



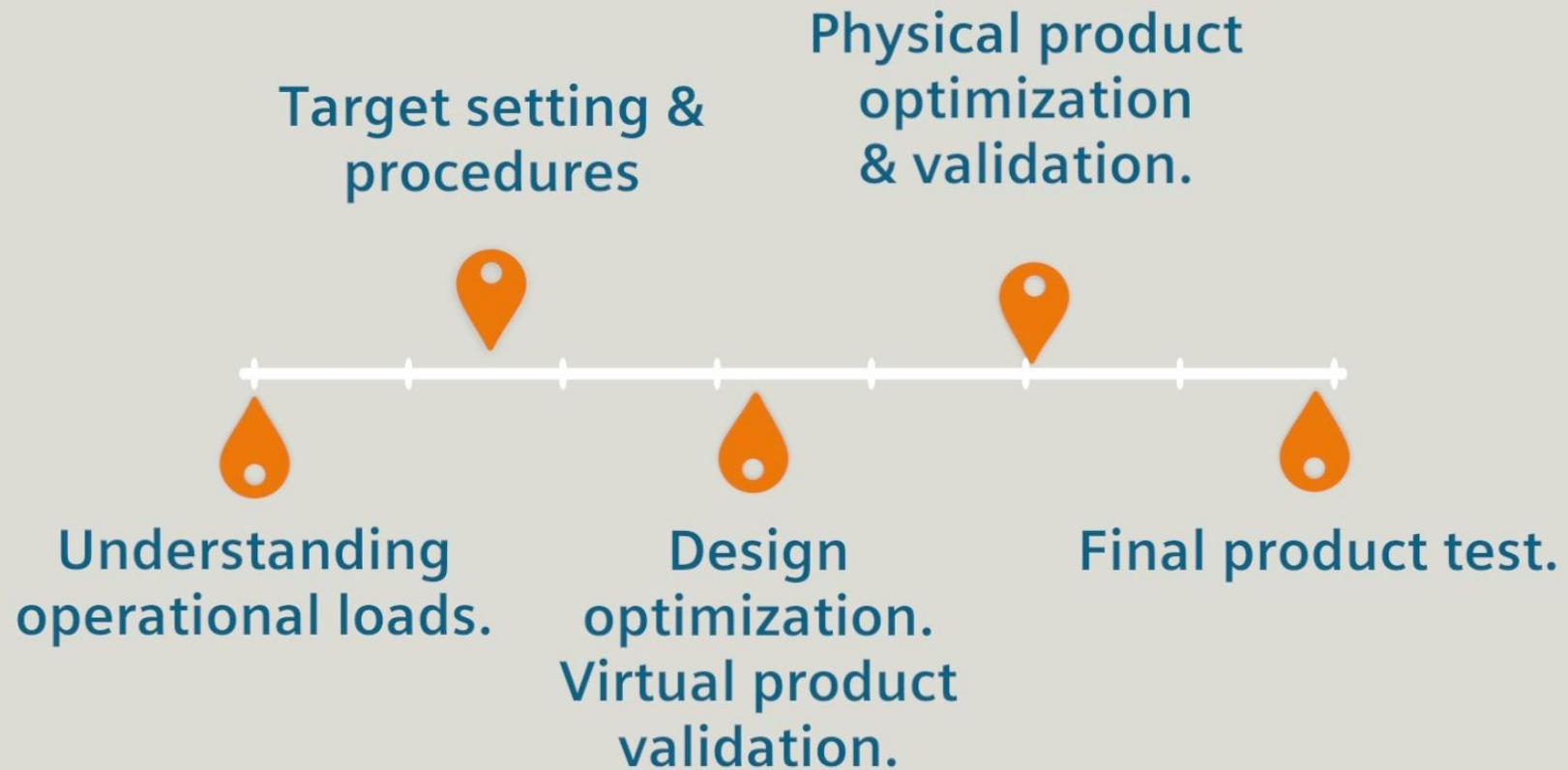
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Efficient Road Load Data Acquisition

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Realize innovation.

