eta/VPG Version 3.1 Release Notes

November 2005

Overview of VPG 3.1 Release

eta/VPG version 3.1 builds upon the new interface introduced in version 3.0, by adding many new features aimed at enhancing the usability and enabling additional reuse of engineering data.

New features in eta/VPG 3.1 :

- Topology Automeshing Features
- Radioss 4.4 Block Format Interface
- Abaqus Interface
- On-Line Help
- Drop Test Module
- Material Library
- Material Thickness Calculation
- Macro Recorder
- Adams/Chassis XML Interface
- Tire Model Improvements
- New Fatigue Analysis Tutorial
- Updated Dummy & Barrier Models
- Airbag Folder
- Post Processing of Eigenvalue and FFT mode shape reconstruction
- Batch Mesher

Release 3.1 Description

New Features and Improvements for VPG/PrePost

New features have been added to the VPG/PrePost module, and additions or updates made to many of the other features already available in this module.

General Improvements

Users now have the ability to change the background to gradients. This is controlled by the Utilities – Setup Menu.

Since model sizes are continually increasing, the ability to view models with only feature lines shown becomes a necessary option. Users may view and rotate their model using feature lines by holding down the SHIFT key while clicking the left mouse button to rotate, center button to pan and right button to zoom. An additional viewing features is also included, which allows the users to view a "node cloud" of the model by selecting the ALT key while simultaneously holding the right / center/ left mouse buttons to rotate, pan or zoom.

New icons have been added to VPG to allow users easy access to Clear Node, Clear Element, Node ID, Element ID, Distance and Angle commands.

New Options for Topology Automeshing

Users who have been using the Topology Automeshing option in the Surface Mesh menu now have additional features which allow more control over the mesh generation. The Control Point option allows users to define nodes or points at which a node will be required to be generated during the meshing process. This allows users to more easily re-mesh local areas of the model and keep the boundary nodes intact.

Another automeshing feature implemented in VPG 3.1 is the ability to automatically refine or corase the mesh along a line. This shows the user the "proposed" mesh along a line and enables a feature where the user may select the line and by mouse clicking, refine of coarse the mesh along that line.

Radioss 4.4 Interface

VPG 3.1 reads and writes Radioss version 4.4 Block format files. This enables users to not only construct models for use in Radioss, but to translate these models into other supported formats including NASTRAN and LS-DYNA. The level of interface allows the users to select the Radioss environment from the SETUP menu (Utilities/Setup), and the environment will then be set so that menus and options are appropriate for Radioss modeling.

To write a Radioss 4.4 file, the user selects Export from the File menu, and will be prompted for which Radioss format will be exported; 4.1 Fixed Format or 4.4 Block Format.

Abaqus Interface

Previous versions of VPG had a very simple ABAQUS interface, allowing users to import nodes and element definitions. VPG 3.1 now includes a more comprehensive material and element library for ABAQUS, and supports Abaqus version 6.5. This interface is not currently at the level of other MCAE interfaces in VPG, as it does not translate to other MCAE solver formats as does the Radioss, LS-DYNA, NASTRAN and Pam-Crash interfaces.

Users may access the Abaqus interface by selecting Abaqus when opening a new database, or by selecting the Utilities menu and the Setup command.

On-Line Help

The VPG User's Manual is now available on-line, by selecting Help from the top menu bar. When the On-Line Help option is selected, a window will open containing a searchable version of the VPG Manual.

Drop Test Module

Earlier versions of the ETA software product FEMB contained a feature called "Drop Test Module". This module allowed users to set up a series of drop tests for a test specimen, using a few simple problem description templates. Based on user requests and feedback, this module has been integrated into the VPG/PrePost module.

To access the Drop Test Module, the user selects "DTM" from the Main Menu bar. This opens a series of dialogue boxes which allow the user to define drop orientation, drop heights. After completion of the problem definitions, the user can output a

Material Library

In order to provide a common database of materials for users to access, VPG now includes various steel and aluminum material properties which can be selected and assigned to parts of the model. This automatically populates the material cards with the appropriate data, in the appropriate model units. This Is available only in the LS-DYNA environment, and supports both the linear material model (Type 1) and the piecewise linear plasticity material model (Type 24).

By implementing this material library, potential for user error is reduced and a great deal of time can be saved.

Material Thickness Calculation

Finite element models of stamped structures have traditionally used the nominal material thickness value as the basis for all simulations. Recent trends in model size and complexity have made it feasible to begin to include additional details into the model, such as material thickness changes due to the metalforming process. VPG 3.1 now includes a tool to automatically calculate a material thinning estimate due to the manufacturing process of stamping the component. This uses a so-called “one step” metalforming analysis to calculate the strains required to form a component from a flat blank.

Users may access this feature by selecting MATERIAL THICKNESS from the PART menu. The user is prompted to select a part id from the menu or from the screen. When the selection process is completed, VPG than calculates a material thickness, using the material information already defined for the components. After the calculation is completed, the user may selectively visualize the new thickness of the part via a contour plot.

