SIEMENS

LMS Test.Lab

Powering testing productivity

LMS Test.Lab

An unrivaled suite for test-based engineering

The pressure is on. Whether you are a vibro-acoustics expert for a large aerospace company or a one-person testing department at a white goods manufacturer, today's market circumstances require creative problem-solving when it comes to product testing. The rules have changed: products must be all-encompassing. Consumers want products with personality that offer uncompromising quality, are ecologically friendly and will have a long life span, all without paying a fortune.

Today, as the world of engineering goes digital, noise and vibration engineers are also challenged to do more with less and work more upfront in the design process. Long gone are the days when you could simply add some damping insulation to mask a disturbing noise. This is where LMS Test.Lab™ software comes in. Designed to make testing more convenient and efficient, LMS Test.Lab is the solution that testing departments count on to increase test productivity while maintaining the utmost quality, ultimately achieving a higher return-on-investment (ROI) from existing testing facilities.

The integrated solution for durability, noise and vibration testing

LMS Test.Lab is a complete, integrated solution for test-based engineering, combining high-speed multi-channel data acquisition with a full suite of integrated testing, analysis and report-generation tools. LMS Test.Lab is the ideal tool for testing departments that need to be future focused: offering the right balance between ease-of-use and functional flexibility. Using LMS Test.Lab significantly increases a test facility's productivity, delivering more reliable results even when the availability of prototypes is dramatically reduced.

A complete portfolio for durability, noise and vibration testing

LMS Test.Lab offers a complete portfolio for durability, noise and vibration testing, including solutions for acoustic, rotating machinery, structural dynamics testing, environmental testing, vibration control, durability acquisition, reporting and data management. With its unified interface and seamless data-sharing capability between applications, LMS Test.Lab offers users tremendous efficiency gains with the added benefit of real ease-of-use. The LMS Test.Lab solution can handle standard, repetitive tests as well as more advanced troubleshooting in a single software and hardware package. This guarantees maximum scalability and optimal investment protection.

Built-in productivity

With its unique workflow-based interface, LMS Test.Lab sets new standards for ease-of-use, productivity and data consistency. The software naturally follows the test campaign process, guiding the user through the different steps and suggesting optimal settings for measurement and analysis parameters. Engineers appreciate the streamlined integration of

LMS Test.Lab and the LMS SCADAS™ hardware family. With a single hardware and software platform, users can cover all laboratory and in-field tests as well as recorder-based testing jobs. Embedded analysis during data acquisition speeds up the testing process and guarantees the right data right from the start.

Right to the source of noise and vibration issues

Using LMS Test.Lab wastes no time with trial-and-error troubleshooting. LMS Test.Lab guides users directly to the source of the problem using comprehensive, integrated analysis capabilities and the unique LMS™ source-transmitter-receiver methodology. Users of all levels can trace the fundamental cause of a problem and solve it efficiently, cost-effectively and quickly.

Adapting to the changing world of testing

Virtual models have no value unless they accurately represent real life. This requires high-quality modeling techniques and accurate load data. By testing existing components and benchmarking competitive products for target setting

purposes, LMS Test.Lab is extensively used to front load data into the simulation process. The tool provides loading information and feedback to update virtual models, and is systematically used to provide test-derived component and subassembly models that are too complex to model virtually from scratch. Easy to integrate into LMS Virtual.Lab™ software and LMS Imagine.Lab™ software as well as other simulation packages, LMS Test.Lab provides the critical support to make virtual simulation efficient and realistic.

LMS Test.Lab highlights
- An integrated platform that provides a scalable suite for durability, noise and vibration testing
- Solutions for rotating machinery, structural and acoustic testing, environmental testing, vibration control, durability acquisition, reporting and data management
- A workflow-based user interface for optimal ease-of-use and productivity
- Combines quick visualization, powerful analyses and easy reporting
- Delivers standard qualification testing to advanced troubleshooting and engineering in a single solution
- Complete integration with the LMS SCADAS data acquisition hardware family for mobile, recorder and lab testing
- Protects your investment with future-ready technology and techniques