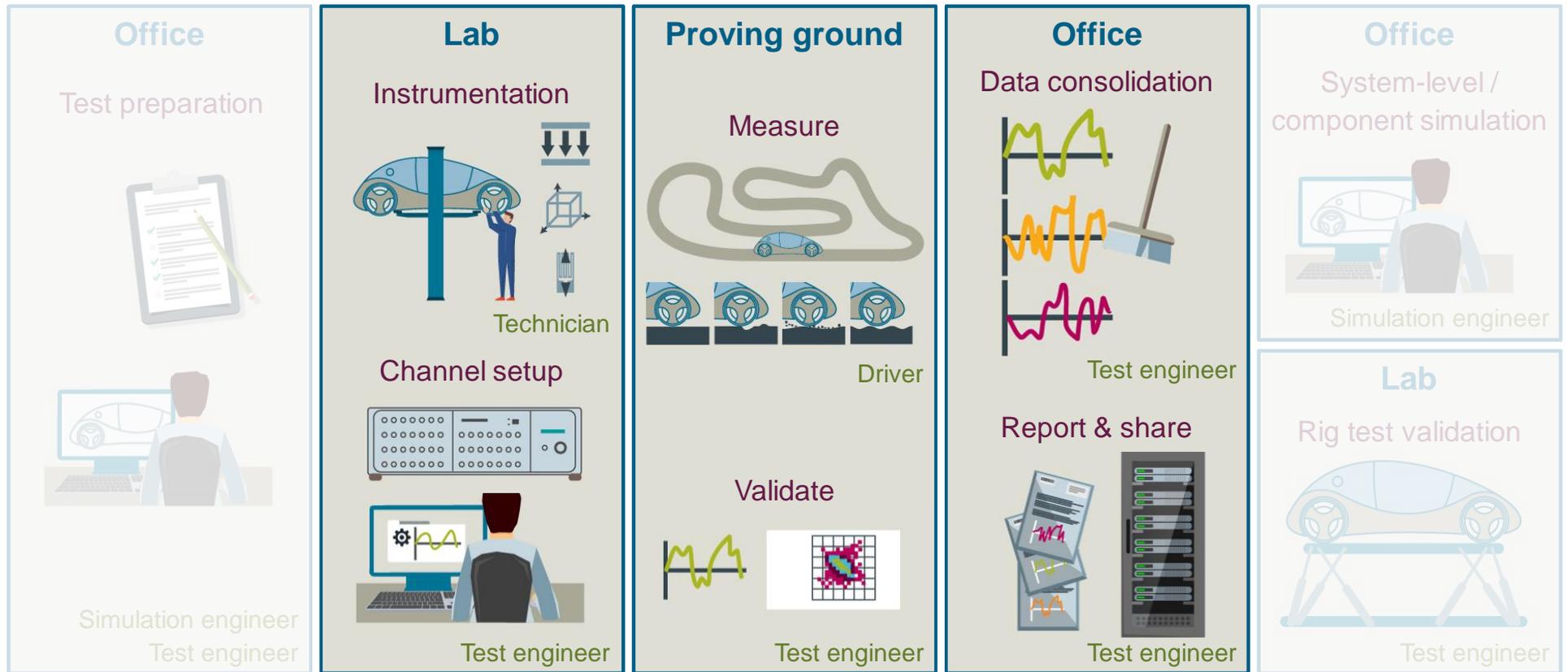
Need for durability engineering



Need for durability engineering



Road Load Data Acquisition (RLDA) Typical steps



Road Load Data Acquisition (RLDA) Typical steps

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Instrumentation

Channel setup

Measure & validate

Data consolidation

Report & share



Step 1 Instrumentation

Instrumentation

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Challenges

- Acquire & synchronize broad range of different sensor types
- Limited space in vehicle



Universal signal conditioning

- Built-in universal signal conditioning
- Fit for high channel count





Step 1 Instrumentation

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Challenges (large vehicles)

- Large number of lengthy cables need to be fixed, leading to long instrumentation time and high cable cost
- Reliability acquisition system in extreme testing conditions, like exposure to water and dust, high shocks and vibrations & high/low temperatures

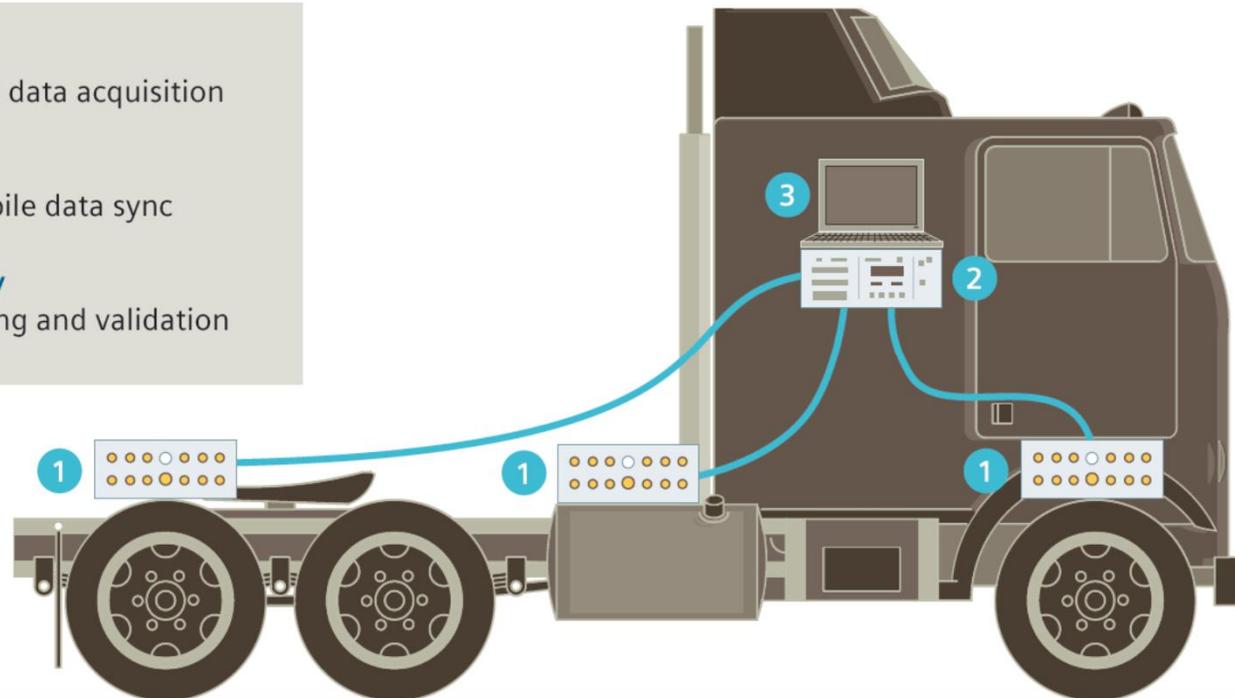
Distributed acquisition setup

- Distributed setup, bringing acquisition units close to sensors
- Designed and certified to work in extreme environments



