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RS MePar – A Module of RS LabSite®

Software for Determining the Characteristics of Components with Visco-Elastic Properties

INSTRON® STRUCTURAL TESTING SYSTEMS

The Perfect Solution for Determining the Static and Dynamic Characteristics of Components with Visco-Elastic Properties

More and more, design organizations are turning to mathematical models and procedures to obtain fatigue life estimates and detect weak spots before the first prototype is built. Physical tests are also an integral part of the development process including final component validation. The data obtained in the test is used to further improve simulation processes and models.

RS MePar, a module from the RS LabSite® software suite, provides all functions for characterizing components with visco-elastic properties. Used in conjunction with RS Console and RS BasLab, the basic module of the RS Labsite suite, RS MePar offers flexible, programmable test monitoring and data acquisition functions which ensure that test engineers obtain all data required for defining the properties of elastomers and components.

The integrated MePar Viewer tool enables direct visualisation of test results and their presentation in various types of plots.

RS MePar can be Used to Fulfil the Following Tasks

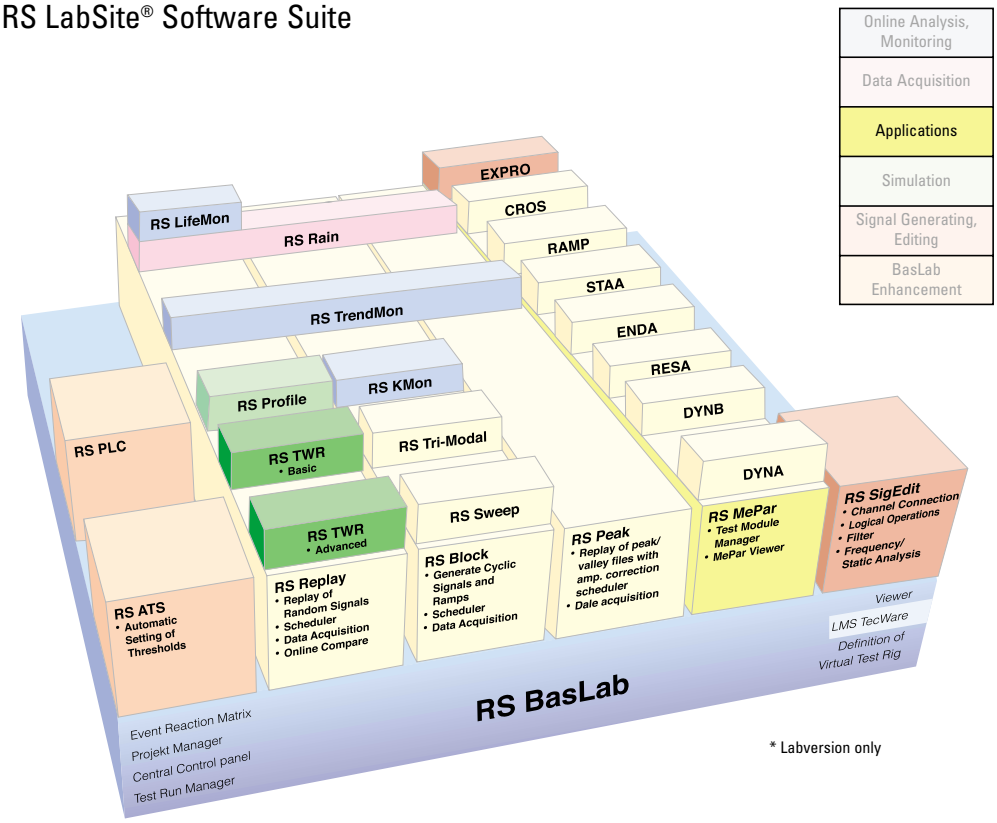
- Determine of static properties
- Determine of dynamic properties
- Analyze and document of test results and test conditions
- Determine component resonance
- Fatigue testing of components outside the resonance

