



Mentat 3.3.0 Release Note

Summary

The purpose of this release is to deliver major new functional items to the user. Some work on optimization is also included.

Enhancements

Vector PostScript[®]

The option to write PostScript files in vector format is now available. The new vector format is useful for 2D and 3D wire frame output. For small models and plots, this results in a reduced file size. For large models, it is still preferable to use the raster (default) mode. Depth sorting is performed to improve the appearance of models displayed in solid mode.

Spring Back Computation

The visualization of deformable body spring back is now available. This is implemented by the computation of closest surface points for a given list of nodes and surfaces. The results can be visualized as either a scalar (contour) or vector plot. The precision of the computation can be controlled by the user. Also, the exclusion of surface points due to non-normal positions or positions exterior to trimming loops is available.

Translucency

Translucency of elements, surfaces, solids, and solid faces is now available. The degree of translucency for each color is controllable by the user through the color map menus. The user can specify either some or all elements, surfaces, solids, and solid faces to be translucent.

Arbitrary Post Tensor Transformations

During post processing, tensor components can be visualized in a coordinate system not aligned with the global directions. In addition to specifying the orientation of the coordinate system, the user can choose to view the results in either rectangular, cylindrical, or spherical systems. The visibility of the coordinate system itself can be controlled. Coordinate systems can be saved to and restored from files.

Progress Meter and Interrupt

A progress meter has been added to the lower right hand corner of the main window. Most significant operations have been instrumented to show their percent completion. Operations may be interrupted by pressing the escape key.

Utilizing the Clipboard in Windows NT

The following clipboard operations are available for the Windows NT version only:

- Copy the graphics area as an image to the clipboard. This is done by selecting the COPY GRAPHICS TO CLIPBOARD option on the system pulldown menu, which is accessed by clicking the right mouse button on the top of the main Mentat window. This pulldown menu also has options to start the on-line documentation and to refresh the Mentat windows.
- Copy tables, history plots, path plots, and optimization plots as tabular data to the clipboard.
- Paste xy textual data to a table. The data must be arranged in tabular format (2 tab delimited columns). The first row is interpreted as the label of the axes.

Optimization of the Delaunay Tetrahedral Mesher

The automatic tetrahedral mesher now runs about twice as fast as the previous version. In addition, meshing input is now checked for self-intersection and gaps before the meshing begins.

Shell Intersection Checking

it is now possible to check for intersection of triangular and quadrilateral elements. This can be used to check surface meshes before analysis or solid meshing.

Boundary Condition Merging

If desired identical boundary conditions applied to different nodes or elements can be merged into one boundary condition. This makes the MARC writer run much faster for large models.

Beam Visualization

Plotting options have been added to allow the visualization of beams with their cross sections. This may be done in solid or wireframe mode. In addition, vectors can be drawn showing the local directions to assist in verifying the proper orientation of each beam.

Identification of Sets

The identify sets plotting option has been improved to include in the legend only sets which have members which are visible. Also, the user can control which type of entities are being identified. For instance, only surfaces and element sets may be identified.

Hardware Double Buffering in X-Windows

Many X servers support a double buffering extension which is considerably faster than the normal methods used in Mentat. This is enabled using the `-xldb true` command line option (default true).

Other Changes

Optimized MARC Reader

The MARC reader has been optimized to minimize the amount of memory used. This allows very large models to be read into Mentat.

Match Curves

The match curves processor now reports and highlights the unmatched curves. Previously, the matched curves were highlighted.

Mapped Mesh Curve Divisions

A button has been added to change the curve divisions used for automatic meshing such that a mapped mesh can be created. This is only done for curve loops having four curves and having an appropriate geometry.

New IGES Export

IGES export now uses ITI's PDELIB 2.1.1 instead of version 1.2.5.

Color Menu

The color menu now has a block of color next to each number to assist in identifying the color. In addition, a second set of colors has been added to support the translucency plotting options.

Creating New Links

The NEW button has been removed from the top level links menu to prevent links of the inappropriate type from being made. Instead, the user must go to the menu appropriate for the desired link type.

Rebar Post Quantities

Mentat can now be used to request and post process element data from the new rebar elements in MARC.

Default Method for Adaptive Stepping

The default method for adaptive stepping has been changed from Crisfield to Modified Riks-Ramm.

New Restart Option

The restart option to write periodically plus the last increment has been added to the program.

New Sparse Solver Parameter

A new parameter has been added for the hardware sparse solver out-of-core threshold.

Writing Older MFD Files

Three hidden commands are now available for writing previous versions of the mfd file, namely:

- save_asmodel_231
- save_asmodel_310
- save_asmodel_320

Mapping and Unmapping Trimming Curves

Trimming curves can now be unmapped from a surface. In this case, they are drawn in the [0,1] global domain. The reverse process is also available; namely, global curves existing in the [0,1] domain can be used to trim a surface. These commands are useful for verifying and editing surface trimming information.

