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Ingenuity for life

Siemens Digital Industries Software

Simcenter testing solutions

Driving innovation and productivity
in test-based engineering

[siemens.com/simcentertesting](https://www.siemens.com/simcentertesting)

Testing today's complex products

Simcenter testing solutions help companies drive innovation and productivity in test-based engineering.

Consumers today want increasingly smart, efficient and customized products that can be delivered in a timely manner. We are seeing a new product generation emerge across industries, powered by a spectacular innovation wave, including ever-increasing mechatronics, new lightweight materials and digital technologies like the cloud and the Internet of Things (IoT). This additional complexity is no longer manageable in a traditional, verification-centric development process, so manufacturers are deploying new approaches that enable them to predict product behavior on an individual level over the entire lifecycle, including all multi-physics. Test departments are feeling the effects of this evolution in their work, both in volume and technical content. More than ever, they need innovative testing solutions that help them achieve maximum productivity.

Today's simulation methodologies often lack the realism to deliver prediction-capable models. Yet those models are essential for complex product development or for use in embedded software to enable smart behavior. Test departments play a crucial role in filling the current gaps. This goes way beyond measuring accurate data for standard structural correlation and model updating. Testing allows companies to explore uncharted design territories and build knowledge about new materials and all the additional parameters that come with mechatronic components. This requires specialized, high-precision tools. And it adds an enormous amount of validation work for test departments on top of their standard tasks, which already are performed under growing time pressure. These include prototype validation and certification.

Time is money, especially late in development. Prototypes and testing infrastructure can be costly to use, and any delay at this stage directly impacts the product's market entry. Companies dictate extremely tight schedules and fear discovering defects that lead to late repairs and recurrent prototyping. Yet this step is indispensable for any product to go into operation. And with increasing product complexity, including after-delivery updates, the share of work in this area can be expected to grow, including many more product variations, parameters, operating points, etc. Therefore, test departments need solutions that can effectively handle projects of any scale and provide immediate and profound insight into product behavior.

Simcenter™ testing solutions help companies drive innovation and productivity in test-based engineering. Simcenter testing solutions combine high-end data acquisition hardware with powerful analysis software to help engineers execute their test campaigns first-time-right, no matter the scale or complexity. Based on embedded industry expertise and an application-oriented approach, Simcenter testing solutions provide more insight in less time. As part of the broader Simcenter portfolio, Simcenter testing tightly integrates with numerous simulation solutions, facilitating collaboration between departments and helping companies deliver innovation faster and with greater confidence.

Simcenter solutions and services integrate physical testing with virtual simulation to form a winning combination for performance engineering of innovative products.

Innovate smart products despite tight schedules

Deliver on brand promise

Gain critical insights

- Diagnose problems quickly
- Analyze the root cause
- Perform what-if iterations
- Understand complex designs

Handle uncertainty

Combine test and simulation

- Verify and validate models
- Correlate test and simulation
- Increase modeling accuracy with test data
- Embed simulation into testing

Balance performance

Unify testing and analysis

- Combine separate tests into a single campaign
- Perform multidisciplinary analysis
- Balance key performance attributes

Reduce time-to-market

Focus on productivity

- Accelerate test preparation
- Automate test execution
- Validate on the spot
- Streamline repetitive analysis

Enhance processes

Standardize on one platform

- Integrate all tasks end-to-end
- Cover standard tests as well as advanced engineering
- Perform lab, mobile and autonomous testing

Facilitate globalization

Support collaboration

- Capture and automate corporate testing procedures
- Support testing teams worldwide
- Manage test data and integrate with product lifecycle management (PLM)



Your versatile partner for test-based engineering

Multidisciplinary test-based performance engineering

Simcenter testing solutions help companies certify products and validate the performance of physical prototypes. Our integrated and scalable solutions cross several engineering disciplines to tackle the most demanding acoustic, vibration and durability testing requirements.

Data collection, analytics and modeling software

Simcenter Testlab™ software combines data collection, analytics and modeling into a single software suite. It is the ideal tool for future-focused testing departments: offering the right balance between ease-of-use and engineering flexibility and closing the loop with simulation. Using Simcenter Testlab increases productivity and delivers more reliable results, even when the number of prototypes is dramatically reduced.