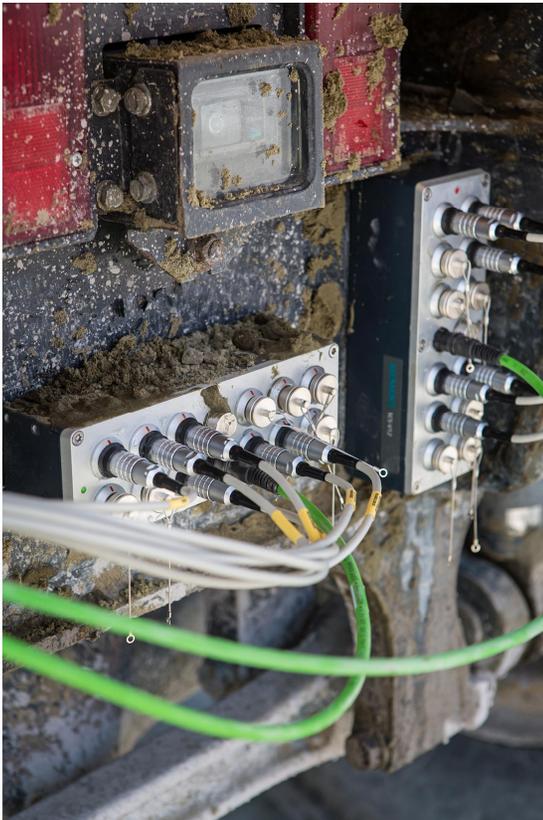
Distributed setup

- 1 LMS SCADAS Satellite**
Distributed, digital, local data acquisition
- 2 LMS SCADAS Recorder**
High-channel count mobile data sync
- 3 LMS Test.Lab Durability**
Quick, easy data recording and validation



Typical 200+ channel campaign: strain gages, accelerometers, displacements, wheel-force, temperature, CAN and video

Distributed setup



- Distributed setup with acquisition units near sensors

Centralized setup



60 (long) cables

Distributed setup



5 (green) cables

- One single (green) cable carrying data and power for 12 channels simplifies instrumentation and repair

Certified equipment

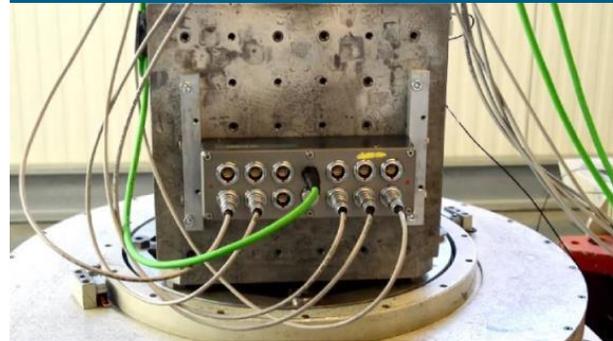
Water and dust



IEC 60529: IP66 and IP67

- Dust-tight (IP6x)
- Power water jet (IPx6)
- Immersion up to 1m (IPx7)

Shock and vibration



MIL-STD-810F

- Vibration: 7.7grms
- Shock: 100g shock

Temperature



Wide range

- -40 °C up to 85 °C
- -40 °F up to 185 °F

Step 1 Instrumentation

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Simplify hardware setup by embedding different signal conditioners
Reduce costs & increase uptime with certified distributed setup

Step 2 Channel setup

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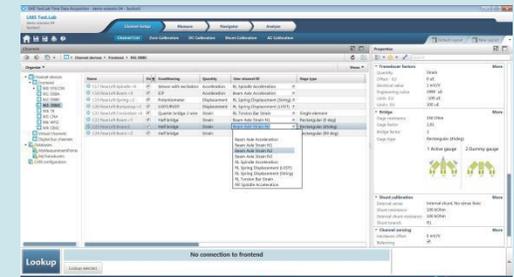
Report & share

Challenges

- Manual channel parametrization takes time and is error-prone
- No link to in-house sensor database

Sensor database

- One-button click to upload sensor information from database or TEDS
- Microsoft® Office Excel alike channel grid



Road Load Data Acquisition

Automatic channel setup with lookup from ODBC database



LMS Test.Lab Durability Acquisition - Project1 - Section1

LMS Test.Lab
Project1
Section1

Channel Setup Measure Navigator

Channel List Zero Calibration Shunt Calibration DC Calibration AC Calibration

Channels

Channel devices Frontend M3: DB8C

Organize Overview Bridge sensor Voltage sensor CAN dbc Sensor DB Processing Views

