TECHNOLOGY, TEST PROCESSES
& ENGINEERING SERVICES

MB Dynamics

BSR SUITE

Designed to Optimize Squeak & Rattle Testing

Designed for

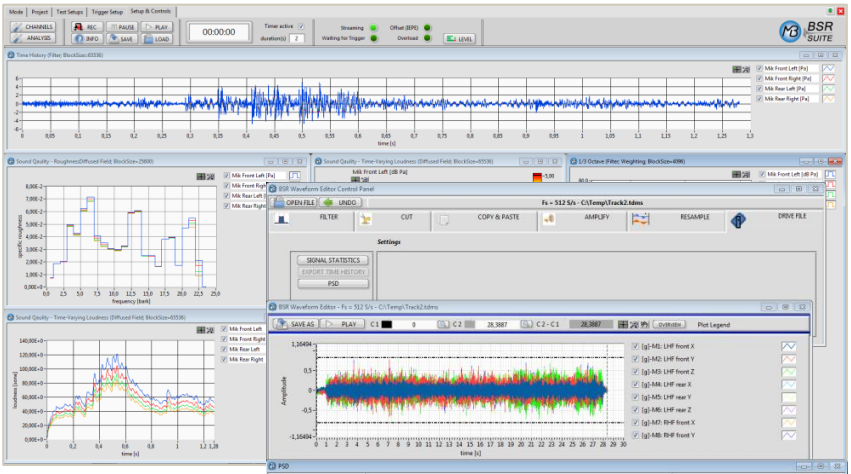
- Road load data acquisition
- Drive-File generation for single- and muti-axis shaker test systems
- Objective Squeak & Rattle testing
- Sound & Vibration measurements
- Measurement of relative motions
- In-line Sound Quality testing

Features

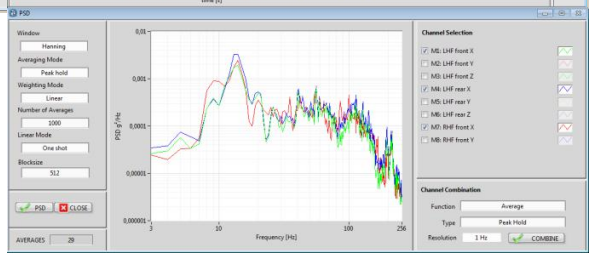
- 4-16 dynamic input channels
- Simultaneous 24-bit A/D converters
- Flexible sample rates up to 105.4 kHz
- 4mA IEPE-supply, software switchable
- Predefined setups for typical S&R tasks and test specification
- Project oriented management of measurement data & test setups
- Signal statistics
- Real-time testing against user selectable thresholds
- Offline data processing and playback

Key Differentiators

- Minimized set-up times & ease of use
- Real-Time Sound Quality testing signal recording and monitoring in one shot
- Independend optimized resolution for each analysis
- Powerfull and flexible signal processing and analysis features for BSR analysis and testing



Real-Time Sound Quality Test in *BSR ANALYZER*



Signal Processing of Recorded Road Load Data and Drive-File Generation in *BSR EDITOR*

Designed to Improve S&R Testing

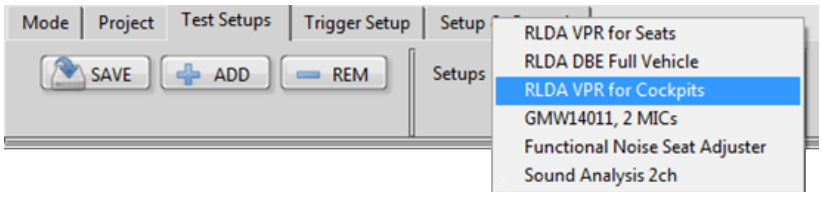
Years of practical experience in the fields of Squeak & Rattle (S&R) and Sound Quality testing are behind the design of this powerful and user-friendly, multi-channel test system for different typical tasks such as road-load data acquisition, drive-file generation or objective S&R testing.

Predefined test setups including channel and analysis configuration, testing thresholds and graph settings turn the ***BSR ANALYZER*** into an application specific tool. Drive-file generation for full vehicles and component test systems based on proven algorithms is easy. Simulation quality and the resulting correlation of test results to road testing is improved.

Objective S&R testing according to different test specifications becomes fast, simple and repeatable. Sound and vibration quality is measureable and comparable.