Powerful and versatile data acquisition

Simcenter SCADAS™ hardware is multi-physics data acquisition hardware to get the testing job done right the first time: in the lab, on the track or in the field. Its flexibility, performance and precision make Simcenter SCADAS an excellent choice for a wide range of applications. It seamlessly integrates with our software for accelerated test setup and correctly formatted results.

Industry expertise

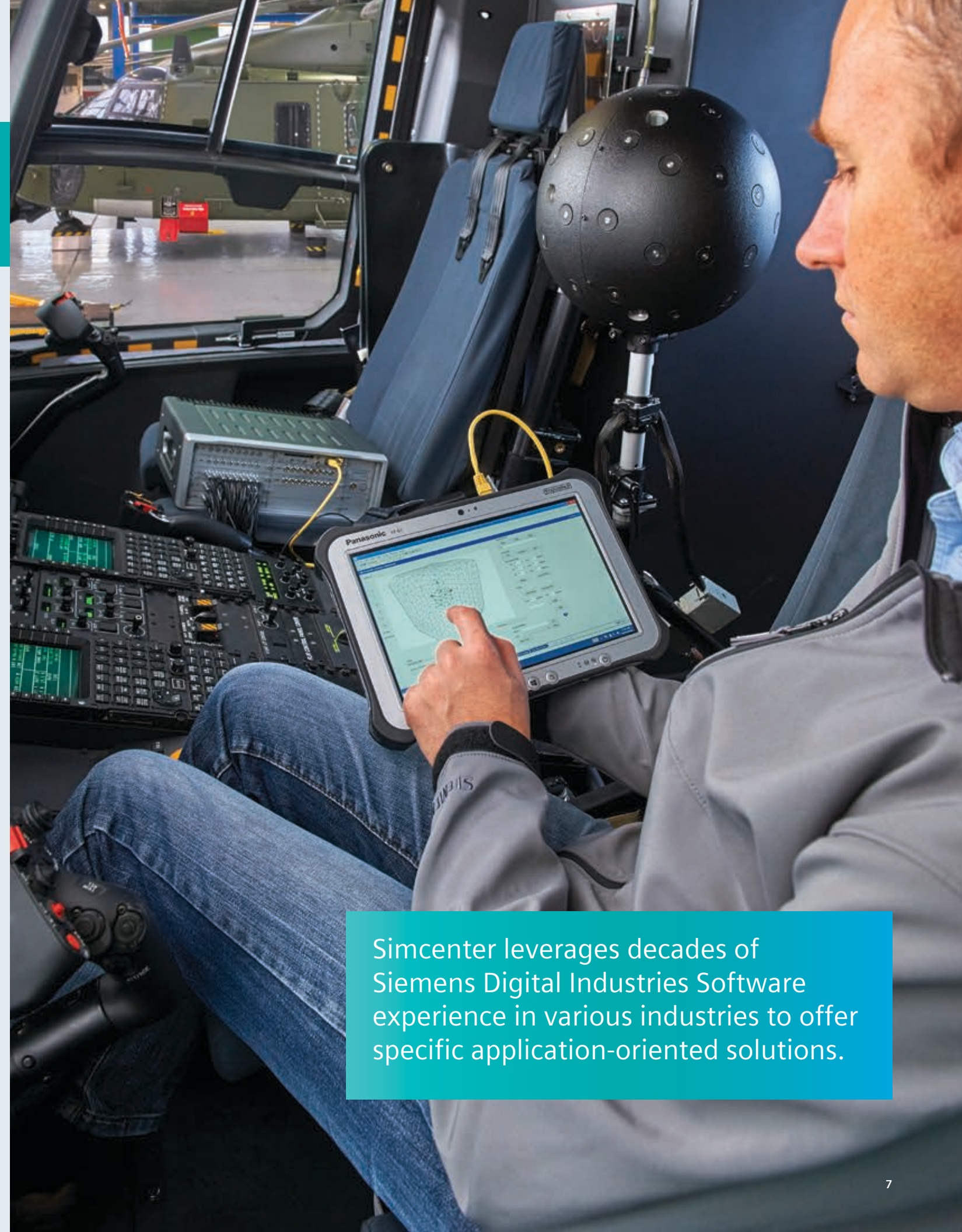
Simcenter leverages decades of Siemens Digital Industries Software experience in various industries to offer specific application-oriented solutions. These help companies effectively add value to their physical testing processes. This access to dedicated tools enables engineering departments to remain connected to the latest technologies at the pace their product development requires.

