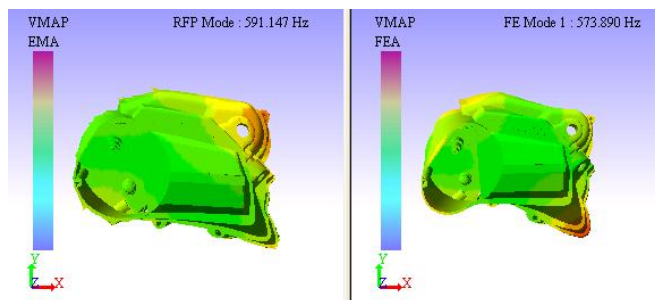
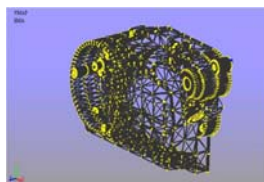


Experimental Modal Analysis and FE Model liason

Goes beyond Experimental Modal Analysis by interfacing ProEngineer, Solidworks, CATIA CAD's and NASTRAN, ANSYS, RADIOSS, SIMULIA solvers



VMAP Key points:

- Direct Data acquisition or Post processing mode
- Built in CAD interface
- Testing as SISO, SIMO, MIMO
- Advanced fitting methods
- Correlation with FE: Geometrical, Visual, MAC, CoMAC, FRAC
- Structural Modification
- Operating Deflection Shapes ODS

Vibroacoustic analysis and Simulation in the fields of: Automotive, Aeronautics, Railway, Ships, Construction, machines, Building construction

VMAP Software Key features and Usage

VMAP is an experimental modal analysis and FEA-Test correlation software which special features are:

Direct Data Acquisition

- Support: National Instruments, Data Translation and Vibration Research hardware
- Testing type: Hammer Testing & Shaker Testing
- Configuration: Single Input Single Output (SISO), Single Input Multi Output (SIMO), Multi Input Multi Output (MIMO)

Built in CAD interface

- Designing three dimensional (3D) models of test objects
- Editing test models
- Export the test model in Universal File Format
- Import models from CAD software (ProEngineer, Solidworks, CATIA)
- Import models from finite element analysis software NASTRAN, ANSYS, RADIOSS, SIMULIA, UFF

Test Planner

- FE-driven test planner, Automated selection of best measurement points, Linked to CAD interface to build and edit test models

Curve Fitting

- Circle Fitting, Rational Fraction Polynomial (RFP) Fitting, Least Squares Complex Exponential Fitting
- Add-on Functions for customization and VMAP-Scilab Interface

Correlation

- Geometric Correlation, Overlap Tool to correlate Test Geometry with FEM Geometry
- Visual Correlation, Comparison of mode shapes of test and FE-Modal Analysis
- Numerical Correlation, Modal Assurance Criterion (MAC, CoMAC), Frequency Response Assurance Criterion (FRAC)

Damping (FE Model Updating)

- Interface with FE Software ANSYS (Workbench, Multiphysics), NASTRAN
- Linked to Modal Analysis, Transient Analysis, Harmonic Analysis
- Different Models of Damping: Alpha-Beta Model, Material Damping, Constant Damping Ratio, Modal Damping

Structural Modification (FE Model Updating)

- Interface ANSYS (Multiphysics), ABAQUS (SIMULIA)
- Stiffness Correlation Analysis
- Results Viewer
 - Locations in the structure requiring modification
 - Compare FRFs - FEM FRF, EMA FRF, Updated FEM FRF

Non Contact Vibration Measurement Data - Polytec

- Applications: MEMS, Rotating machineries, Hot surfaces
- Animation: Frequency Domain results, ODS

	ANSYS	NASTRAN	RADIOSS	Hyper Mesh	SIMULIA
Hexahedral	✓	✓	✓	✓	✓
Tetrahedral	✓	✓	✓	✓	✓
Pentahedron	✗	✗	✓	✓	✓
Quadrilateral	✓	✓	✓	✓	✓
Triangle	✓	✓	✓	✓	✓
Line	✓	✓	✓	✓	✓
Mixed Mesh	✓	✓	✓	✓	✓

VMAP is a product of TechPassion



VMAP: Experimental Modal Analysis and FEA-Test Correlation Software

VMAP, combined with our expert engineering services team, can offer complete NVH solutions for new product development and Troubleshooting, it covers & include high-end features for Experimental Modal Analysis, FE Modal analysis, FE-Test Correlation.

