, HVAC, and EPWT noise.

11

Comply with **Acoustic Vehicle Alerting Systems (AVAS)**, pass-by noise, and other exterior noise safety regulations.

# Smart Manufacturing Simulation Solutions



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Assess different materials to identify the **optimal combination of strength and weight** that doesn't compromise structural integrity or manufacturability.

15

Optimize casting processes to **reduce trial runs, rework, material waste, and energy consumption.**

13

Accelerate development and innovation by enabling an **iterative design process** so engineers can quickly evaluate and fine-tune multiple design variations.

16

Assist product designers in finding geometries for **sheet metal forming and automotive stamping** that reduce weight and enhance the strength and stiffness of components while ensuring its manufacturability.

14

Optimize the design of **complex cast components - including mega castings** - to achieve the optimal balance of strength, durability, and lightweight properties.

17

Optimize the mechanical properties and strength of **composite structures** such as carbon fiber reinforced polymers (CFRP) and understand how the component will behave under different load conditions.

A car chassis is shown on an assembly line, illuminated by purple and blue lights. Robotic arms are visible in the background. In the foreground, a tablet displays a simulation titled "Joining & Assembly" showing a cross-section of a car part with a color-coded stress or temperature map.

## Smart Manufacturing Simulation Solutions

18

Optimize composite manufacturing processes, such as pre-forming, resin infusion and autoclave curing to reduce production time, minimize waste, and improve efficiency.

20

Understand the thermal effects of the welding process to predict distortions, warping, and thermal-induced stresses.

19

Assess the weldability of different materials including aluminium, high-strength steel, and various alloys so they can be joined/welded effectively without compromising structural integrity.

21

Create a virtual manufacturing process chain, chaining stamping, casting, and composites to welding and assembly reducing lead times and costs for new lightweight designs.



## Virtual Validation of Human-Centric Processes

22

Validate **packaging and space claims** of drive train components, vehicle architecture and topology.

25

Prevent wear, abrasion, or pinching of cables, hoses, or wires during operation when mounted on articulated parts of the vehicle or in areas of consistent vibration or motion.

23

Evaluate and improve cable and wire harness routing with real-time physics for more agile and accurate planning of cable routes and installation paths.

26

Experience the integration of complex systems and components for **maintenance and service tasks**, ensuring proper fit, clearance, and accessibility.

24

**Collaborate virtually** for faster consensus on design changes and improvements and reduce the negative impact of travel.

27

Avoid inadvertent shorts and electrical shocks by ensuring **critical clearances and accessibility**, e.g. of high voltage EV components and tool contact (intentional and unintentional).

# Virtual Validation of Human-Centric Processes



28

Validate assist tooling for assembly and installation of modules like batteries that require human intervention or assistance.

31

Optimize workflow and production line efficiency to reduce assembly time and minimize the risk of rework.

29

Provide an agile environment to discover new repair or replacement methods.

32

Evaluate, resolve, and optimize – from first person PoV - issues of proposed assembly or production workspaces.

30

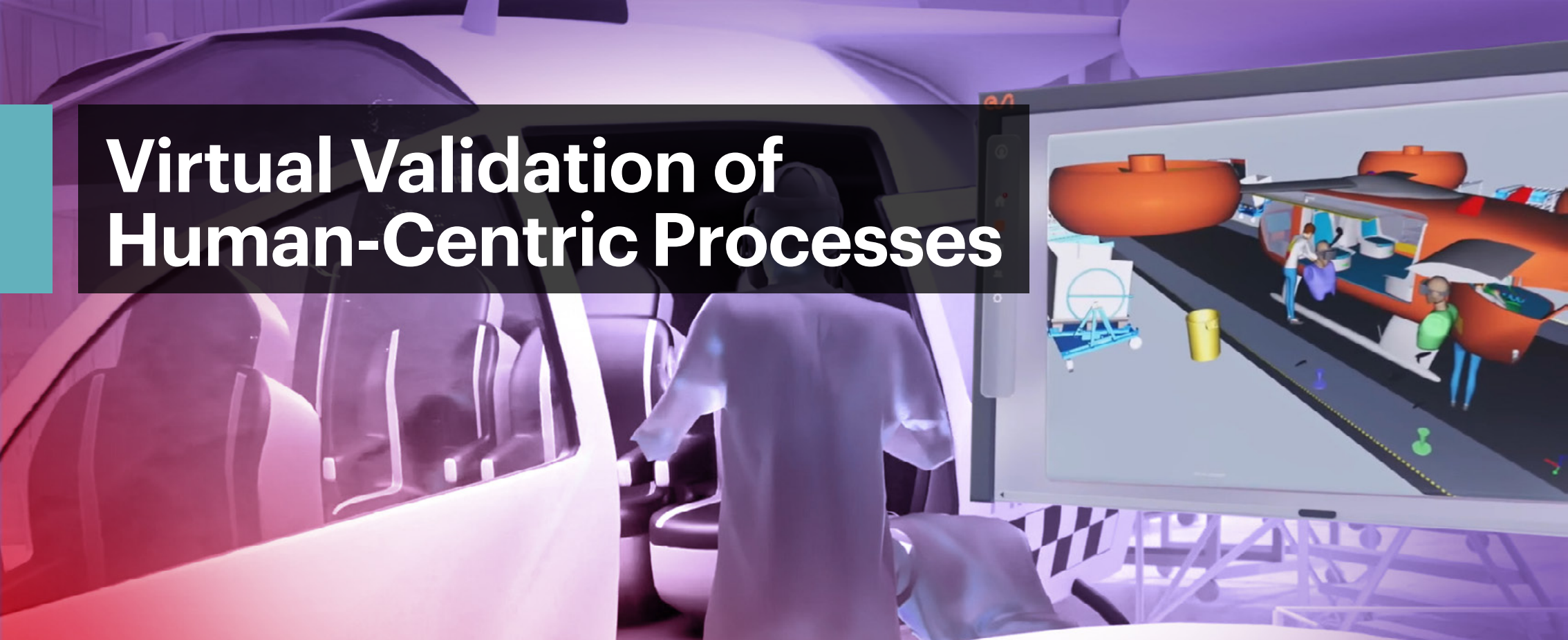
Validate assembly line layout and processes, specific to new and sometimes unique components, materials, and vehicles.

33

Identify and address potential design issues or ergonomic challenges early in the development process, minimizing the need for costly physical prototypes and design iterations.



# Virtual Validation of Human-Centric Processes



Want to know more about using Virtual Prototyping to drive your **product development into the future?**

34

Deliver a virtual environment to improve workforce communication, reduce ramp-up costs, and ensure effective production or service environments.

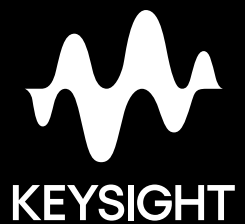
35

Determine, evaluate, and optimize service processes - disassembly, removal, and replacement - through an open exploration in VR.

36

Ensure serviceability, access, and inspectability of unfamiliar parts within unfamiliar vehicle architecture.





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Keysight is an S&P 500 company delivering market-leading design, emulation, and test solutions to help engineers develop and deploy faster, with less risk, throughout the entire product lifecycle.

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