On	Name	Description	Point	Serial number	User channel ID	Conditioning	Gage resistan	Quantity	Supply	Supply type
<input type="checkbox"/>	C17 Point17		Point17			Quarter bridge 3 wire	350 Ohm	Strain	0 V	DC
<input type="checkbox"/>	C18 Point18		Point18			Quarter bridge 3 wire	350 Ohm	Strain	0 V	DC
<input type="checkbox"/>	C19 Point19		Point19			Quarter bridge 3 wire	350 Ohm	Strain	0 V	DC
<input type="checkbox"/>	C20 Point20		Point20			Quarter bridge 3 wire	350 Ohm	Strain	0 V	DC
<input type="checkbox"/>	C21 Point21		Point21			Quarter bridge 3 wire	350 Ohm	Strain	0 V	DC
<input type="checkbox"/>	C22 Point22		Point22			Quarter bridge 3 wire	350 Ohm	Strain	0 V	DC
<input type="checkbox"/>	C23 Point23		Point23			Quarter bridge 3 wire	350 Ohm	Strain	0 V	DC
<input type="checkbox"/>	C24 Point24		Point24			Quarter bridge 3 wire	350 Ohm	Strain	0 V	DC

Arm Idle

Read TEDS Read selected TEDS Lookup Lookup selected

8 items listed

Step 2 Channel setup

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Channel setup

Faster setup
by linking available sensor data to measurement software

Measure & validate

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Step 3 Measure & validate

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Instrumentation

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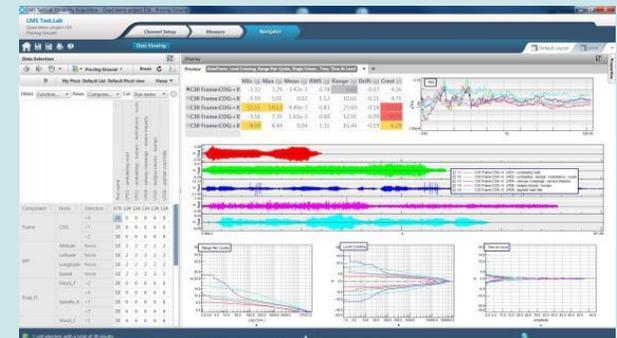
Report & share

Challenges (PC connected)

- Compare large amount of acquired data
- Be able to make quick but efficient data validation