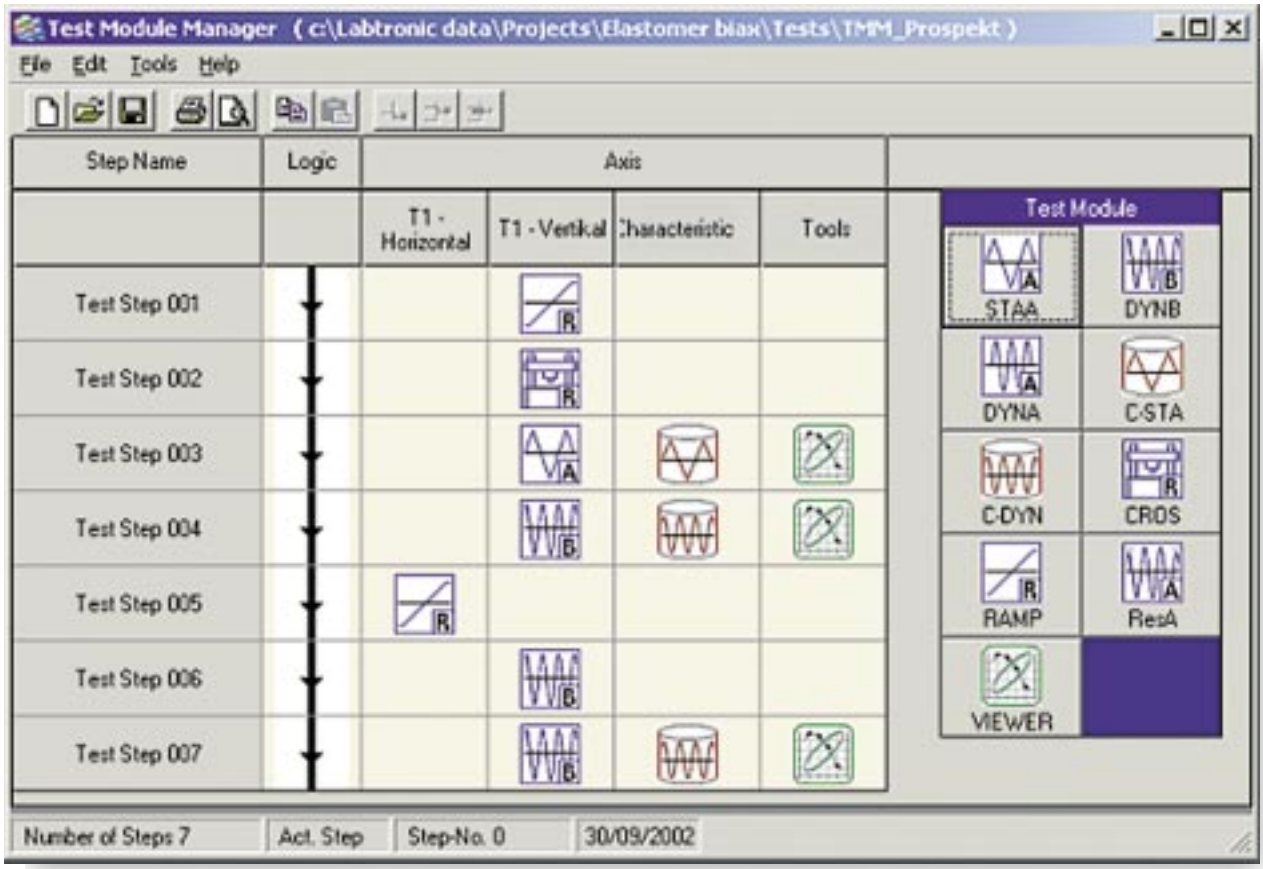
Specimens include:

- Elastomers
- Elastomer compound elements
- Hydromounts
- Vibration dampers
- Torsional vibration dampers
- Exhaust Lines
- Clutches
- Crankshaft

RS MePar consists of a basic package and currently eight optional modules.

