m+p VibControl
Shock Control

m+p VibControl is m+p international's proven software for carrying out a wide variety of vibration tests. Shock testing simulates an extreme event that a unit under test is exposed to during handling, shipment and/or daily use (e.g. dropping an object or exposure to an explosive event). The profile for this type of testing is defined by the shape of the time domain waveform together with its amplitude and duration. m+p VibControl offers full functionality for Classical Shock and Shock Response Spectrum testing as well as for tests using external pulses or the capture of transient signals.

Key Features

- Shock testing fully compliant with ISO, DIN and MIL-STD 810 standards
- Support on electrodynamic and hydraulic shakers
- Automatic operation or manual controls
- Peak-to-peak displacement for best shaker performance
- Throughput time data recording
- Earthquake simulation mode according to Bellcore specifications, all zones
- Use of pre-stored drive signal, for minimal equalization

Classical Shock

- Reference waveforms: half-sine, haversine, sawtooth, triangle, rectangle, trapezoid
- Auto-reverse of drive for positive and negative shocks
- Sampling frequency: standard 102,400 samples/sec., up to 204,800 samples/sec. (hardware dependent)
- Record length up to 32,768 samples
- Maximum record duration: 64 sec.
- Displacement and velocity compensation
- SRS analysis
- Alarm limits include common standards such as MIL-STD 810, DIN, GAM-EG 13 as well as user-defined
- Accelerometer negative sensitivity definition
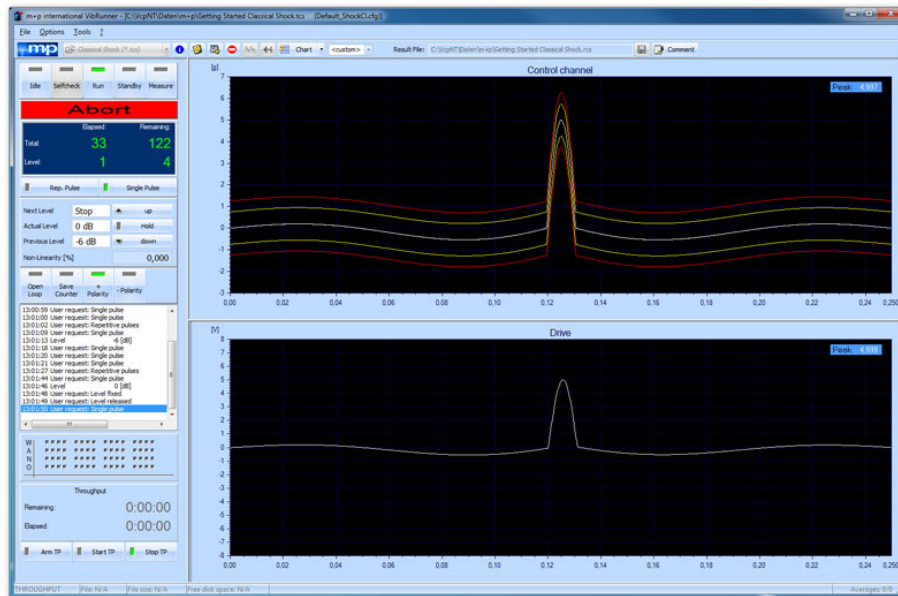
Shock Response Spectrum (SRS)

- Frequency range up to 20 kHz
- Maximum record duration: 64 sec.
- Calculation of MaxiMax/positive/negative shock response spectrum
- Automatic SRS optimization
- Wavelets and damped sine components
- Octave analysis: 1/1-1/24
- Sine burst and sine beat with variable amplitudes

External Pulse

- Import of ASCII data for replication with pulse editor
- Synthesis of any pulse form
- Kinematic compensation for minimum shaker displacement
- Short transient history control up to 64 sec.

Transient Capture

- Capture of transient signals such as drop table or pyroshock pulses
- Online SRS calculation and SRS analysis
- Scope function
- Various triggers
- Throughput mode for capture of multiple pulses

Classical shock testing

Applications

- Classical shock testing
- Duplicating short-duration pyrotechnic events (explosions, rocket blasts) or long-duration events at lower frequencies (earthquakes) using the shock response spectrum
- Replicating pre-recorded time sequences (crash tests)
- Synthesis of any pulse form

- Earthquake simulation
- Capture of transient signals such as drop tables
- or pyroshock pulses
- Strain measurements using m+p hardware (m+p VibRunner, m+p VibMobile), available bridges: full bridge, half bridge, quarter bridge measuring either bending or Poisson's ratio