Engineering and consulting services

With Simcenter, you can engage in scalable projects with a versatile and talented team of engineering experts. Companies get in touch with us to extend their capabilities, solve problems or integrate test and simulation. Our specialists help to evaluate design options, balance conflicting performance requirements and innovate their engineering processes.

Dedicated support

Becoming a Simcenter customer means more than purchasing world-class solutions; it opens the door to a wealth of engineering proficiency. The mission of the Simcenter dedicated support engineers (DSE) is to proactively help our customers who will gain maximum value from their investment in our technologies.



Simcenter leverages decades of Siemens Digital Industries Software experience in various industries to offer specific application-oriented solutions.

Covering a wide range of disciplines



Acoustics

A compelling acoustic signature and quality are essential to innovative design. Sounds play a critical role in conveying the right message about a product's features and functionality. Simcenter testing covers a broad range of industry applications and acoustic engineering tasks, and follows the latest international standards to design, verify and validate your product's sound.



Rotating machinery

Rotating machinery testing is essential for optimizing performance and fuel efficiency while preserving reliability and low noise levels. Simcenter testing simplifies the acquisition and analysis of the speed, torque and control strategy impact on sound quality, (torsional) vibrations and energy efficiency. Using Simcenter testing saves time, increases data reliability and augments insight.



Structural dynamics

Modal analysis is key to exploring solutions for structural weaknesses with simple impact testing, large-scale modal surveys or validating 3D finite element models with experimental data. Simcenter testing solutions include state-of-the-art modal parameter identification methods that help engineers focus on the problem's root cause with extremely reduced lead time.



Transfer path analysis

Transfer path analysis (TPA) allows quantifying and modeling energy sources and paths, revealing the most important ones to ultimately optimize the noise, vibration and harshness (NVH) performance of systems at given receiver locations. The Simcenter testing solutions workflow-based setup helps engineers trace the root cause of NVH issues by guiding them through complex TPA techniques.



Durability

Durability testing is needed to deliver long-lasting designs. Acquiring and analyzing load data is key to optimizing material strength and fatigue performance. Simcenter testing integrates rugged and reliable data acquisition hardware with comprehensive data collection and analysis software, guiding engineers through the complete testing process. This results in reduced time, increased confidence and fewer errors.



Analytics and collaboration

As the amount of data from physical and virtual testing campaigns continuously grows, it's crucial to organize and keep track using analytics and collaboration. Simcenter testing allows you to quickly and easily convert, visualize, interpret, compare, analyze, report and share data. Our solutions embed application-specific knowledge for enhanced ease-of-use.



Dynamic environmental testing

Dynamic environmental testing uses realistic boundary conditions to investigate the dynamic behavior of products subject to loading such as shocks during transportation, vibrations during operation, extreme launch conditions and more. Simcenter testing includes a full solution, from routine vibration qualification tools to effective, high-speed, multi-channel, closed-loop-controlled shaker systems with parallel data acquisition and powerful analysis capabilities.



Model-based system testing

Model-based system testing embeds simulation in physical testing to accelerate system testing at any development stage of the model-based development process. Simcenter testing enables performance evaluation using virtual models, combined virtual-physical models and physical prototypes. This increases consistency between simulated and tested analyses, allows immediate comparison of results by correlation analysis and leads to more accurate, realistic simulation models.