RS LabSite® Software Suite





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Test Module Manager

Features

RS MePar integrates seamlessly into the RS LabSite® laboratory environment. The Windows® compliant software is easy to use, minimizing familiarization time.
RS MePar's Viewer functionality enables individual series of data from the measurement report to be plotted as required, with user-selectable scaling.
All test data is stored in a MS ACCESS data base, enabling data to be exported to other programs such as MS-Excel for presentation or further processing.

RS MePar Provides

- Automatic calculation of all relevant characteristic properties (more than 50)
- Automated test sequences with online plots (user configurable)
- Manual and automatic scaling
- Online or offline presentation of results
- Print function for result tables and plots
- Scheduler for multiple channels
- Displacement or load control (torque, angle, acceleration, etc.)
- Comparison of different results with EXPRO supplementary module
- Conversion of data to ASCII format
- Modular testing procedures built from individual test modules
- Input of specimen data
- Multi-axial testing
- Simultaneous evaluation of several pairs of measurement channels

Test Definition

Test Module Manager

Test Module Manager is the central tool for defining testing sequences within RS MePar.

The software takes the form of a clearly structured table, its lines and columns containing graphical symbols representing the functions of individual modules.

The columns show the individual axes of a testing system. A test program can be built individually for each axis from the modules in the Test Module tool bar, simply by inserting the respective Test Modules from the Test Module function box using the drag and drop method.

Each line of the test program is equivalent to a test module and specifies which functions are to be performed in a given step of the test. Several lines of the Test Module Manager thus constitute an easily defined and understood test program.

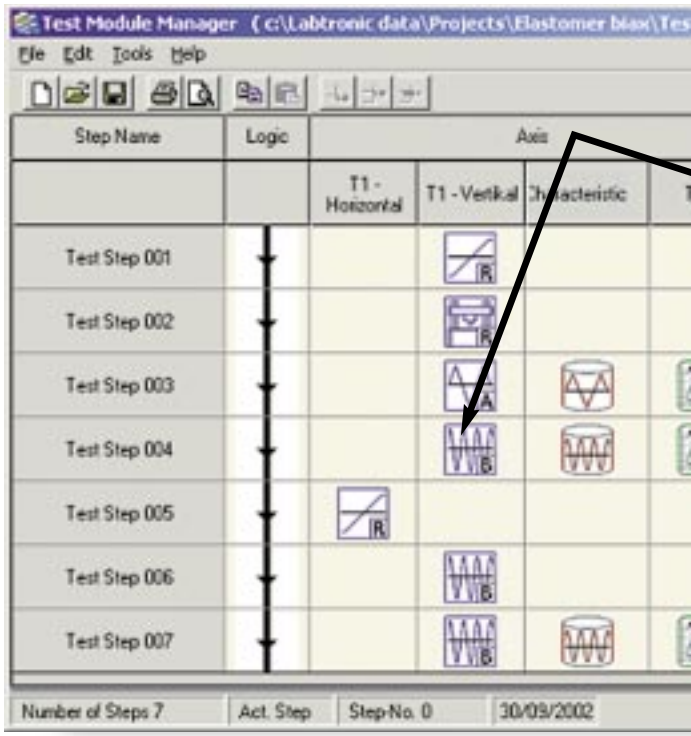

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Table containing different steps and test modules

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Torsion test system

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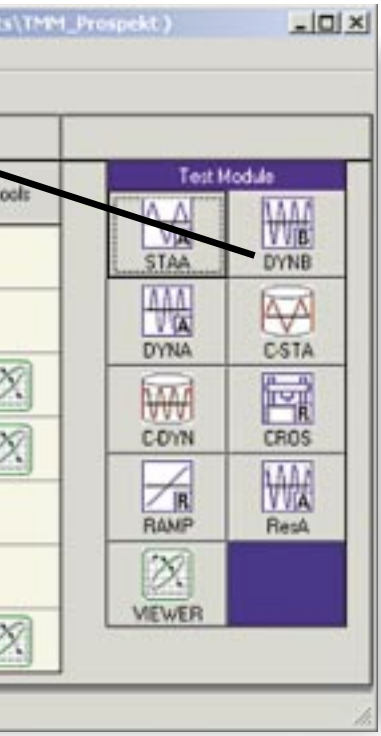
4-axis test system for evaluation of component properties and endurance testing