A complete portfolio of testing solutions

LMS Test.Lab Desktop
LMS Test.Lab Desktop is not just the launch platform of all other LMS Test.Lab applications; it is an essential application for everyone in the organization – management, engineers and technicians – who need to access your work, process data and create reports. Distributed test preparation and postprocessing frees up the expansive test cell and shows the process-centric LMS Test.Lab approach.
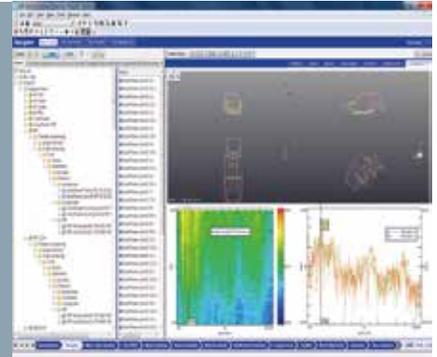
LMS Test.Lab Acoustics
We provide acoustic engineers with a powerful set of highly integrated tools. From the signal conditioning of microphones and interfacing with digital heads to the acquisition of sound power levels, real-time octaves and the latest high-tech tools for sound quality engineering, LMS Test.Lab Acoustics software conforms to the latest international standards and engineering practices.
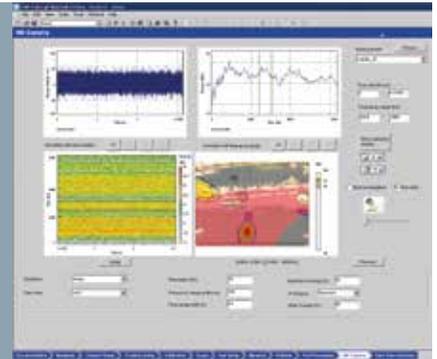
LMS Test.Lab Structures
Structural testing used to be a long and complex process. No longer. With LMS Test.Lab Structures software, technicians can perform large-scale modal surveys in less than a day. LMS is renowned for its modal testing experience – from impact testing of small structures to campaigns using many shakers and hundreds of measurement channels. LMS Test.Lab extends that tradition while LMS Test.Lab Polymax provides a state-of-the-art modal parameter estimator and expert-like automatic modal pole selection (AMPS) – a combination that results in fast and user-independent results.
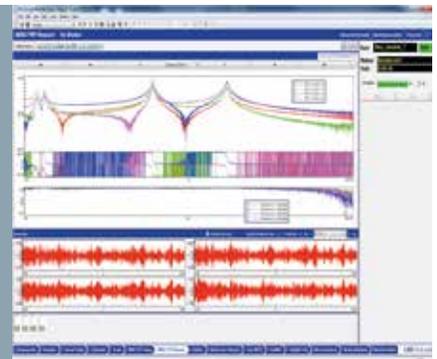
LMS Test.Lab Rotating Machinery
Troubleshooting and product refinement demand a comprehensive array of tools: waterfall mapping to globally characterize the problem; order tracking for an in-depth investigation; time data to experience the sound; a complete set of processing functions, including angle domain processing based on data sampled at fixed angles; specialized modules to help assimilate and visualize the vast amounts of data that are generated. Whether you are measuring with an engine dynamometer (dyno), in a vehicle on the proving ground or in the field near a large turbine, LMS Test.Lab is the efficient, cost-effective choice.