Classical Shock

m+p VibControl's Classical Shock testing performs closed-loop control of transient waveforms. It applies all classical reference waveforms: half-sine, haversine, initial and terminal peak sawtooth, triangle, rectangle, trapezoidal pulse shape, in a controlled way to the specimen. The peak-to-peak displacement optimizes the pulse displacement in both directions, thus making optimum use of the shaker performance. The user-defined alarm limits are compliant with all standards such as MIL-STD 810, DIN and GAM-EG 13 and are excellent to document the compliance of the shock test to these standards.

m+p VibControl provides simple automatic controls for routine testing as well as manual controls (single or repetitive pulse, polarity, open loop, level, non-linear correction) which may be disabled. While the test is running, the most important information on the closed-loop control can be seen at a glance for fast and direct monitoring. A full selfcheck ensures feasibility of the test setup. A date and time stamped test log is created showing details of the selfcheck and every test event. The test safety is continuously checked. The optional m+p VibUtil/m+p Advanced VibUtil tools enable test sequencing and digital channel control features (e.g. for controlling a climatic chamber).

The advanced data review and report program included in m+p VibControl allows reports to be printed directly from the control window; alternatively the displayed data can be copied to standard Windows applications such

as Word or Excel. There is also the automatic one-click Word documents generation. Post-test analysis provides extensive handling and analysis of the shock data, single and multiple data graphing and custom report formatting including company logo or other custom styles. These together with advanced cursor functions, peak search and display of several traces in one graphic mean high-quality reports are completed easily and quickly. The analysis functions are available on all engineer's workstations connected to the data server. Data filtering is available to quickly select the most relevant data from all that was stored during the test. For the ultimate step in reporting, data and graphics can be directly exported to or dragged and dropped into the m+p Analyzer eReporter package.

- Sampling frequency: standard from 128 to 102,400 samples/sec., up to 204,800 samples/sec. (hardware dependent)
- Record length from 256 to 32,768 samples
- Maximum record duration 64 sec.
- Reference waveforms: half-sine, haversine, initial and terminal peak sawtooth, triangle, rectangle, trapezoid
- Positive and negative going pulses, user-selectable during test
- Peak or peak-peak displacement calculation
- Pre- and post-pulse compensation on all classical shock pulses. Pre- and post independent shapes (sine, square, rounded, …) and length for optimum displacement performance

- Accelerometer negative sensitivity definition
- Unlimited pre-test and test duration schedule including measurement storage and looping
- User-defined alarm limits as per MIL-STD 810, DIN and GAM-EG 13
- Manual controls during the test (can be disabled): single or repetitive pulse, polarity, open loop, level, non-linear correction
- Earthquake simulation mode according to Bellcore specifications, all zones
- User-defined external data file import including custom pulse editor. The pulse graphical editor helps conditioning field measured pulses to be able to run on a laboratory shaker
- Time history recording to throughput disc

Shock Response Spectrum (SRS)

Shock Response Spectrum (SRS) testing enables the test engineer to synthesize transient pulses and reproduce them on the shaker. This method is widely used for simulating high-frequency pyrotechnic events and long-duration events such as earthquakes. The transients may be manually or automatically generated from damped/undamped sine waves and/or wavelets components. Time delay, positive and negative slope are freely combinable. The peak-to-peak displacement optimizes the pulse displacement in both directions, guaranteeing best shaker performance. m+p VibControl uses an automatic technique to optimize SRS wavelets.
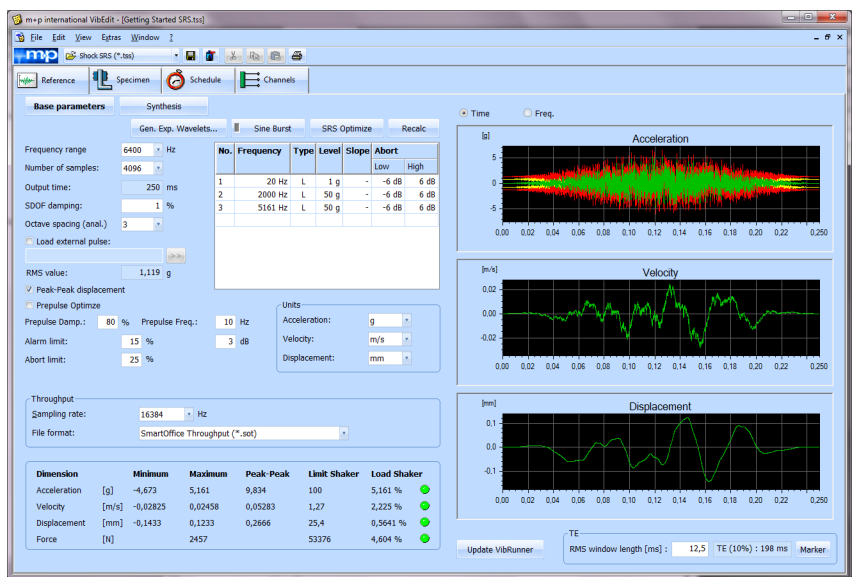
Setting up an SRS test