Data collection, analytics and modeling

Simcenter Testlab combines data collection, analytics and modeling into a single software suite for multidisciplinary, test-based performance engineering. It is designed to make individual users and complete teams more efficient. Simcenter Testlab is an excellent software for future-focused testing departments, offering the right balance between ease-of-use, engineering flexibility and closing the loop with simulation. Simcenter Testlab significantly increases a test facility's productivity, delivering more reliable results, even when the availability of prototypes is dramatically reduced.

Speed up data collection

- Accelerate test preparation
- Introduce standardized tests in advanced engineering
- Validate acquired data immediately and reduce costly testing time

Convert measurements to insights

- Carry out interactive and automated multidisciplinary analytics
- Identify the root cause and compare two datasets promptly
- Share your insights and reports easily

Connect to simulation

- Provide simulation with real-life loads and models
- Correlate simulation and test results on the spot
- Embed simulation models in the test setup



“We benefit from almost all the implemented functionalities of Simcenter Testlab, and despite being advanced users, we still appreciate the easy-to-use worksheets and intuitive workflow approach.”

Yoni Meyer
Test Engineer
UTAC CERAM



Multi-physics data acquisition

Simcenter SCADAS hardware helps engineers increase productivity by delivering the data quality and format required to get the job done right the first time, for a wide range of analog and digital sensors. The range of Simcenter SCADAS hardware includes handheld solutions, compact and portable mobile units, autonomous smart recorders and high-channel-count laboratory data acquisition systems.

The flexibility, performance and precision of Simcenter SCADAS hardware makes it an excellent choice for a wide range of multi-physics measurement applications, at any scale in the lab or field. All Simcenter SCADAS hardware is optimally tuned for acoustic, vibration and durability engineering, and is seamlessly integrated with Simcenter Testlab for accelerated test setup and correctly formatted results. It represents a secure investment that can easily be extended to the scale of your measurement requirements.

Flexibly fitting industry needs

- Handheld, mobile, autonomous and laboratory solutions
- Universal modules to optimize investments
- Mix-and-match mobile and laboratory configurations

Superior precision and data quality

- State-of-the-art signal-to-noise and dynamic range
- Ultra-low noise floor and highly precise phase match
- Precise time-synchronized data in any configuration

Sheer measurement productivity

- Condition a wide range of analog and digital sensors
- One single system covering multi-physics testing
- Capacity of hundreds of channels at once



Test engineers around the world count on Simcenter SCADAS data acquisition hardware to get the testing job done right the first time in the lab, on the track or in the field.

A future-proof test offering for automotive OEMs and suppliers

Over the last few decades, the variety of vehicle models, motor types, configurations and options per brand has exploded. Car manufacturers have introduced new powertrain architectures, innovated materials and invented functionalities for safety and autonomous driving.

This dramatically increases the validation testing workload, including new tasks that are specific to digital technologies and electric vehicles. Therefore, physical testing continues to play a crucial role during early development, even though a growing number of companies are digitalizing the process.

Electrified vehicle development and testing

Electrifying vehicles impacts vehicle testing teams. The additional battery weight influences vehicle performance, while the absence of a conventional internal combustion engine (ICE) brings new NVH challenges to the surface.

Simcenter testing addresses all important electrified vehicle development (xEV) noise sources, such as e-powertrain noise, road noise and wind noise, and helps you design and optimize the sound of xEV. This end-to-end hardware and software solution helps you successfully balance weight, vehicle NVH, durability and ride and handling. Unique innovations that combine test and simulation help you predict subsystem performance prior to integration and reduce overall development time.

Complete and efficient vehicle NVH testing suite with direct link to simulation

In a rapidly evolving automotive industry and with growing vehicle complexity, original equipment manufacturers (OEMs) and suppliers need additional focus on performance prediction and control over development time. The increasing amount of testing work requires a growing amount of integration with simulation, efficiency and automation. Simcenter testing solutions prioritize efficiency as well as a seamless connection with Simcenter computer-aided engineering (CAE) and system simulation solutions.

End-to-end solution for vehicle durability testing

Durability testing is a substantial task, yet essential to durable vehicle design. Testing teams are continuously pressured to do more work in less time.

