INTERNATIONAL

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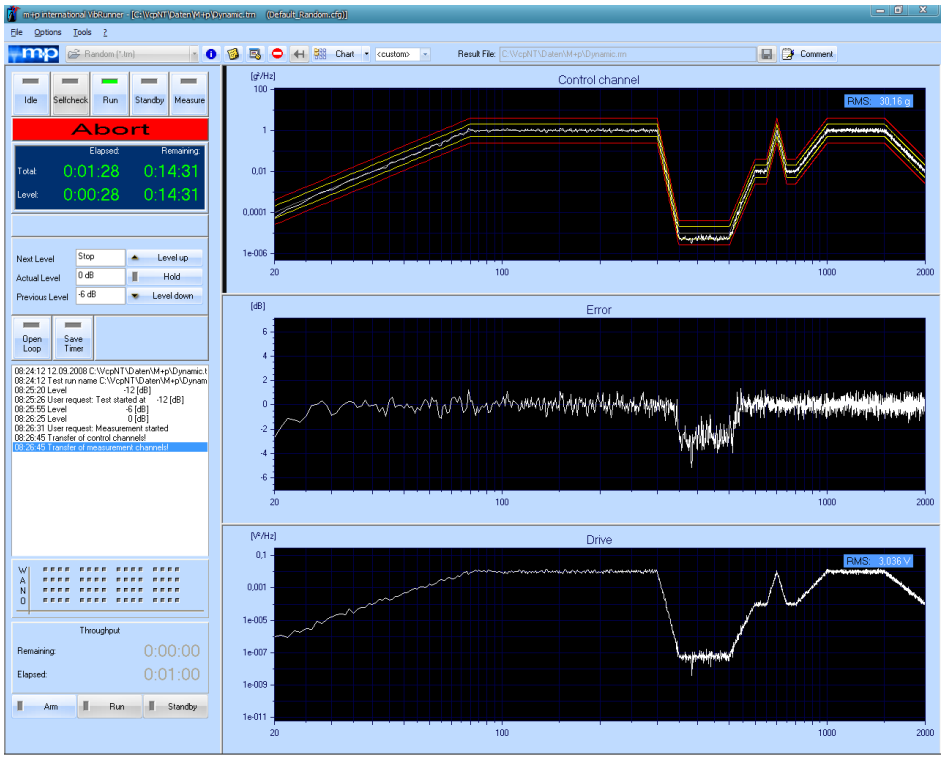
m+p VibControl

Random Vibration Control

m+p VibControl is m+p international's proven software for carrying out a wide variety of vibration tests. The Random control mode is one of the most common excitation modes for environmental shaker testing and performs real-time closed-loop control of PSD profiles.



Random test

Key Features

- Fully compliant with ISO, DIN and MIL-STD 810 standards
- Support on electrodynamic and hydraulic shakers
- Frequency range up to 12.8 kHz or 40 kHz, hardware dependent
- All input channels available as control, watchdog and/or measurement channels
- Control strategy: average, maximum, minimum
- True multi-tasking without loss of real-time control
- Notching/force limiting
- Kurtosis control
- Throughput time data recording
- Online time data and PSD displays
- Resolution up to 25,600 spectral lines, hardware dependent
- Import of field measured profiles with up to 25,600 breakpoints
- Seamless import/export of test results into applications such as Microsoft Word or Excel and m+p Analyzer
- Measuring and monitoring DC signals for functional testing

Applications

Random testing is commonly used in aerospace and military applications for duplicating such events as aircraft take-off, rocket launch or transportation over rough terrain. Kurtosis control accelerates structural life tests by controlling the amplitude distribution to achieve the high peaks seen in the field data. m+p VibControl also performs strain measurements using m+p hardware (m+p VibRunner, m+p VibMobile). Available bridges are full bridge, half bridge, quarter bridge, measuring either bending or Poisson's ratio.

Random Vibration

m+p VibControl's Random testing applies a random signal to the structure under test for a user-defined time and controlled by a user-defined PSD spectrum. The noise generated during this type of control tests is Gaussian random with or without amplitude sigma clipping. The reference PSD can have up to 25,600 lines of resolution (3,200 typical, hardware dependent) in any selectable sampling frequency range. The spectrum can be entered manually, copied and pasted from the Microsoft Windows clipboard or imported from a dual column ASCII file. A test schedule of multiple levels relative to the full level PSD reference spectrum will be followed to assure safe and accurate control based on lower level information.

Input Channels

All input channels can be allocated as control, watchdog, measurement or any combination. A measurement channel just measures the response and does not influence the control at all. A watchdog channel checks for not to exceed response amplitudes for system shutdown (tolerance) or for not to exceed response amplitudes for drive signal reduction (notching/limiting). The tolerance watchdog channel checks its response versus tolerance amplitudes. The notch watchdog channel checks its response versus a notch spectrum, broadband or narrowband. A control channel is always in the control loop and its response is always fed into the control algorithm defined with control strategy average, maximum or minimum.

- All input channels as control, watchdog, measurement or any combination
- Control on all input channels with average, maximum and minimum control strategy
- Notching (limiting) profiles may be defined for each watchdog channel individually
- Minimal notch profile overshoot
- Further notching features provided are:
  - Momentum Notching
  - RSS Vector Notching
  - Summed Force Notching

Test Set-Up & Test Run

The test set-up is very intuitive and easy to use. It is split up into four separate parts: reference spectrum editor, shaker/specimen information, level schedule and channel information including notch profiles. Typical set-up parameters like reference spectrum, notch spectra, channel descriptions, channel sensitivities and channel EU (Engineering Unit) can easily be copied and pasted from any application, m+p VibControl software (for easy transfer of information from other tests and/or modes of excitation) using the Microsoft Windows clipboard. Also complete column copy and paste of data series is supported.