Macros

A new feature has been added to VPG/PrePost, allowing the user to record the commands executed by VPG, and then replay those commands in an automated fashion. Macros are saved in an XML format which lends itself to creation of custom macros by way of text editing.

The Macro menu is located on the Main menu bar and allows users the option to start recording the macro, end the recording, pause the recording of the macro, or replay an existing macro file.

This function, has many uses, but is especially useful for performing repetitive tasks, such as reading files.

New Features in VPG/Structure

Several enhancements have been made to existing features in the VPG/Structure Module. These include tire model enhancements and increase flexibility in creation of tire models, as well a new interface with MSC Software’s ADAMS/Chassis which allows users to import XML data for suspension system generation.

Adams/Chassis XML Interface

VPG users who wish to re-use data to create system level models have had the ability to read MSC Software's Adams files (*.adm) to establish a mechanism model. Recent releases of MSC's Adams software have had the ability to export data in an XML format, which is intended to facilitate sharing of the data with other applications. To take advantage of this source for suspension data, VPG has implemented an Adams/Chassis XML file reader. This allows users to import XML data generated by Adams/Chassis, creating all of the topology of the suspension, the bushings, springs, dampers, rigid links, and beam elements which make up a suspension.

Once this data has been imported into VPG, the user may visualize the suspension data using surfaces which VPG temporarily creates for this purpose.

All of the bushing, spring and damper data may be modified by the user. VPG provides an Modify Bushing command which allows the user to select the bushing and edit any data associated with that bushing. In a similar way the user may select Modify Hardpoint, where each of the suspension points may be selected and modified.

Tire Modeling

The standard VPG tire modeling interface now includes new options to allow the user to create a user-specified number of elements around the circumference of the tire. The previous version was limited to 48 elements around the circumference. Tire models which contain a greater number of elements in the contact patch area have been found to be more effective in predicting responses due to impacts with small objects. This feature also takes advantage of increased CPU power to provide improved simulation results.

Another option added to the tire modeling menu is the ability to automatically define Null Shell elements on the surface of the tire. Defining Null Shell elements on the surface of tires has been found to improve the performance of the tire to roadway contact interface.

Fatigue Analysis

The Fatigue Analysis menu on VPG/Structure has been improved by allowing users to read in up to 500 D3PLOT files as input for fatigue life calculations.

Additional improvements have been made to allow users to define stress units as GP, PA, and LB/FT^2 .

The Fatigue Menu is located in the Main Menu bar and must be executed on an empty VPG database.

A new tutorial is now available for users wishing to learn fatigue analysis. This tutorial provides a discussion of fatigue algorithms used in VPG and teaches the user how to define and assign material properties for fatigue analysis.

Post Processing Enhancements

The development of new features in eta/Post continues to focus on the NASTRAN and LS-DYNA results presentation features. Users will find new features such as dynamic analysis mode shape calculation via FFT and new display features such as user-defined color mapping.

Mode Shape Calculation from NODOUT Files has been reintroduced into VPG as a post processing feature accessed through the nodout to model icon.

The Post Processing module is integrated into VPG 3.0, and is accessed through the POST menu at the top of the VPG window.

Unix users will notice that the post processing capabilities are reorganized into Deformation and Stress modes, and that all the model results and animation control are available at all times, providing a greater ease of use.

To use the post processing functions, the user must first open a result file. VPG supports LS-DYNA D3PLOT and D3EIGV files, NASTRAN Punch and OP2 format files.

E3D File Assembly

ETA/Post allows users to now construct multi-stage animations by assembling various E3D files into a single continuous animation. This can be accessed in the Post processor by selecting the Tool menu and the Assemble E3D option.

User Defined Color Maps

Users who don't care for the default colors assigned to parts can modify the colors displayed by selecting EDIT and COLOR MAP. This opens a window where new colors may be selected. When the user saves this color map, it will be automatically loaded the next time they open the eta/Post software. There are also 2 other preset options, ETA and LSTC color maps. The default colors correspond to the ETA style color map.

VPG/Safety Features and Improvements

VPG/safety has undergone many changes since the version 3.0 release, however, these may be unseen by the users. Dummy models have been updated to make accurate positioning of the dummy models feasible.

Crash Tool Documentation

Many of the barrier models and dummy models now have documentation, showing the calibration curves for the barriers, dummy sub assemblies and complete dummies. This was compiled at user requests for a more comprehensive set of calibration data.

Airbag Folder

Airbag folding is a tedious and difficult task which can effect the response of dummy models if improperly performed. VPG 3.1 now includes an improved airbag folder, which allows users to fold an airbag using standard fold types, and to save that fold pattern and re-fold a bag, if desired.

The airbag folder is accessed through the VPG/Safety menu (SAFETY on the Main Menu bar), and can be used on various bag geometries.

Other Enhancements

Batch Meshing Software

Users who have a valid VPG license obtained from ETA or an authorized distributor have access to ETA's Batch Mesher software. This is a stand-alone module that allows users to select CAD files from their computer system, define element quality criteria and mesh parameters. This information will be used to automatically create a mesh, and generates a LS-DYNA file containing all element and node definitions.