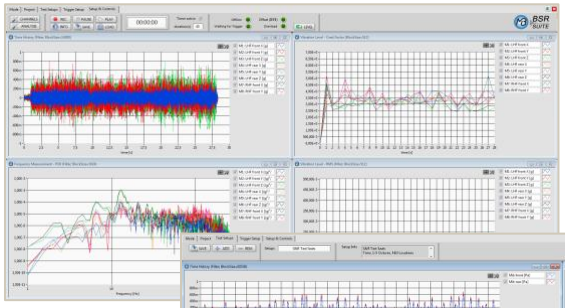
The compact USB-powered 4-channel frontends can be combined for up to 16 simultaneous sampled measurement channels. Flexible sample rates up to 104 kHz (combined with the MB 4104-I USB-Frontend) per channel, independent block length for each analysis and the definition of virtual input channels enable the use of ***BSR SUITE*** for many different S&V applications.

BSR ANALYZER – Recording and Real-Time Testing



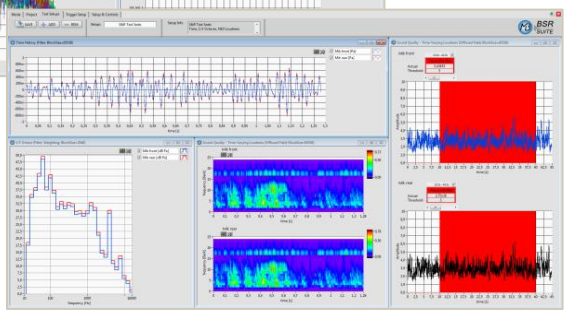
Predefined test configurations for Road Load Data Acquisition (RLDA), Drive-File Generation, objective Squeak & Rattle testing and general Sound & Vibration measurements help get measurements done – easy and *repeatable!*

Each test setup defines the input channel configuration, signal processing, analysis settings and graph properties. By loading a predefined test configuration, ***BSR ANALYZER*** is transformed into an application-specific tool. Test setups and associated measurement data can be managed in different projects. Raw data, analysis settings and test limits are always available for offline analysis, playback or export into standard formats like WAV, CSV, TXT or RCPIII.

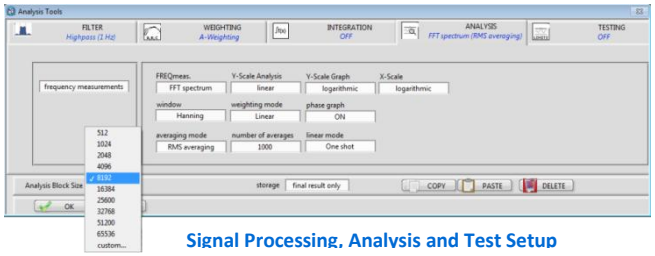


2ch S&R Testing against Definable Thresholds

Multi-Core processing enables Real-time analysis and simultaneous recording to hard disc up to 16 dynamic input channels using user definable sample rates up to 105.4 kHz. Recorded time history data is available for further offline analyses in ***BSR ANALYZER*** or data processing, playback and export to various data formats in ***BSR EDITOR.***



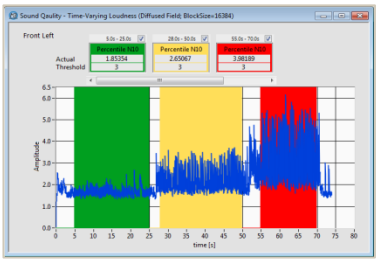
8ch RLDA, PSD, CREST and Vibration Level



Signal Processing, Analysis and Test Setup

Comprehensive signal processing and analysis features that different filters, weighting, integration and various analyses such as Running RMS, Leq, Lpeak, FFT, PSD, 1/n Octave Band Spectra and Time-Varying Loudness turn ***BSR SUITE*** into a powerful and flexible tool for S&R testing and Sound & Vibration analysis.

