

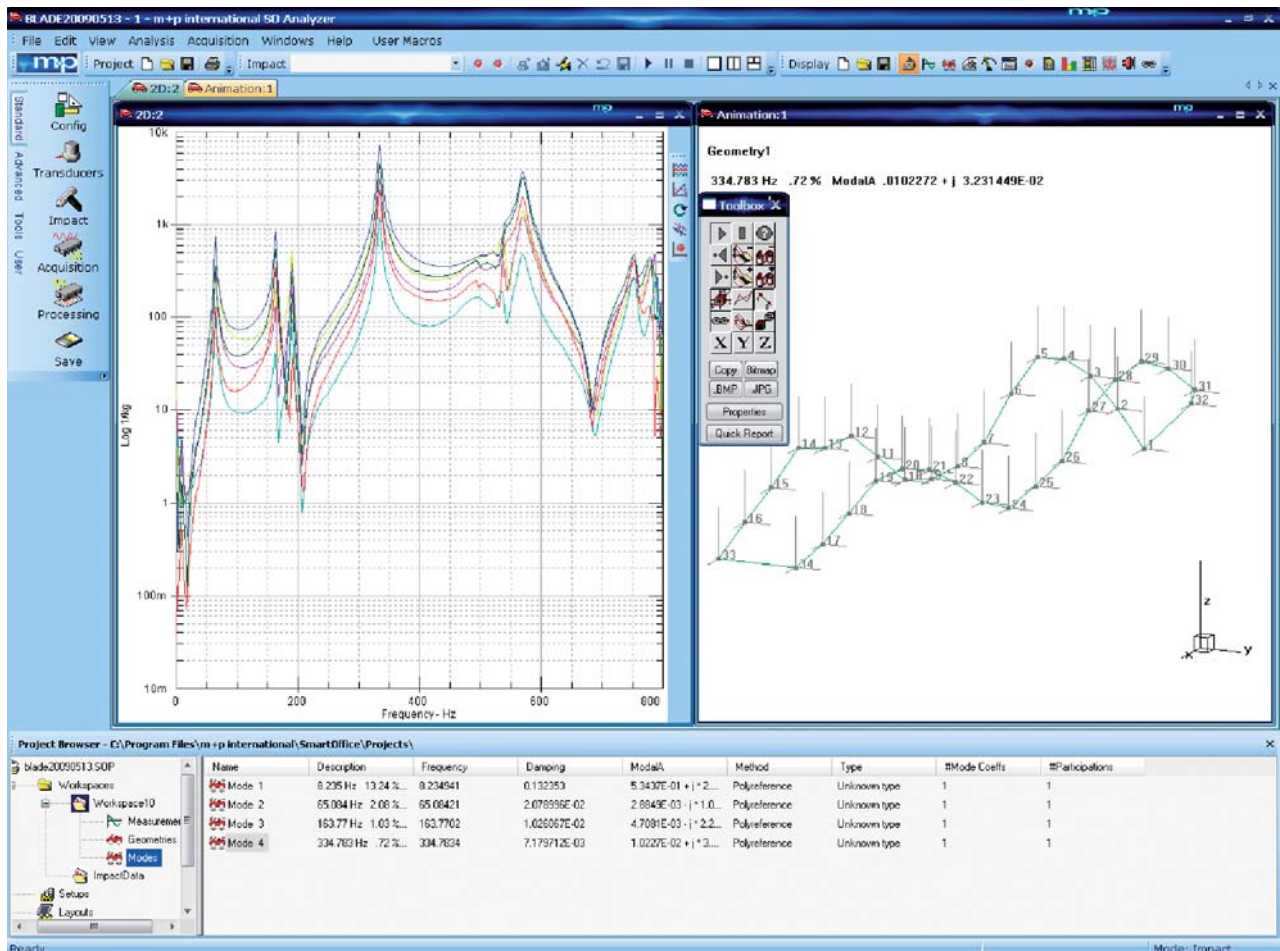
Application Note

Modal Testing on Helicopter Rotors

Tsinghua University in Beijing successfully uses the m+p international SO Analyzer impact testing bundle to perform modal tests on helicopter rotor blades. These tests are done to study the coupled or uncoupled behaviour of the blade which is exposed to wave, shimmy and torsional modes.

The acquired modal parameters of the blade (natural frequency, mass and damping) enable optimization of the blade design such that it cannot resonate with the air harmonic excitation. As a consequence, the vibration of the helicopter will be reduced.

The results of the modal tests on the helicopter blade can also be used as input for flutter evaluation.



SO Analyzer provides a full suite of test tools for modal analysis including guided impact hammer testing, swept and stepped sine testing with one or more shakers and includes ODS, SDOF and MDOF analysis methods – all integrated into the one user interface for efficient and easy-to-use testing and analysis. Modal model validation is also available for mode comparisons between tests or between tests and FE results.

The impact testing module includes useful tools like the selection of a roving hammer or transducer, selection of data points/nodes, double impact detection and rejection, definition of force and exponential window and a user-definable display configuration as visual measurement feedback. The combination of automatic DOF/node scheduling, automatic rejection of invalid measurements and automatic saving of data after a user-defined interval virtually eliminates all keyboard interaction. This is helpful for impact testing on large structures or at locations that are difficult to access.

As a standard, the impact testing bundle includes a simple step-by-step approach for geometry creation and ODS (Operating Deflection Shape) analysis.

For structural analysis m+p international also provides bundles for advanced modal analysis, SDOF (Single Degree of Freedom) and MDOF (Multiple Degree of Freedom) analysis, MIMO (Multiple Input/Multiple Output) for multi-shaker use, operating modal analysis, modal model validation, stepped sine online analysis and sine reduction analysis.

The SO Analyzer is a powerful software system for central management of large data sets. It provides the test engineer with comprehensive capabilities for browsing, viewing, editing, analysing and reporting data as well as with full ActiveX compliance.