LMS Test.Lab Transfer Path Analysis
LMS Test.Lab is packed with enhanced features that promise to help every test department save time and resources. With the broadest portfolio of transfer path analysis solutions on the market, LMS can help customers tackle issues from every possible angle – from simple systems with a single soft-mounted source to complex structures with multiple and variable mounted sources.
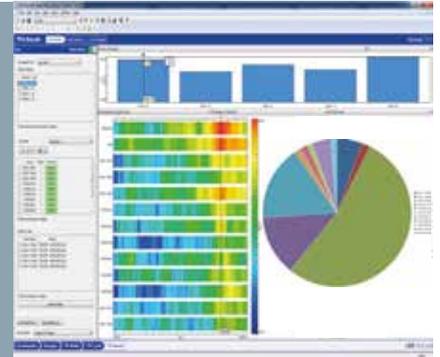
LMS Test.Lab Vibration Control
LMS Test.Lab Vibration Control software is an entry-level vibration control solution with high-end performance. It combines optimal ease-of-use with the performance and reliability of an advanced system. The system offers accurate closed-loop shaker control and maximum built-in safety mechanisms, which minimizes the risks of damaging costly test items. User guidance and secure automation capabilities deliver maximum productivity and enable testing teams to meet critical deadlines.
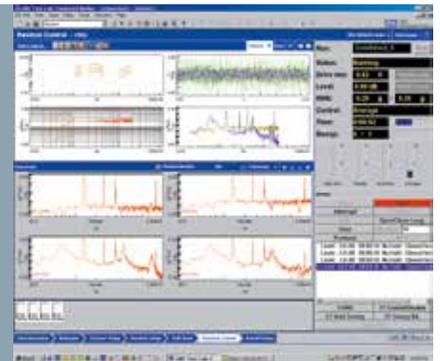
LMS Test.Lab Environmental
LMS Test.Lab brings you the most advanced and complete range of environmental testing solutions on the market – a powerful, high-speed multi-channel vibration control system to measure, monitor and control prelaunch vibration tests on multibillion-euro satellites.
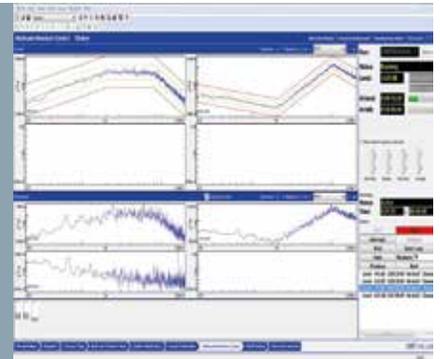
LMS Test.Lab Durability Acquisition
LMS Test.Lab Durability Acquisition software is an integrated, end-to-end solution for road load data acquisition, designed to make testing more efficient and more convenient. From a single software platform, you have complete control of the full load data acquisition process. With its unique workflow-based interface, LMS Test.Lab Durability Acquisition sets new standards for ease-of-use, productivity and data consistency. The software naturally follows the test-campaign process in three basic steps: set up channels; measure and validate; and report and share.
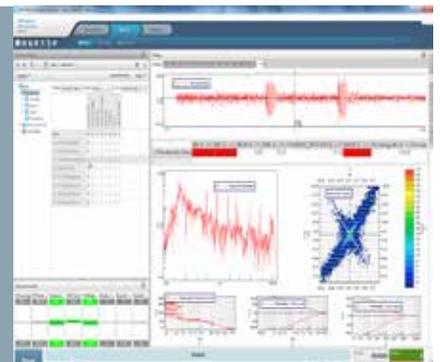
LMS SCADAS

Take your mind off the deadline – focus on the test

Test engineers around the world count on LMS SCADAS systems to deliver the data quality and format required to get the job done right the first time – in the lab, in the field, with a personal computer (PC) or recording autonomously. Add in seamless integration with LMS Test.Lab and LMS™ Test.Xpress software for accelerated measurement setup and correctly formatted results. Then you'll see why the LMS SCADAS system is your tool to deliver reliable results and optimal testing productivity.

LMS SCADAS XS
- A pocket-sized, compact and portable solution
- Accomodates 12+ channels
- Provides 6+ hours of battery autonomy (typical use)
- Set up, monitor and validate on the go
- Replay in full standalone mode
- Use in standalone mode, with a tablet, or with a PC

LMS SCADAS Mobile
- Accommodates 8, 16, 40 or 72 channels in a single frame
- Compact size and low weight for optimal mobility
- Rugged design qualified for rough conditions and high temperatures

LMS SCADAS Recorder
- Enhanced functionality over the LMS SCADAS Mobile hardware
- On-the-spot validation prevents errors and annoying reruns
- Autonomous recording on CompactFlash cards
- Wireless personal digital assistant (PDA) remote control with Bluetooth communication

LMS SCADAS Durability Recorder
- Enhanced functionality over the LMS SCADAS Recorder hardware
- Top performer in tough conditions: water and dust protected
- Vibration-resistant cable connections
- Strain, vibration and displacement measurements in a single measurement module