Simcenter testing includes innovative tools for extremely time-efficient data acquisition, processing and reporting. This one-stop testing solution covers all durability testing profiles for both road and dedicated test rigs.

Powertrain NVH testing

Current powertrain development is often driven by energy efficiency. This has led to downsized engines and increased electrification. It requires innovative testing methodologies and processes to deal with this complexity, while being continuously under time pressure.

Simcenter testing helps you optimally balance powertrain NVH and fuel efficiency and supports your company with the new challenges that come with electrification. Smart testing, automation and the unique combination of test and simulation strongly boost efficiency.

Simcenter testing covers the following key automotive applications:

- Engine noise and vibration testing
- Gear whine and rattle testing
- Brake squeal testing
- Driveline sensitivity testing
- Noise source identification
- Sound power testing
- Acoustic intensity mapping
- Noise source ranking
- Interior noise assessment
- Sound quality testing
- Pass-by noise testing
- Torsional vibration measurements
- Acoustic material testing
- Active sound design
- Aero-acoustic wind tunnel testing
- Transfer path analysis
- Operational deflection shapes
- Modal testing and analysis
- Operational modal testing and analysis
- Component vibration qualification testing
- Full system and component durability testing
- Road load data acquisition
- Load data analysis
- Accelerated testing
- Experimental fatigue life prediction
- Model-based system testing



High-end testing solutions for aviation and space industries

Innovations in material engineering and digital technologies for structures, system performance and lifecycle management are disrupting aviation and space industries. These target improved efficiency, mission range and lifetime without compromising safety and reliability. New players approach the market with different business models and processes, putting established OEMs under pressure.

Consequently, certification testing takes place under ever tighter schedules and includes more complexity, while the new technologies require lots of additional validation work.

Power and precision for aircraft performance testing

Integration challenges complicate aircraft performance engineering. For example, to study the risk of flutter or acoustic cabin comfort, OEMs need to use validated dynamic models to understand the structural behavior of all subsystems. This requires versatile testing tools that can gather accurate information on myriad types of components, materials, boundary conditions and more, and seamlessly connect to simulation.

Additionally, during certification, engineers need dedicated, productive solutions that can guide them through enormous standardized campaigns in minimum time.

High-speed throughput for jet engine testing

Jet engine reliability and performance testing is mandatory for certification and is expensive and extremely demanding. When measuring the full engine or larger subassemblies, cabling becomes complex and instrumentation is typically subject to extreme conditions. Therefore, testing solutions need to guarantee a safe operation, yielding useful data from the first time.

This requires high-quality equipment that can continuously record and monitor numerous channels simultaneously and process an enormous and continuous data stream from various sensor types at high sampling rates over a period of days.

Securely testing precious structures

Particularly in space industries, for qualification or acceptance testing there is often no option to using the real spacecraft or satellite. Verifying if these usually large, expensive and delicate structures will, for example, survive launch conditions, requires precautions.

Test engineers need performant solutions that combine a high-channel count with capabilities to accurately replicate acoustic or mechanical boundary conditions and include a reliable closed-loop control that prevents them from damaging the structure.

Pioneering aviation and space testing
Simcenter testing leverages decades of top-notch aviation and space engineering proficiency to deliver a versatile set of solutions to OEMs that are fit for any application. Simcenter testing combines ultra-large-scale testing capabilities with dedicated features for advanced applications and embedded industry expertise to achieve increased productivity during standardized certification tests.