Writing Older Versions of ACIS SAT Files

The user can now write versions 1.6, 2.1, or 3.0 of the ACIS SAT file format. By default, the most recent version is written. This is located in the OPTIONS menu of the ACIS export menu.

Bug Fixes

Extra Nodes in MARC Reader

Only nodes which are truly in the MARC input file are generated when imported into Mentat. Previously, extra nodes were generated if there were gaps in the nodal ids.

Solid Plotting

The plotting of solids has been improved. Previously some faces were incorrectly plotted. In addition, on NT, it was not possible to correctly control the display of vertices, edges, and faces.

Solid Conversion

The conversion of solid faces to trimmed surfaces has been greatly improved, especially for faces whose underlying geometry was spherical or cylindrical.

Post Title

The post title is now properly read and displayed from a newly opened post file. Previously if a user changed the post title before opening a post file, the title was not properly updated.

Executing Procedures while Recording a Procedure

If a procedure file is executed while another procedure is being recorded, the new procedure file contains only the command to execute the file and not all of the commands in the file. This allows the creation of procedures which call other procedures.

Cylindrical Transformations

Cylindrical nodal transformations can now be made for any two defining points of the axis. Previously, if the first point was not at the origin, incorrect results were produced.

Orthotropic Materials with Radiation

An additional line of input is now written for the MARC input file when an orthotropic material is used in conjunction with radiation.

Contact Areas without Contact Bodies

It is now possible to define contact areas without having to first define contact bodies. Previously, the program crashed.

Scroll Bar

For long lists, the scroll bar now behaves properly. Previously, it had the tendency to jump around.

Outline Edges on Collapsed Elements

Edges of an element with collapsed faces are no longer detected as being on the outline.

Retained Nodes Greater than Nine

The menus have been updated to reflect the upper limit of nine retained nodes in a nodal tie. Previously, the program would crash if the tenth node was added.

Surfaces Could Not be Deleted

It is now possible to delete a surface after it has been meshed. Previously, the elements were permanently attached to the surface which prevented it from being deleted.

Retries During Hex Meshing

The hex mesher now repeats the meshing process with a 10% smaller element size after a meshing failure. The number of retries is set in the RUNS field of the hex meshing menu.

Rezone of Shells

It is now possible to rezone shells. In this case, the thickness of each element is used during the rezone if available.

Node Normals with Displacements

During post processing, the nodal displacements are now used when computing the normal direction of each node.

Writing Springs in Multiple Domains

A proper MARC input file is now written when the nodes of a spring are in different domains. The spring is considered to be in the domain of its first node.

Duplicate Set Names in Post File

The post reader now handles the case when there are duplicate set names in a post file by changing one of the set names.

Point Loads in Multiple Domains

Point loads which span more than one domain are now properly written.

Outline Filter in Select

The outline filter used for selecting nodes and edges now works properly.

Reading Cylindrical Transformations

When reading a MARC input file, each node having a cylindrical coordinate is assigned a proper transformation. This assures that boundary conditions are properly created.

Saving History and Path Plots on NT

It is now possible to save history and path plots on NT. Previously, the program crashed due to a bug in the NT libraries.

Known Bugs

X Server Problems on IRIX 5.3

The program may fail to start up when using the SGI IRIX 5.3 X Server. Either use the OpenGL version of the program (command line option -ogl) or set the maximum number of bit planes to 16 (-mb 16).

Static Stand-alone Menus

The command line option -df STATIC_STANDALONE no longer works because the menus are read from a binary menu file. Instead, the above option should be used when compiling the menus (menat -df STATIC_STANDALONE -compile menus/main.msb), or the binary menu file should be deleted and the option used as normal.

Supported Platforms

The following platforms and operating systems are supported by Mentat 3.3.0.

Vendor	OS	Hardware	OpenGL
DEC	OSF1 4.0	DEC Alpha	y
	NT 4.0sp1	DEC Alpha	y
HP	HPUX 10.0.1	700 series (PA1.1)	n
	HPUX 10.20.0	C series (PA 2.0)	y
IBM	AIX 4.1	RS6000	y
	AIX 4.2	RS6000	y
SGI	IRIX 6.3	mips2	y
Sun	Solaris 2.5	ultra	y
Intel	NT 4.0sp3	Intel Pentium	y

OpenGL Compatibility

When running over a network, the following combinations of client machine (where Mentat is running) and graphical server (where the user is viewing the program) have been found to work properly using OpenGL.

Client	Server					
	DEC	HP	IBM	SGI	SUN	NT ²
DEC	y ¹	n	y	n	y	y
HP	y	n	y	y	y	y
IBM	y	y	y	y	y	y
SGI	n	y	y ¹	y	y	y
SUN	y	y	y	y	y ³	y
NT	n	n	n	n	n	y

¹Double buffering not available.

²Requires additional software (see <http://www.hummingbird.com> or other vendor of X server software)

³Single buffering may not work on some Solaris 2.6 machines.