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Function box

Optional Test Modules:

The following modules are currently available:

STAA – For static tests

DYNA – Dynamic block tests with fixed, predetermined, pre and measurement cycles

DYNB – Dynamic block tests with predetermined tolerances of feedback and of measurement points

RAMP – For testing with ramp signals

CROS – applying pre-loads by control of the crosshead

RESA – Establishing resonant frequencies and accomplishment of tests within the resonance

ENDA – For endurance tests and monitoring

EXPRO – For test evaluation and comparative display

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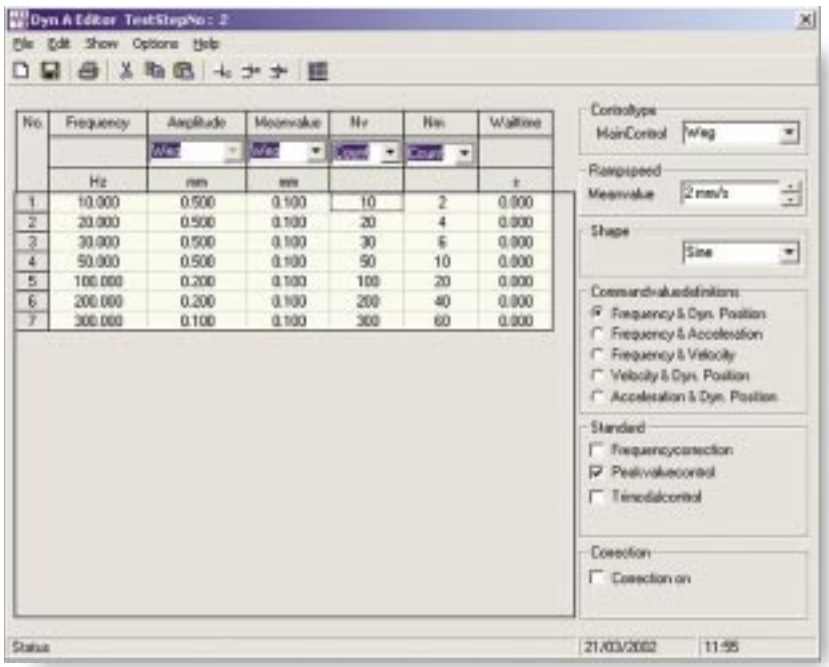
Multi axial elastomer testing system for triaxial component testing

Block Programming

Test conditions can be set for each block inserted in Test Module Manager. Double clicking on the respective test block (e.g. DYNA), opens an editor, in which test conditions such as frequency, amplitude, mean value, number of preliminary cycles and measurement cycles and waiting time can be defined for each block.

The tests thus created can be loaded into RS Block or RS Replay (Scheduler) for further processing. This enables endurance tests, simulation tests or arbitrary loops (including multi-axial tests) to be defined.



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Dynamic test in displacement control at frequencies from 10 to 300 Hz

Test Analysis

Presentation of Test Result

All characteristic properties are logged by MePar Viewer in a results table. To document a test procedure, the results table can be printed with all parameters or with desired pre-selected parameters.

To compare different tests, several plots can be placed side by side in several Viewers or shown directly in one graph with the help of the EXPRO supplementary module.