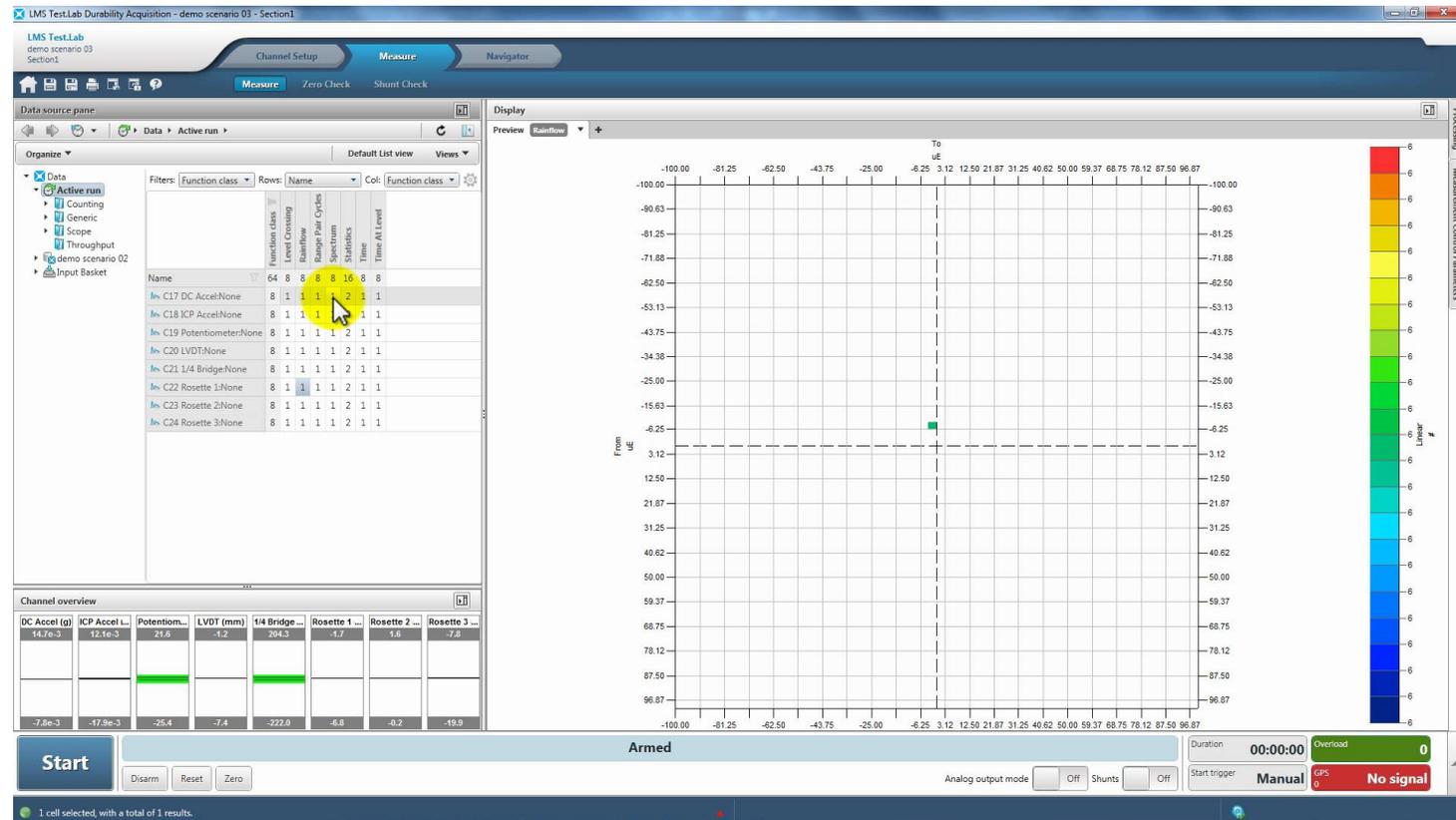
Instant data visualization

- Tailored user experience for organizing multiple measurements and channels, thanks to PivotTable
- Preview pictures automatically display any combination of test data and insights



Measure and validate in real time Online displays while measuring

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Step 3 Measure & validate

Instrumentation

Channel setup

Measure & validate

Data consolidation

Report & share

Challenges (no PC connected)

- Costly test re-runs in case of erroneous channel acquisition
- No immediate feedback on test procedure quality during measurement

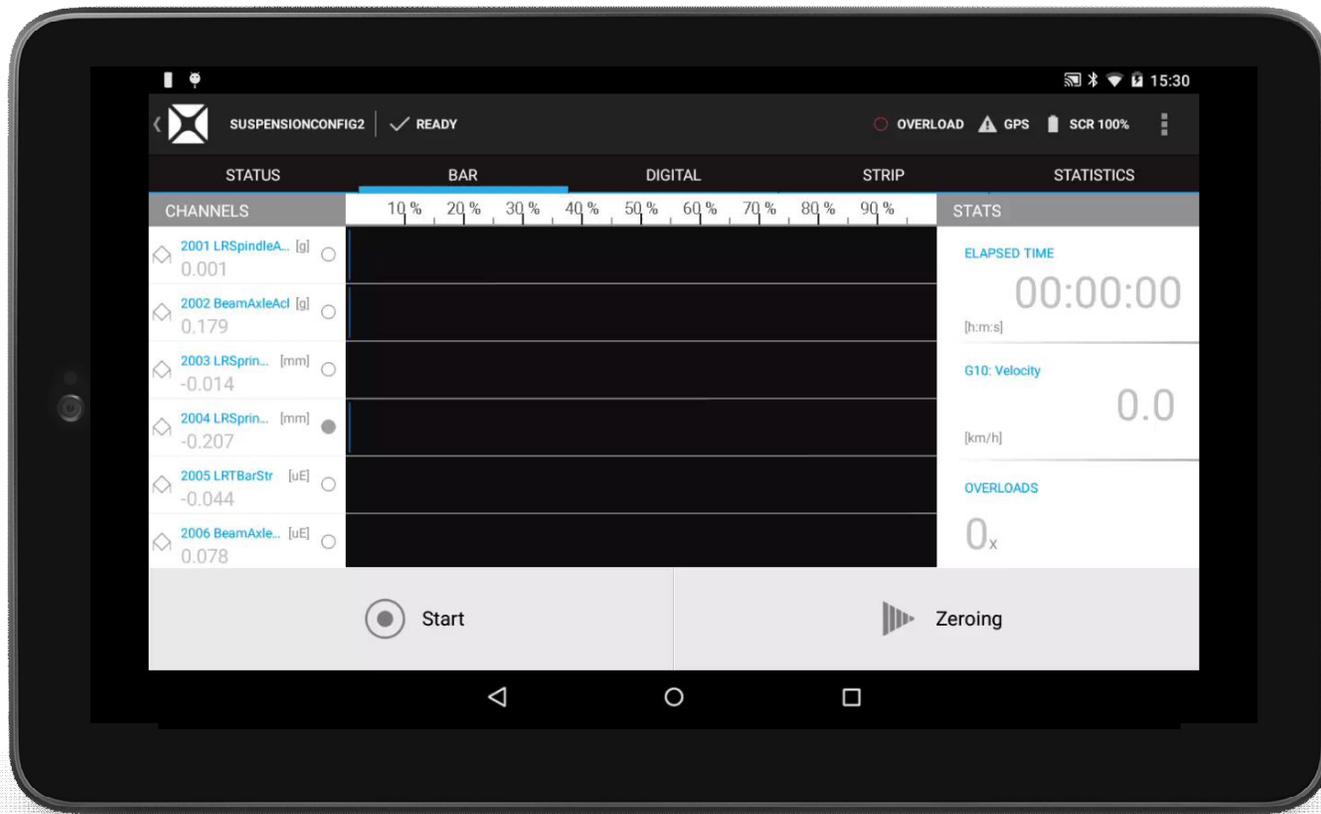
Trackside validation of test quality

- Detect and highlight signal anomalies through statistics monitoring during test
- Verify test procedure quality immediately after each measurement

The screenshot shows a mobile application interface with a table of test statistics. The table has columns for Mean, RMS (rms), RMS, STD (rms), STD, Range, Crest, Dist, and STATUS. The STATUS column contains values like 418.55, 6060.0, and 660.01, some of which are highlighted in yellow or red. Below the table, there are buttons for 'Stop', 'Zeroing', and 'Reset'. On the right side of the interface, there are indicators for 'OVERLOAD', 'GPS', and '10:30 H', along with a 'STATISTICS' button.