LMS SCADAS Lab
- Easy 19-inch rack mounting mainframe
- Configurable from 8 to more than 2,000 channels
- Up to 160 input channels in a single frame
- Arbitrary mix-and-match with additional SCADAS Lab/Mobile/ Recorder mainframes
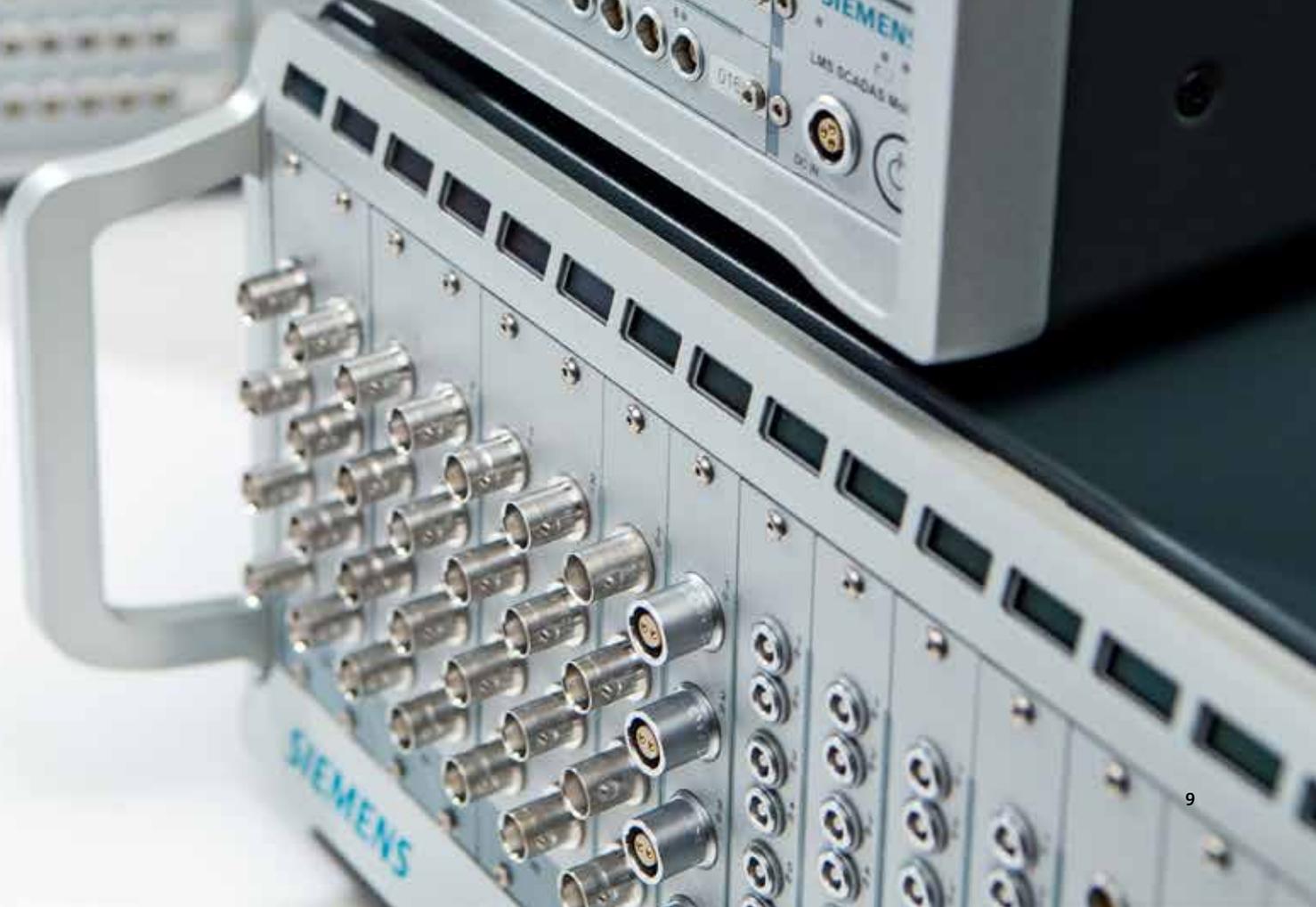
From lab to mobile to portable

LMS SCADAS gets the job done

Your personal testing solution

With solutions specifically designed for in-lab testing, as well as mobile front ends that cover the most challenging field test setups, the LMS SCADAS series already covers a wide range of testing needs. LMS SCADAS XS now adds a truly portable solution to further broaden this successful product range.

There is continuous pressure these days to test products in real-life circumstances and against ever-stricter deadlines. LMS SCADAS XS answers this challenge by allowing on-the-go investigation diagnostics and troubleshooting, even by nonexpert users who need to perform fast and reliable measurements. With its attractive, compact design, LMS SCADAS XS literally fits in your hand. Combined with reliable onboard data storage and a full working day's battery autonomy, it offers test engineers the flexibility they need to take testing efficiency to the next level.

Lab mobility: testing on a whole new level

Using Lab mobility, you can mix-and-match all types of LMS SCADAS systems and connect LMS SCADAS Mobile hardware or LMS SCADAS Recorder directly to your LMS SCADAS Lab hardware unit. You save time by using your LMS SCADAS Mobile to take measurements in the field. And when you return to the lab, all you have to do is connect your LMS SCADAS Mobile to the LMS SCADAS Lab to take more measurements. There's no need to spend valuable time on a new test setup, even on the roller bench or in the anechoic chamber.