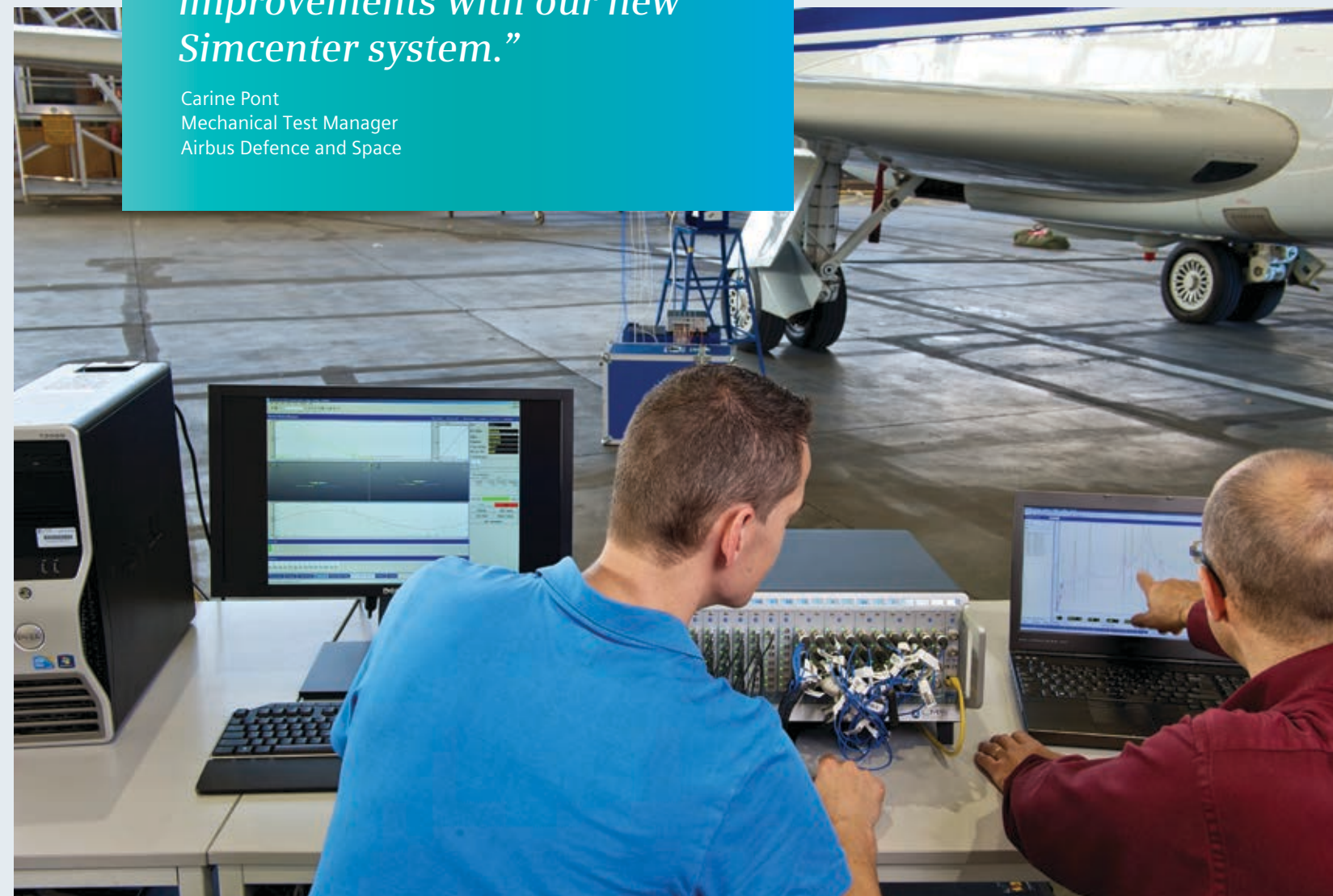
Simcenter is an open platform that facilitates collaboration between teams and connects to simulation for correlation analysis and updating, test planning and calculating results of physical types or on locations that cannot be measured directly.

Simcenter testing solutions cover the following key applications for aviation and space:

- Ground vibration testing
- Sound source localization
- Experimental modal analysis
- Jet engine testing
- In-flight testing
- High-channel count data acquisition
- Closed-loop acoustic control
- Dynamic environmental testing

“We can easily see a factor of 10 in terms of timesaving improvements with our new Simcenter system.”

Carine Pont
Mechanical Test Manager
Airbus Defence and Space



Flexible solutions that apply to any manufacturing industry

Evolving trends such as product and process digitalization, the introduction of new materials and smart functionalities, mass customization and the growing importance of systems engineering are taking hold in all manufacturing industries. Oftentimes, these new methodologies/materials are used in performance areas such as vibration, noise, efficiency, service life and more. Only the targeted balance between them is application-dependent and differs between various industry segments.