Mean	RMS (rms)	RMS	STD (rms)	STD	Range	Crest	Dist	STATUS
728.19	504.66	731.35	10.73	24.90	2091.9	1.43	418.55	00:01:01
-4.45E-6	0.002	9.33E-4	0.002	9.24E-4	0.237	127.03	0.003	6060.0
5336.5	-	5336.5	-	-	1320.1	0.124	660.01	2

Instant graphical and tabular feedback per channel



Step 3 Measure & validate

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Measure & validate

Right-first-time tests
by on-the-spot validation of data & test quality

Data consolidation

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Step 4 Data consolidation

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Instrumentation

Channel setup

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Data consolidation

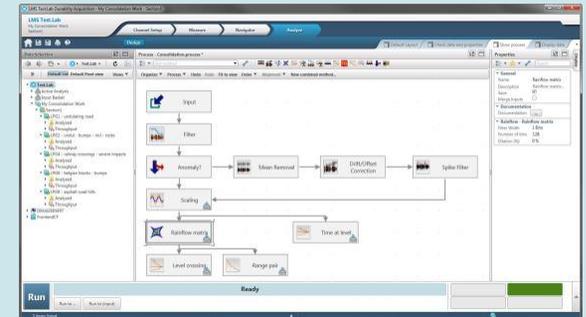
Report & share

Challenges

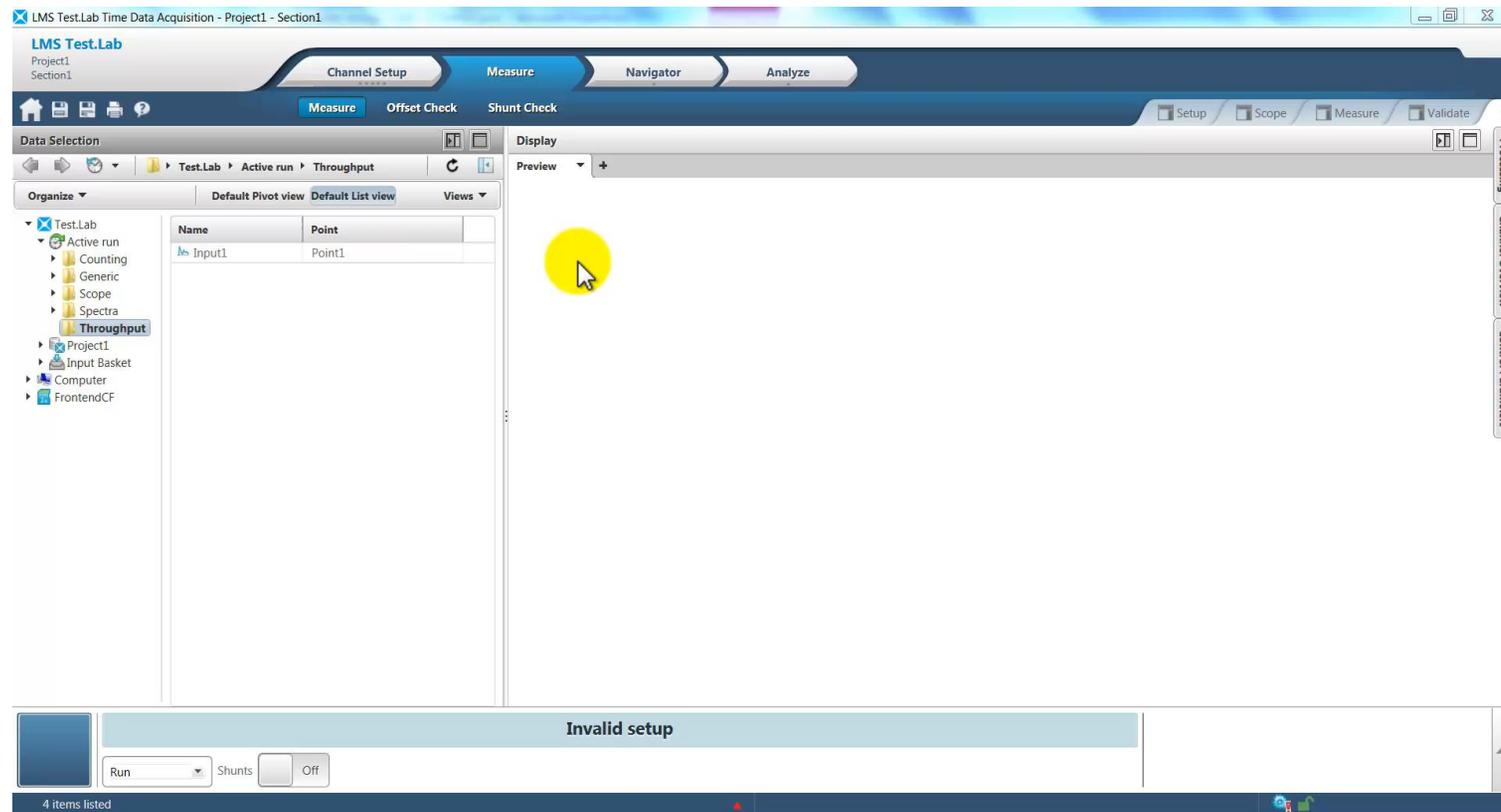
- Need to upload (and convert) data into processing tool
- Manual data clean-up is time-consuming and sensitive to human interpretation & errors