On-demand channel and signal conditioning

Lab mobility lets you rethink your lab setup. Install a high-performance LMS SCADAS Lab system for day-to-day testing at each testing station. And supplement that with a selection of LMS SCADAS Mobile units for additional channel capacity and specialty work. Instead of depending on separate systems when you need a few extra channels or special conditioning, just grab your LMS SCADAS Mobile and hook it up for more capacity or more exotic testing.

Simplify your setups

The days when data acquisition hardware solutions only had to collect the data are long gone. The LMS SCADAS systems are real all-in-one multi-taskers that can handle all types of applications. The highly flexible LMS SCADAS hardware features integrated signal conditioning for a variety of transducers, such as strain gauges and accelerometers. The hardware accepts a variety of digital signals, from digital audio to CAN-bus, FlexRay, Global Positioning System (GPS) and digital wheel-force sensors. State-of-the-art synchronization guarantees seamless real-time integration of these signals in the data acquisition process. The LMS SCADAS family also includes a single universal module. With this one flexible module, you can take all types of noise, vibration and durability measurements. There is no need for separate devices.

No limits to what you can do

More channels at higher rates translates to mega-data at your fingertips. Maybe you don't need several hundreds of channels right now or a 14-MSamples/s data transfer rate, but with the trend toward more complex tests and upfront simulation, you might need this performance level shortly. And that is the beauty of an LMS SCADAS system – it is an investment that grows with you.

Superior data quality for effective testing

An LMS SCADAS system offers much more than supreme data quality. It offers built-in process understanding. Test engineers who use LMS SCADAS hardware are more efficient because the system lets them skip classic steps like auto-ranging. Not only does this save time, it eliminates risk factors as well. The data is delivered in the purest state possible – low noise, no unnecessary conversion and, best of all, minimal human error. Quality cables and rugged connectors ensure no-compromise data acquisition security.

A tailor-made solution that works perfectly every time

There is an LMS SCADAS data acquisition and signal conditioning system to match your exact requirements – from compact mobile units, autonomous smart recorders up to high-channel-count laboratory systems. With a large variety of supported transducers and signal conditioning, LMS SCADAS systems are optimally tuned to meet the specific needs of noise, vibration and durability testing.

The quality leader in data acquisition

With its range of signal conditioning, choice of connectors and high throughput rate, the LMS SCADAS family brings years of proven technology into the lab environment. High-precision data is guaranteed, including best-in-class limiting of harmonic distortion and interchannel specifications with a phase match better than 0.2˚ at a frequency of 10 kHz. The LMS SCADAS system achieves its high-level reliability through rigorous design standards, efficient quality control and a strong service organization.

An LMS SCADAS for every testing job

Covering a wide range of industry applications

LMS SCADAS XS
Compact and powerful pocket-size data acquisition system
- More than 12 channels
- More than six hours of battery autonomy (typical use)
- Set up, monitor and validate on the go
- Use in standalone mode, with a tablet or with a PC; replay in full standalone mode

LMS SCADAS Mobile
Maximum mobile measurement power
- Accommodates 8 to 16, 40 or 72 channels in a single frame
- Compact size and low weight for optimal mobility
- Rugged design qualified for rough conditions and high temperatures

LMS SCADAS Recorder
PC-less recording and intelligent mobile data acquisition system
- On-the-spot validation prevents errors and annoying reruns
- Autonomous recording on CompactFlash cards
- Wireless PDA remote control with Bluetooth communication

LMS SCADAS Durability Recorder
Designed for the extreme
- Water and dust protected (IP54 and MIL-STD 810F qualified)
- Strain, vibration and displacement measurements in a single measurement module
- High-channel density (from 8 to 72 channels expandable to hundreds of channels)

LMS SCADAS Lab
Fit-for-purpose laboratory solution
- Easy 19-inch rack mounting mainframe
- Configurable from 8 to more than 2,000 channels
- Arbitrary mix-and-match with additional LMS SCADAS Lab/Mobile/Recorder mainframes