- Frequency bandwidths from 50 Hz to 12.8 kHz
- Maximum record duration 64 sec.
- Calculation of MaxiMax/positive/negative shock response spectrum
- Octave spacing from 1/1 to 1/24 octaves
- Synthesis of reference pulse: damped sine waves or wavelets components; time delay and slope up/down selectable
- Sine burst and sine beat with variable amplitudes

- Peak-peak displacement to make optimum use of the maximum shaker displacement
- Automatic SRS optimization for minimal or user-defined displacement
- Interactive online SRS (re-)synthesis of the control pulse/SRS
- Earthquake simulation mode according to Bellcore specifications
- Display of effective shock duration

External Pulse

To save you the time-consuming synthesis of pulses, it may be the best to replicate time sequences acquired for instance through crash testing or in earthquake tests. m+p VibControl's External Pulse option allows you to import an external ASCII data file which can then be adapted to the test requirements and shaker limits in the pulse editor. Generally speaking, the External Pulse function synthesizes any pulse form. A kinematic compensation is performed for minimum shaker displacement. External pulses can be integrated both into classical shock tests and shock response spectrum tests.

- Import any ASCII pulse. Two column pulse containing time vs. amplitude or one column pulses with amplitude and delta time
- Compensation for measurement error such as DC-offset, drifts, residual velocity and displacement
- Short transient history control up to 64 sec.
- Advanced option includes user-defined pre- and post-pulses, half sine pulses sequences

- Sine burst support, with user-defined burst frequency, number cycles for ramp-up, full level and ramp down; multiple sine bursts in one sequence are also supported
- Synthesis of any pules form

Transient Capture with SRS Calculation

The Transient Capture module allows the test engineer to acquire any transient event such as drop table, crash test or pyroshock pulses with high "g" hammer/tap impact or other excitation. Functions include calculation and visualization of an online SRS and display of the reference SRS graphics and the online SRS graphics in a single window for immediate evaluation of the test. Additional operating modes make this module an ideal tool for measuring, displaying and storing signals in general. Optionally the time domain data can be throughput to disc in a continuous data stream. This option is for capturing a series of pulses. Triggering is then done in post-test, avoiding missing a real-time trigger.

- Maximum blocksize: 32,768 samples
- Maximum sampling up to 192 kHz (hardware dependent)
- Channel or manual trigger together with free run mode as scope
- User-defined trigger channel and conditions (level, slope, pre-trigger)

- Optional: data throughput to disc to capture a continuous data stream of multiple pulses (e.g. solar panel deployment)
- Post-processing of time data throughput files (*.sot)

Post-Processing & Reporting

m+p VibControl's Advanced Post-Processing package is provided with any software module you purchase. Its post-testing includes extensive data handling, analysis, single and multiple data graphing and custom report formatting including company logo or other custom styles.

The reports can be generated online while running a test or upon test completion and data can be copied and pasted to Microsoft applications such as Word or Excel. For even more advanced analysis and reporting functionality, all m+p VibControl test results can be directly exported to the m+p Analyzer eReporter package.

Post-Processing

- Peak value analysis:
  Peak values will be marked automatically in the graphics and listed with their numerical data in a table
- DC offset removal (for classical shock, and transient capture modes)
- Graphical and numerical measurement and reference data analysis:
  - Control and response spectra with reference, alarm and abort limits
  - Error
  - Drive
  - FFT amplitude and phase
  - Double cursor with zoom-in function
  - Horizontal cursor
- - MaxiMax, positive and negative shock response spectrum
  - Multiple damping values calculations with graphical overlay

Printouts

- Multiplot:
  - Displaying and printing several traces in one graphic
  - Minimum and maximum labels for all traces
  - Peak search over all traces
- Autoplot:
  - Automatically printing a preselected series of graphics
- Printing a list of preselected test parameters
- Printing directly to Microsoft Word using a customer defined template
- One-click printing to a Word document of all or a selection of result data

Reporting

- Interface to m+p Analyzer software for comprehensive analysis and reporting
- Copy and paste of all or a selection of result data to Excel for matrix analysis
- Export of all or a selection of result data in Universal File Format
- Export of complete binary result file into ASCII file

Operating System

- Microsoft Windows 7 Pro and Windows 10 Pro 32 or 64 bit

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