Automate repetitive tasks

- Dedicated interactive environment designed for non-experts to define analysis tasks
- Automated execution of an unlimited number of analysis tasks with LMS Test.Lab ProcessDesigner



Automate repetitive tasks



Step 4 Data consolidation

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Data consolidation

Work smarter
by automating repetitive tasks

Report & share

Step 5 Report & share

Instrumentation

Channel setup

Measure & validate

Data consolidation

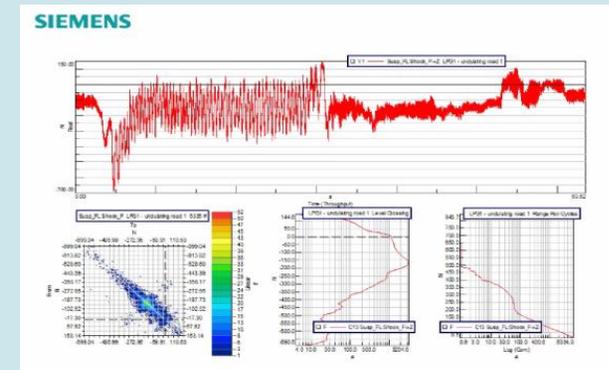
Report & share

Challenges

- Static screenshots with limited information
- (Non-value added) reporting time \neq (value added) measuring time

Actionable reports

- Template-based batch reporting to Microsoft® Office
- Sharing data and insights as interactive representations with Active Pictures



Active reports for easy results sharing



The screenshot displays the Siemens LMS Test.Lab software interface. The main window title is "LMS Test.Lab Durability Acquisition - Pivot Durability Data 15A - Proving Ground". The interface includes a top navigation bar with "Channel Setup", "Measure", and "Navigator" tabs. Below this is a "Data Viewing" section with a "Data Selection" pane on the left and a "Display" pane on the right. The "Data Selection" pane shows a tree view with "Test.Lab" selected, containing sub-items like "Input Basket", "Pivot Durability Data 15A", "Computer", and "FrontendCF". The "Display" pane shows a table with the following columns: "Function class", "Level Crossing", "PSD", "Rainflow", "Range Pair Cycles", and "Time". The table contains multiple rows of data, with a yellow circle highlighting a mouse cursor over the table area.

DOF ID	Function class	Level Crossing	PSD	Rainflow	Range Pair Cycles	Time
Susp_FL:Shock_F:+Z	52	10	5	10	7	
Susp_FL:Spindle_A:+X	52	10	5	10	7	
Susp_FL:Spindle_A:+Y	52	10	5	10	7	
Susp_FL:Spindle_A:+Z	52	10	5	10	7	
Susp_FR:Shock_F:+Z	52	10	5	10	7	
Susp_FR:Spindle_A:+X	52	10	5	10	7	
Susp_FR:Spindle_A:+Y	52	10	5	10	7	
Susp_FR:Spindle_A:+Z	52	10	5	10	7	
Susp_RL:Shock_F:+Z	52	10	5	10	7	
Susp_RL:Spring_D:+Z	52	10	5	10	7	
Susp_RR:Shock_F:+Z	52	10	5	10	7	
Susp_RR:Spindle_F:+X	52	10	5	10	7	
Susp_RR:Spindle_F:+Y	52	10	5	10	7	
Susp_RR:Spindle_F:+Z	52	10	5	10	7	
Susp_RR:Spindle_M:+RX	52	10	5	10	7	
Susp_RR:Spindle_M:+RY	52	10	5	10	7	

Step 5 Report & share

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Simplify hardware setup by embedding different signal conditioners
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Channel setup

Faster setup
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Measure & validate

Right-first-time tests
by on-the-spot validation of data & test quality

Data consolidation

Work smarter
by automating repetitive tasks

Report & share

Quicker delivery
by embedding complete test data in actionable reports

Summary



Instrumentation

Simplify hardware setup by embedding different signal conditioners
Reduce costs & increase uptime with certified distributed setup

Channel setup

Faster setup
by linking available sensor data to measurement software



Measure & validate

Right-first-time tests
by on-the-spot validation of data & test quality



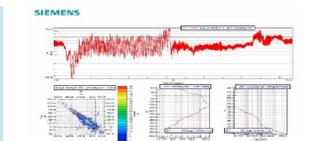
Data consolidation

Work smarter
by automating repetitive tasks



Report & share

Quicker delivery
by embedding complete test data in actionable reports





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Applications

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Realize innovation.