LMS testing solutions

Covering a wide range of industries

Aerospace engineering
Aerospace manufacturers are faced with the challenge of designing systems and components that must be safer, more reliable, lighter, cheaper to operate, deliver better passenger comfort and have less environmental impact. On the spatial side, manufacturers must design larger and more complex satellites at a faster rate while guaranteeing that the payload can withstand extreme launch conditions. Although virtual prototype simulation has accelerated the development processes, only testing can fulfill the final signoff and provide the feedback to validate assumptions and calibrate virtual models. LMS Test.Lab offers dedicated aerospace solutions:
- Ground vibration testing (GVT) to ensure structural integrity of the aircraft or spacecraft
- Operational modal analysis to assess the behavior of aerospace structures during operational conditions
- Dynamic testing and qualification of jet engines
- Scalable solutions for accurate acoustic testing and sound quality analysis

Automotive engineering
The biggest issues on the mind of noise, vibration and harshness (NVH) experts in the automotive industry are productivity and efficiency. The explosion of product variants and increased testing scenario complexity largely compensates for the routine testing tasks eliminated by simulation. In addition, automotive companies are continuing to shorten their product development cycle times, resulting in fewer prototypes and therefore less time for testing. LMS Test.Lab is designed to meet these challenges and offers a complete set of tools and applications for automotive NVH and durability engineering:
- Engine noise and vibration testing
- Torsional vibration measurements
- Gear whine and rattle testing
- Break squeal testing
- Driveline sensitivity testing
- Noise source identification
- Sound power testing
- Acoustic intensity mapping
- Noise source ranking
- Interior noise assessment
- Sound quality
- Pass-by noise testing
- Acoustic material testing
- Transfer path analysis
- Operational deflection shapes
- Modal testing and analysis
- Operational modal testing and analysis
- Component vibration qualification testing

Heavy machinery
In the face of unrelenting global market pressure, heavy machinery companies must deliver innovative products that outperform the competition and meet or exceed customer expectations. Test.Lab offers proven testing solutions for all types of manufacturing industries. We have

developed a scalable portfolio of solutions that help all types of companies in all types of industries create true competitive advantages. This might include controlling resonant vibrations of high-speed machinery to ensure consistent production quality, maximum fatigue resistance and minimum radiated noise productivity without compromising operator safety. Or it might be assisting with regulation safety and environmental compliance for new machine designs.

Wind energy and power generation

To certify a new wind turbine, manufacturers must ensure full system reliability under real-life operating conditions. Durability must be assessed to provide a 20-year lifetime with low operation and maintenance costs. Noise emissions must remain within prescribed tolerances. Additionally, the control system must guarantee clean voltage at constant frequency. For wind turbine manufacturers, LMS Test.Lab offers a complete solution to measure and optimize the vibration and noise emitted by the gearbox, generator and blades. LMS Test. Lab is used to identify propagation of noise and vibrations throughout the complex structure and find optimal solutions for noise radiation and excessive vibrations.

LMS expert solutions are used in other power generation sectors, such as load identification and foundation analyses for power plants; noise and vibration studies for gas turbines and pipelines as well as research and development (R&D) and onsite troubleshooting.

Off-road, construction and agricultural vehicles

Off-highway manufacturers must continuously increase operation performance and optimize the operating limitations of their products. Giant mining trucks must run faster and carry the maximum load capacity. Excavator manufacturers constantly improve the reach and agility of their products, while maintaining optimal safety and stability. And agricultural tractors and machines are designed for ever-tougher operating conditions, increasing environmental standards and more demand for product customization. Driver comfort, which includes reducing interior noise levels and vibrations mostly in extreme conditions, is becoming a distinctive brand differentiator and one that is increasingly being dictated by regulations and industry norms. LMS Test.Lab has been adopted by many off-highway manufacturers to cover these specific noise and vibration issues.

Consumer and business electronics

Manufacturers of white goods, home and office appliances and other consumer goods face extremely short development cycles, an increasing number of design variants and ever-higher customer expectations. Minimal noise levels are critical success factors for products like dishwashers, washing machines, PCs and even copiers. Other consumer electronic products, such as loudspeakers, home cinema systems and mobile phones, are differentiated by the quality of their acoustic performance. LMS Test.Lab helps proactively meet these stringent requirements when completing new product designs.

About Siemens PLM Software

Siemens PLM Software, a business unit of the Siemens Industry Automation Division, is a world-leading provider of product lifecycle management (PLM) software, systems and services with nine million licensed seats and 77,000 customers worldwide. Headquartered in Plano, Texas, Siemens PLM Software helps thousands of companies make great products by optimizing their lifecycle processes, from planning and development through manufacturing and support. Our HD-PLM vision is to give everyone involved in making a product the information they need, when they need it, to make the smartest decisions. For more information on Siemens PLM Software products and services, visit www.siemens.com/plm.

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