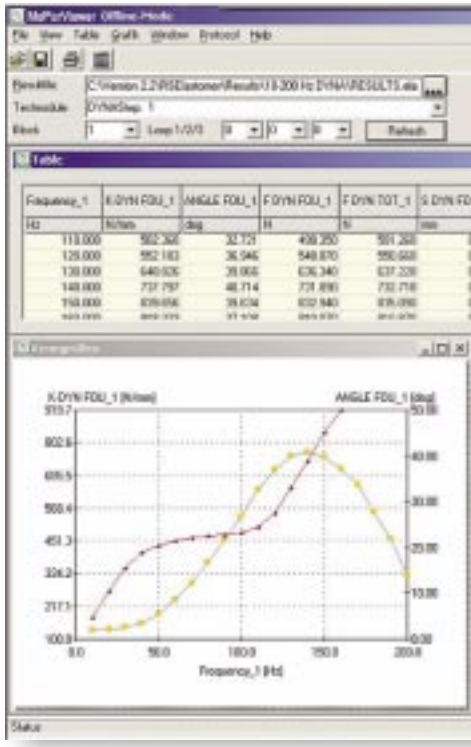
For dynamic tests, two methods of evaluation are available:

1. Determination of loss work by integration of the area of the hysteresis loop and determination of overall signal amplitudes (TOTAL)

2. Determination of amplitudes and phase positions of the signals by analysis of the fundamental frequency (FOURIER)

More than 50 characteristics are available for selection in the results file, some of which are listed below.

- Displacement mean value
- Load mean value
- Amplitude of displacement fundamental
- Amplitude of force fundamental
- Phase lag between displacement and force fundamental
- Amplitudes of overall signals
- Loss work
- Dynamic, elastic and imaginary spring stiffness
- Phase shift, loss angle
- Damping coefficient
- Dynamic, storage and loss modulus of elasticity
- Loss factor
- Power



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MePar Viewer - test results

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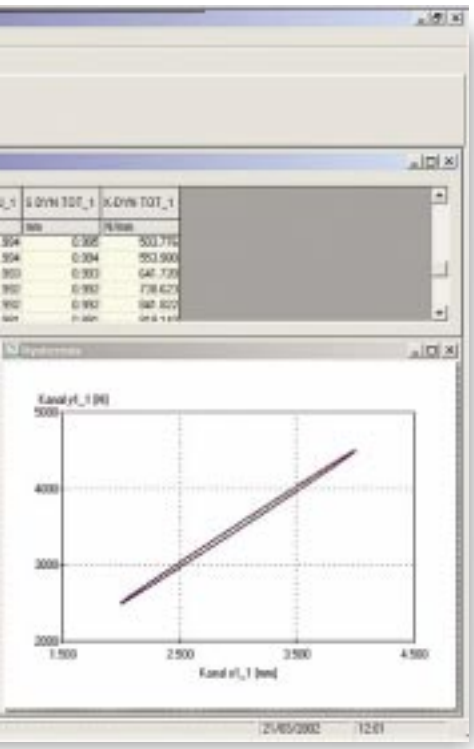
Selection of characteristics

Data Export

For further processing and preparation of complex presentations, data can be exported to MS Excel format.

The ability to program user-specific macros enables automated customized processing of test data.

Integration in RS LabSite®



RS Block and RS Replay provide the basis for additional powerful options. For some applications, particularly when testing complex structures, iterative processes are commonly applied to optimize drive signals. RS LabSite offers a number of programs for this purpose. A test created under RS MePar can be loaded into RS Block or RS Replay (Scheduler) for further processing and modification. This enables endurance tests, simulation tests or arbitrary loops and even multi-axial tests to be programmed.

- **RS BasLab** manages all test laboratory data in a central database, from the creation of tests to the management of test results. In addition, RS BasLab manages the users of a test rig, enabling new users to log-on easily and take over from other users. Consistent storage procedures guarantee high data integrity while ensuring that data is readily available and easy to find.

- **RS Block** provides command signal generation, monitoring and data acquisition functions for single and multi-channel tests within the RS LabSite software suite. Control channels can be operated individually or assigned to test groups in any combination required. This makes RS Block a highly flexible tool in any test laboratory.