Objective S&R Test based on N10 Loudness for 3 Different Test Tracks

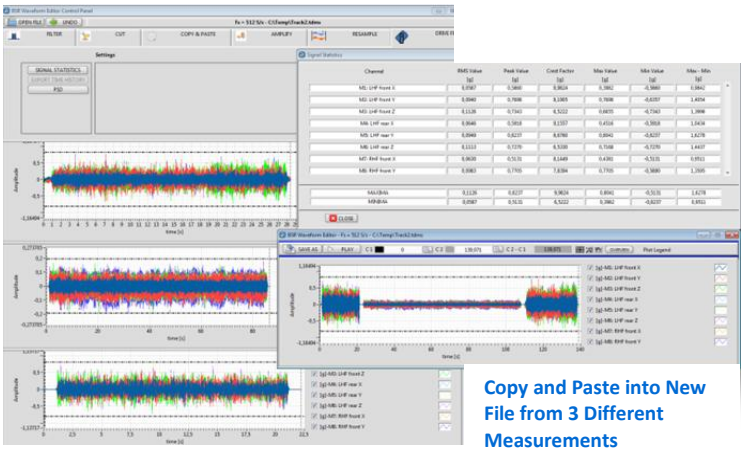


Independent analysis block length up to 65536 Samples for each analysis allow for maximum resolution in time and frequency domain without having to compromise. Define ***virtual input channels*** through an arithmetic combination of multiple physical input signals enables the measurement of relative motions for effective Squeak & Itch testing.

Signal statistics and testing against user definable thresholds enables objective Squeak & Rattle and Sound Quality testing according to different test specifications in real-time. Statistical values and test results (Green/Yellow/Red) over freely definable time periods are displayed directly in the associated graph.

Analysis Configuration including 4 Physical and 2 Virtual Input Channels

BSR EDITOR – Signal Processing, Playback and Export



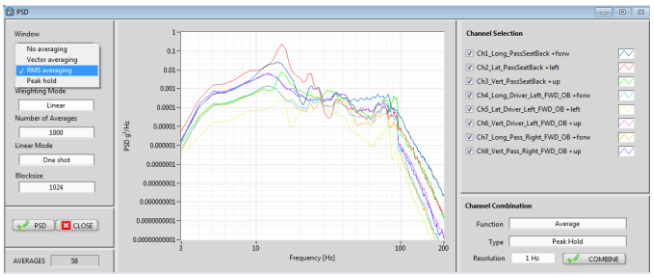
Copy and Paste into New File from 3 Different Measurements

Editing multiple records in parallel enables very easy and effective ways to compare and combine different recordings. Cut, Copy and Paste of relevant time signal sections from different recordings into a new file is intuitive and easy. Fading signals in and out, inserting pauses of user selectable durations or mixing and combining test track data is done within a few minutes.

Signal statistics provide overview of main statistical values such as RMS, PEAK, MAX, MIN and CREST-factor for each channel with just one mouse click.

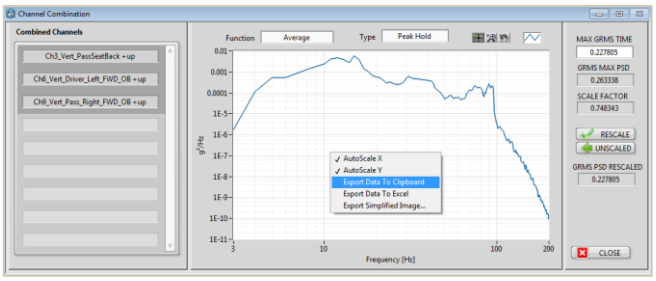
Integrated know-how and procedures to transfer vibration conditions from the road to the lab improve the simulation quality and correlation to road testing. Calculation of equivalent PSD-spectra over user selectable time sections, averaging of multiple sensor locations, rescaling of the resulting vibration level and smoothing of the PSD shape is done by only a few clicks.

For RANDOM tests data can be copied directly into the Win2k5 Vibration Controller. For multi-axis vibration testing data can be exported to the MB MIMO Drive File Processor for further processing. ***BSR SUITE*** will help you to improve your vibration testing.

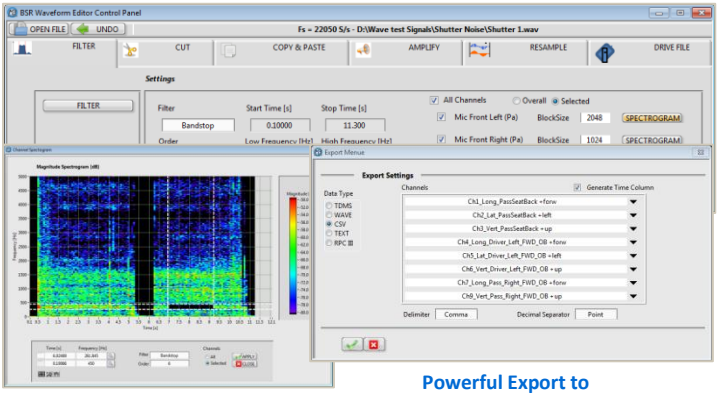


Calculate PSD Spectra based on User-Selectable Averaging Methods
Combine Multiple Sensor Locations to MAX-PSD

Filter definition in time and frequency domain by drag and drop allows the modification of recorded sounds. Interfering noise can be identified and filtered out by selecting the desired time and frequency band in the 3D-Spectrogram. Recorded and filtered sound signals can be compared by offline analysis or playback in various ways.