General Motors

Using LMS SCADAS and LMS Test.Lab for road load data acquisition



End-to-end solution for road load data acquisition



Developing world-class GM vehicles



Road data gathering in tough terrain

- Plug-and-go data acquisition
- Efficient hardware, easy-to-use software
- Dedicated technical support team
- Innovative tools for better brand confidence

- Despite growing use of simulation, ever-growing and challenging volume of testing
- Simcenter™ end-to-end solution lets engineers have complete control of the RLDA process

“Since the LMS SCADAS data acquisition system is streamlined for efficiency, it lets engineering teams get their jobs done much more quickly and easily.”

John Davis, lead measurement engineer, General Motors (GM) Proving Grounds, Milford, Michigan

Daimler Trucks

Enhancing durability testing with the help of Siemens PLM Software



- Enhanced durability testing
- Improved measurement instrumentation and the execution of the data collection
- Generated high-quality results on the test track

Boosting measurement instrumentation and data collection



Forging a strong collaboration



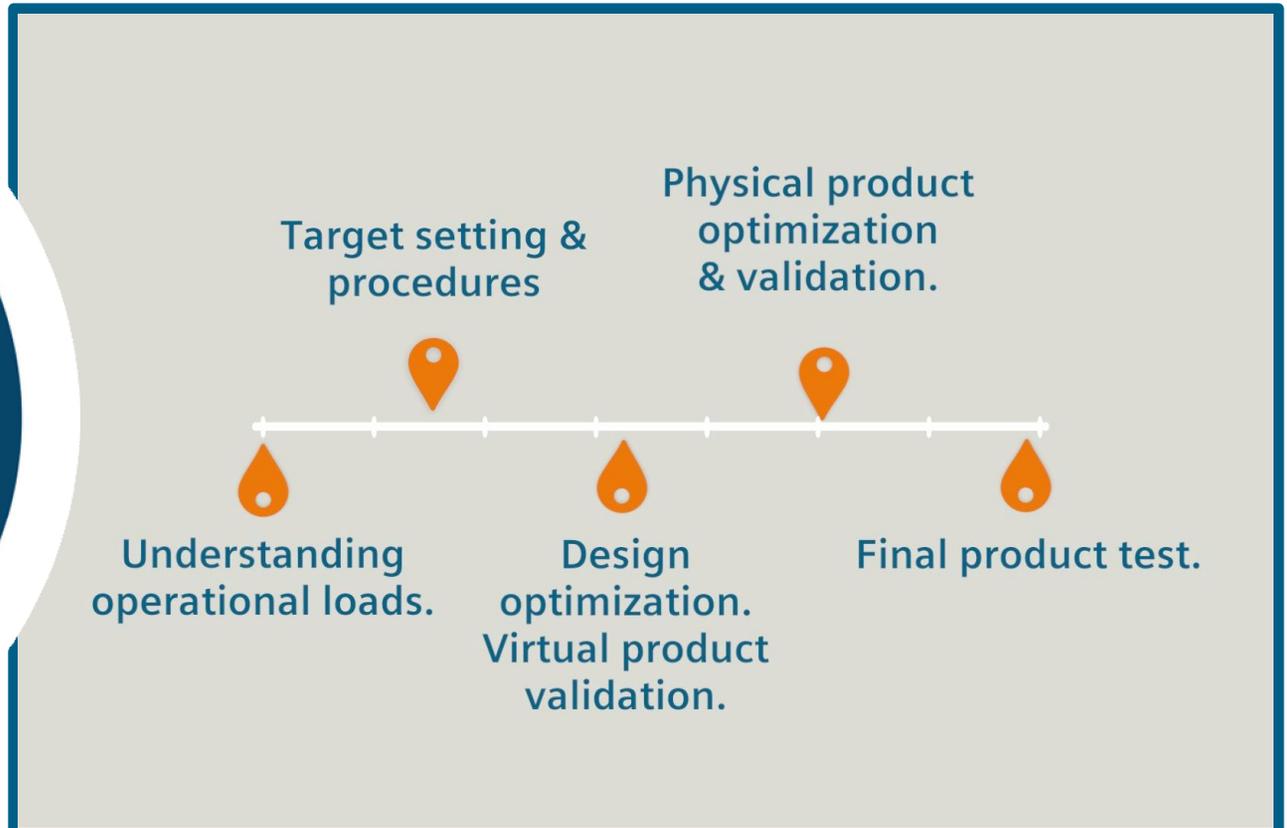
Understanding specific market requirements

- Implement full integration of test and simulation procedures
- Leverage data generated on the proving grounds

“We very much appreciate the collaboration with Siemens PLM Software, especially the fully integrated service offered. It is not only about evaluating data; when needed, Siemens PLM Software can provide us with the full line of services.”

Dr. Christof Weber, Daimler Durability and Bench Testing Competence Center

Simcenter durability solutions throughout the development process



Thank you! Want to know more?

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Contact the expert