- **RS Replay** includes all functions required for performing durability tests under RS BasLab, the basic module of the RS Labsite software. Flexible, programmable test monitoring and data acquisition functions allow the test engineer to obtain all necessary information to ensure accurate reproduction of field measured loads.

- **RS Profile Correction** is used for single axial and multi-axial tests where there is little or no cross talk between channels. The software offers excellent ease of handling and provides drive file correction on a sample-by-sample basis to achieve the required response signal.

- **RS TWR** provides advanced tools including a powerful inversion method for evaluating simulation quality. The number of channels to be reproduced may be different from the number of excitation channels (handling of non-square FRF matrices). During the iteration phase, RS TWR optimises the drive signal until the best possible response signal is found.

- **RS Rain** enables online determination of rainflow matrices of selected signals. To facilitate visual assessment, reduction to Range Pair or Level Crossing distribution is easily achieved.

Determination and monitoring of a number of different properties with powerful modules.

- **RS TrendMon** provides for segment-by-segment determination of the following statistical variables:
  - Minimum and maximum
  - Mean value and range
  - Standard deviation and rms value

- **RS KMon** determines and monitors various parameters during hysteresis acquisition (e.g. loss angle, loss work or stiffness).

Report Generation

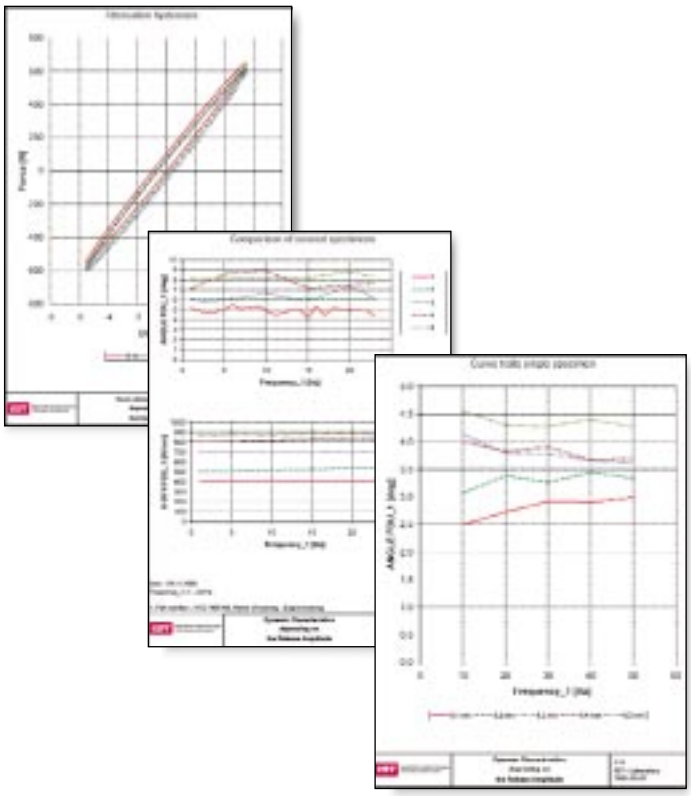
EXPRO

The EXPRO software provides flexible functions for presentation of result data in the form of plots (hysteresis loops, time signals, characteristic properties).
EXPRO opens MS Excel for generating report. If necessary, the test report can be further processed using MS Excel functionality.

Expro Features:

Flexible output of plots:

- Hysteresis loops
- Time signals
- Characteristic properties
- Up to two plots per report
- Presentation of multiple curves relating to one specimen in one plot (up to five traces)
- Presentation of multiple traces for multiple specimens in the same plot (up to five traces)
- Integration of headlines, comments or logos in the report
- Two Y-axes
- Predefined tolerance range



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Test system for characterization of elastomer components and rubber metal elements, up to 400 Hz

The Durability Alliance
ACCELERATING THE DEVELOPMENT PROCESS

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