Rescaling of GRMS Level and Smoothing of PSD Shape
Copy and Paste to WIN2k5 Vibration Controller



Filter Definition in 3-D Spectrogram

Powerful Export to Various Data Formats

Amplifying, Resampling and Export to various data formats allows the ideal adaption of recorded data for direct transfer to MB vibration control systems or exchange with other sound and vibration analyzers. Data exchange with colleagues and customers becomes quick and easy.

Hardware and Technical Data

USB Powered Front-end Modules MB 452-I and MB 4104-I

Technical Specifications	
Analog Inputs	4, simultaneous sampled, 24-bit resolution
Max. Sampling Rate	52.7 kHz (MB 452-I), 105.4 kHz (MB 4104-I)
IEPE-Supply	4mA, software switchable
Input Ranges	±10V, ±1V
AC/DC Coupling	Yes, 0.1Hz AC-cutoff frequency (MB 452-I) Yes, 0.5Hz AC-cutoff frequency (MB 4104-I)
Trigger	External digital or analog threshold
Tachometer-Input	Input Range ±30V
Cascade-able	Synchronization of up to 4 modules (max. 16 channels)
Power Supply	USB

Technical Data

Virtual Arithmetic Channels	
Functionality	Definition of virtual channels by arithmetic combination of physical input signals
Channel arithmetic	Difference, Average

Signal Conditioning	
Filter Functions	Low-Pass, High-Pass, Band-Pass & Band-Stop
Integration	Single & double integration in time domain
Weighting-Filters	Linear, A-,B- and C-Weighting

Vibration Level	
RMS	User selectable block size / time resolution
Peak	User selectable block size / time resolution
Exp. Avg. Level	Time constants: FAST, SLOW, IMPULSE, CUSTOM
Crest Factor	User definable block size/time resolution

Sound Level	
Leq	User selectable block size / time resolution
Lpeak	User selectable block size / time resolution
Exp. Avg. Sound Level	Time constants: FAST, SLOW, IMPULSE, CUSTOM

Frequency Analysis	
Narrowband FFT	Amplitude & Phase
Power Spectral Density	Amplitude
FFT-Block size	512-65536 Samples
Window functions	Rectangle, Hanning, Flat Top, Gaussian, Blackman
Averaging	Linear, Exponential, Peak-Hold

1/n Octave Analysis	
Fractional Octaves	1/1-, 1/3-, 1/6-, 1/12 & 1/24-Octave bands
Averaging	Linear, Exponential, Peak-Hold
Time constants	FAST, SLOW, IMPULSE, CUSTOM

Loudness	
Stationary Loudness	Loudness Level in [Sone] or [Phon] Specific Loudness spectra In compliance with ISO 532B, DIN45631 and ISO/R131
Time-Varying Loudness	Time-Varying Loudness [Sone] Specific Loudness Spectra In compliance with DIN45631/A1

Sound Quality (Option)	
Sharpness	Specific Sharpness spectra & Sharpness [acum]
Roughness	Specific Roughness spectra & Roughness [asper]
Tonality	1/3 octave spectra & Tonality [tu]
Fluctuation Strength	Specific Fluctuation Strength spectra & Fluctuation Strength [vacil]

Signal Statistics	
Statistical Value	Max, Min, Max-Min, Average
Percentile Levels	N1-N99 (user selectable)

Waveform Recording	
Sampling rates	Up to 52700 S/s on 16 channels (MB-452I) Up to 105400 S/s on 8 channels (MB-4104I)

Input Monitoring and Playback	
Real-time	Monitoring user selectable input channels (max. 2 channels) over internal sound card
Offline	Playback of recorded time history data over internal sound card

Graphs	
2-D Plots	Overlay of multiple curves in one graph or separate graphs grouped in one window
3-D Plots	Real-Time colored Sonogram

Data Export and Import	
Graphs & Data	Direct export of graphs and to clipboard or Office programs
Export THD	WAV, TXT/CSV, RPCIII
Import THD	WAV, TXT/CSV, RPCIII

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