For example, heavy equipment needs to operate in harsh conditions and have the ability to deliver peak power, so the fact there is a direct relation between efficiency and operational cost is vital. Then there are regulations regarding noise. White goods and home appliances must operate quietly and efficiently; the sound

from speakers and mobile phones must be clear and well oriented. For industrial machinery and certain medical devices, vibrations should not affect precision. Companies in the energy and utilities industry count on efficient and uninterrupted operation, while respecting environmental legislation. And in marine industries, different priorities apply for manufacturers of cargo vessels and luxury yachts.

With Simcenter testing, manufacturers can find the right applications to address their concerns. Partners around the globe and across industries value Simcenter testing for combining versatility with scalable solution depth and embedded engineering expertise.



“Simcenter helps us set up quick and reliable component tests with minimal effort. All necessary functions are integrated within one software solution, making data conversion unnecessary.”

Matthias Patalong
Development Engineer
Hilti Competence Center for Health & Safety Technologies



Combining skills and experience in engineering and consulting services

Offering a scalable partnering model

Get support during any stage of the product development cycle, from the smallest outsourcing tasks to full program management.

Sharing application know-how

Get help for all possible cross-attribute challenges from a team of more than 250 experts with decades of industry-specific experience and multidisciplinary know-how.

Transferring technology

Achieve technical superiority by having your engineers trained as part of a product development project or a pure technology transfer program. When the work is done, your engineers will be able to adopt our innovative methodologies as part of their standard design process.

Providing global testing facilities

Get access to our high tech prototype testing facilities worldwide. Those include in-house structural testing labs, anechoic and reverberant rooms and NVH/durability test benches equipped with multiple multi-channel mobile and laboratory testing and analysis systems.

Integrating test and simulation

Get familiar with our approach that combines test and simulation to help you front-load design decisions, accurately assess multiple design concepts and make objective performance-related architectural choices.



Siemens Digital Industries Software uniquely combines experience, skills and application know-how to help customers optimize complex product designs and improve processes.

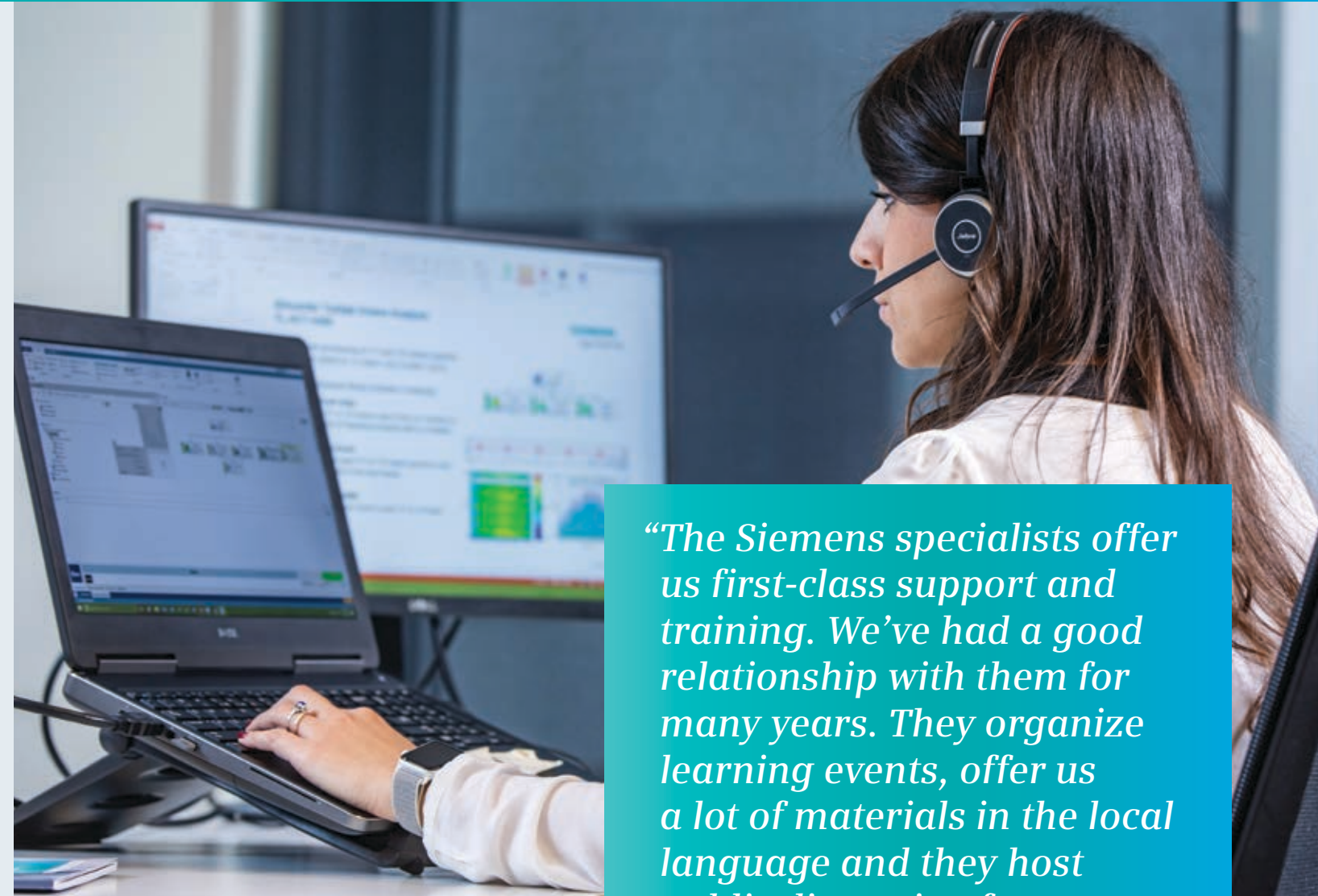
Maximizing engineering value with customer support