Some applications in brief:

Wind Turbines: Turbine blades are large and flexible structures subjected to transient aerodynamic excitations of large magnitude causing failures of gear-pinions and bearings due to fatigue. Simulation models of the dynamic characteristics of an assembled wind turbine are extremely complex since it must be taken in account structural and aero-elastic properties of a wind turbine. Operation deflection modes can affect alignment of power train and lead to fatigue. Correlation studies are necessary for events like load reversals, emergency stops, turbulent conditions.

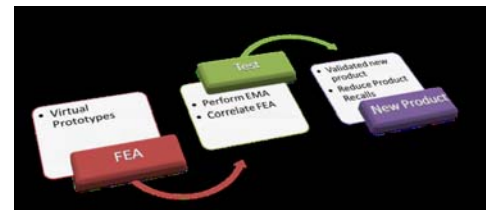
Aerospace: the increase need to design lighter and quieter aircrafts for passenger comfort using flexible components and the need to compare numerical modeling with testing and validation.

Principal activities refer to *Component fatigue* in the design of critical systems such as landing gears, *Ground vibration testing* help in identification of critical vibration modes for increased aircraft safety, *Flutter analysis* for aerodynamic instability where wings and other aircraft surfaces vibrate excessively above certain speeds.

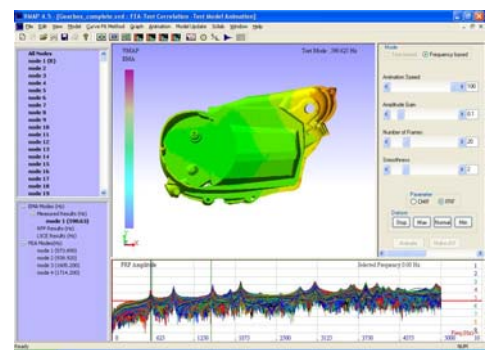
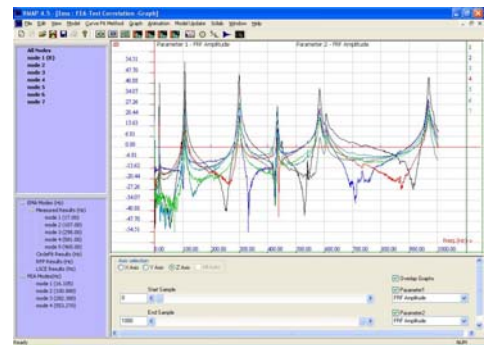
Comparison of predicted results from analysis models with physical test results, lead to accurately tuning of simulation models and arrive at flutter airspeed. Also *Critical stiffness* attributes can be obtained from model updating, to create flexible body representations of individual components.

Civil Engineering: to detect bridge failures before it happens it requires VMAP Modal Analysis advanced features, right sensors selection, large and accurate data acquisition systems.

Automotive: to develop products to meet requirements on durability, acoustics, comfort, warranty and time and money constraints, VMAP and our experience can help you in the design and development of: Exhaust System, Suspensions, Pumps, Transmissions, Steering Wheels, Bearings ...



FEA to Testing to the Product



Typical VMAP workdesk to handle the full process from testing to FE and correlation. All the layout and items displayed can be customs define to match specific applications and personal usage.

VMAP Data acquisition, Data exchange, Post Processing, Data-base

DAQ: VMAP is based on Open Hardware Architecture and has direct interface with DAQ Systems from National Instruments, Data Translation, Vibration Research.

Data exchange with market available DAQ Hardware and Software is handled using UFF file format

CAD: On top of the built in CAD interface, VMAP import data from ProEngineer, Solidworks, CATIA

FEM: VMAP import data from Nastran, Ansys, Radioss, Simulia

FE Model: VMAP has a direct interface with Ansys, Nastran and Abaqus (Simulia)

VMAP Scilab interface

Scilab is free open source software with a GPL compatible license, developed by the [Scilab Consortium](http://www.scilab.org/). All Scilab libraries are free with accepted and recognized licenses by the FLOSS community (Free, Libre Open Source Software). The license is one of the key criteria for the selection of a library of Scilab.