While the test is running, all information important to the closed-loop control can be seen at a glance for fast and direct monitoring. Routine testing is done by simple automatic controls. Advanced manual controls for diagnostic test applications may be disabled for production use. A comprehensive system selfcheck is performed

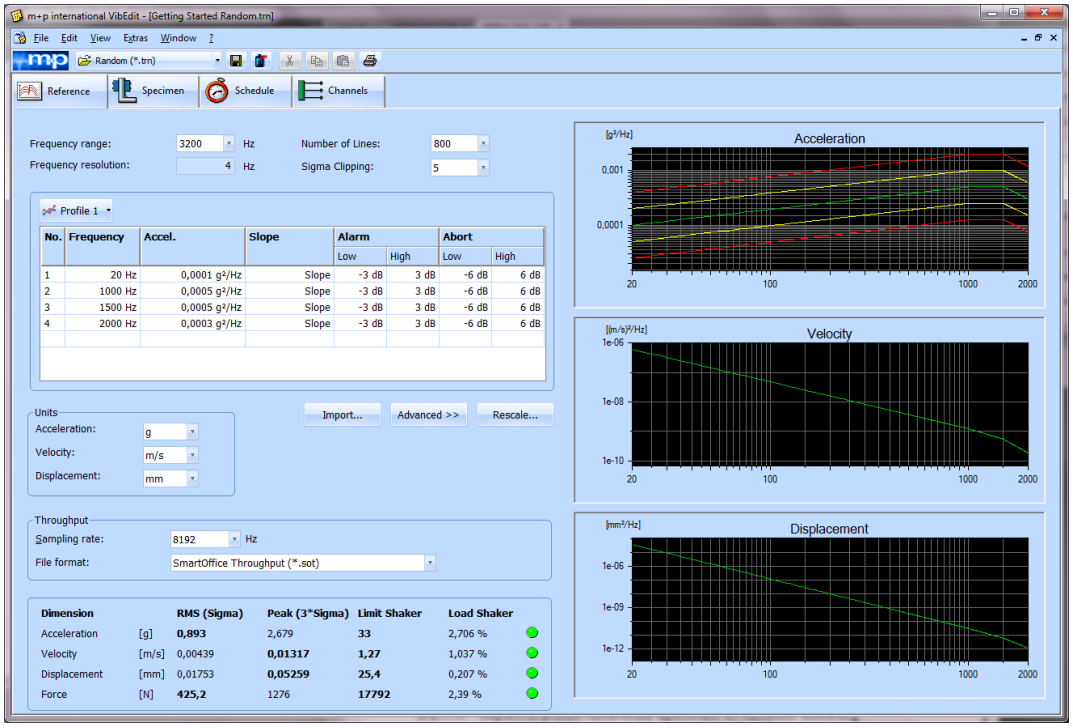
prior to running the test to ensure that sensors and drive signals are in place avoiding potentially dangerous and damaging situations. A date and time stamped test log is created showing details of the selfcheck and every test event. The test safety is assured with open loop detect, alarm/abort profile checks, overall grms control checks, drive level limit, individual channel grms high/low limits. 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).

Broadband Random Set-Up

- Frequency bandwidths from 50 Hz to 12.8 kHz in 9 steps (up to 40 kHz, hardware dependent)
- Time data display selectable
- Resolution from 200 to 25,600 lines in 8 steps
- Selectable units for acceleration, velocity and displacement
- Up to 10 profiles per test set-up
- Time history recording to throughput disc
- Automatic re-calculation with units changed
- Profile defined in PSD (g^2/Hz) up to 25,600 breakpoints with import from ASCII file
- Amplitude and/or slope entry with auto-calculation of end points
- Independent alarm and abort profiles with overall grms limits on each channel
- User-defined DOF averaging from 1 to unlimited
- User-defined level schedule with pre-test, unlimited steps and looping
- User-defined measurement schedule for data storage during test
- Sigma clipping selectable from 1.42 to 8
- Manual measure, reset, level up/down, open loop during test (functions can be disabled)
- Random control including notching/force limiting

Random Data Reduction

- Online analysis of random data
- Post-processing of time data throughput files (*.sot)



Setting up a random test

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. These together with advanced cursor functions, peak search, mathematical functions and transfer function analysis mean high-quality reports are completed easily and quickly. The Multiplot function extends the post-test analysis even further with the ability to display and plot data from different test types, several test runs or multiple test specimens in a single window. Data filtering is available to quickly select the most relevant data from all that was stored during the test. Data and graphics can be copied and pasted to Microsoft Office applications. 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

- Transfer function:
  Relating the behaviour of control and measurement channels in the test run
- Mathematical functions:
  Converting the measured acceleration signal into velocity and displacement, or vice versa
- Peak value analysis:
  Peak values will be marked automatically in the graphics and listed with their numerical data in a table
- Graphical and numerical measurement and reference data analysis:
  - Control and response spectra with reference, alarm, abort and notch limits
  - Error
  - Drive
  - FFT amplitude, coherence and phase
  - Double cursor with zoom-in function
  - Horizontal cursor

Printout

- 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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