To deliver true engineering innovation in a productive manner, companies need to maximize the effective use of their advanced systems. Therefore, it becomes increasingly important to master various engineering and physics disciplines simultaneously as product complexity rises: Domain specialists can no longer work in isolated silos. On the contrary, these engineers need to be surrounded by professionals who have competencies outside their area of expertise with ready access to a global community of test and simulation engineers and individualized customer support.

At Siemens, becoming a Simcenter customer means more than purchasing world-class solutions; it opens the door to a wealth of engineering proficiency. Our technology is backed by a global team of experts dedicated to helping our customers' engineering departments meet the challenges of their industry and exceed the expectations of their market – ultimately leading to success.

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The mission of the Simcenter DSEs is to proactively help our customers who will gain maximum value from their investment in our technologies. The Simcenter DSEs achieve this by building a relationship with their customers, understanding their technical challenges and business goals and providing personalized, detailed technical guidance. By maintaining a continual proactive dialogue with our customers, we aim to identify their test and simulation engineering issues before they happen and provide immediate resolutions if they do occur. Our global team of highly-skilled engineers can quickly provide customers' engineering departments with an appropriate local expert in order to deliver top-quality engineering analysis on time, every time. Simcenter DSEs help customers solve more than just technical problems; they help them keep their business ahead of the competition.



“The Siemens specialists offer us first-class support and training. We’ve had a good relationship with them for many years. They organize learning events, offer us a lot of materials in the local language and they host public discussion forums where more than a thousand professionals exchange ideas.”

Liu Erbao
Director, Body NVH Engineering
Great Wall Motor

About Siemens Digital Industries Software

Siemens Digital Industries Software is driving transformation to enable a digital enterprise where engineering, manufacturing and electronics design meet tomorrow. Our solutions help companies of all sizes create and leverage digital twins that provide organizations with new insights, opportunities and levels of automation to drive innovation. For more information on Siemens Digital Industries Software products and services, visit [siemens.com/software](https://www.siemens.com/software) or follow us on [LinkedIn](#), [Twitter](#), [Facebook](#) and [Instagram](#). Siemens Digital Industries Software – Where today meets tomorrow.

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