Release 1.9.1
Maestro Workstation Software
Release Notes

Important Notice For SGI Maestro 1.9.1 Users:

Late in the development of Maestro 1.9.1, an inadvertent change was made to the functioning of the File Save command in Maestro's View module. As a result, the File Save command does not function as documented in the Maestro 1.9 User Guide and Maestro On-line Help module. The current functioning of the File Save command in View is described below. Because the new functioning of the File Save command may not be optimal for some users, we have posted a patch on the 3D System World Wide Web site that can be downloaded and installed to restore the intended functionality. To download the patch along with instructions for installing it, connect to 3D Systems' web page at: http://www.3dsystems/MaestroPatch. Alternatively, you can also obtain a DOS formatted diskette containing the patch files by calling the 3D Systems Hotline at (800) 793-3669.

The intended functioning of the File Save command in View is to save only those part files that had been modified since the last File Save. The way the command functions in this release of Maestro 1.9.1 is that all files are saved, regardless of their modification status. The patch described in this notice restores the File Save command to its intended functionality.

The impact of the current functionality of the File Save command ranges from minimal, if you build only one or a few parts at a time, to serious, if you build many parts in a single build. Additionally, if supports are created for a part that is subsequently brought into the View module without the support file, and that part is saved even though it was not modified, the support and part files become unsynchronized. The supports must then be recreated before they can be edited or the part/support files can be sliced.

We appologize for the inconvenience this oversight may cause, but are happy that we can supply the patch to restore the program to its intended functionality.

Introduction

3D Systems is proud to announce Release 1.9.1 of the Maestro workstation software. Highlights of this Maestro release are:

- Supports the SLA™-190, SLA-250, SLA-350/3500, SLA-500, and SLA-5000 machines.
- Supports Silicon Graphics™ (SGI) platforms running IRIX™ release 5.3 or greater, and the low-cost SGI O2 platform running IRIX 6.3.
- Supports Hewlett-Packard™ platforms running HP-UX™ release 10.2.
- Improves Vista™ part support generation and editing.
- Incorporates new build styles that enable faster part building on SLA-500 machines with Zephyr™ recoaters.
- Incorporates new styles to support the ACES™ draw speed calculation in the Buildstation 4.1.1 software.
- Incorporates a new 0.05 mm (0.002 in) layer thickness **Tooling** style for SLA-3500 and SLA-5000 machines.
- Supports the 0.0635 mm (0.0025 in) layer thickness style on the SLA-250/50HR machine.
- Supports QuickCast 2.0 and its new hatching style called Hexagon. The Hexagon hatch style streamlines part draining, and increases the void ratio to improve casting success using standard foundry practices.
- Improves **Vents and Drains** functionality.
- Incorporates the ability to define differential values for each hatch/fill pass.
- Incorporates a new Help facility which significantly improves the on-line help available in Maestro.
- For HP users, improves the Z-directional accuracy with the incorporation of the ZSlice™ slicing module. This module was introduced to SGI users in release 1.8.0, replacing CSlice™. ZSlice, which is fully integrated into the Part Manager™ interface, includes all the functionality of CSlice while bringing the Z-directional accuracy in line with the SLA's industry-leading X and Y-directional accuracy.
- Fixes many bugs present in Maestro 1.8.

Hardware and Software Requirements

General Workstation Requirements

- Netscape's Navigator™ (Version 1.1 or greater) browser software is required to support Maestro's new Help Facility.
- Inventor™ Runtime Library Release 2.1.1 (execution only environment) or later is required to support Maestro's Vista viewer module.

SGI Platform Requirements

Minimum

- Indigo® R4000
- 66 MHz CPU Speed
- 48 MBytes of RAM
- IRIX 5.3
- CD-ROM Drive

Suggested

- Indigo 2® R10000
- 250 MHz CPU Speed
- 128+ MBytes of RAM
- IRIX 6.2
- CD-ROM Drive

Suggested

- O2® R10000
- 175MHz CPU Speed
- 128 Mbytes RAM
- IRIX 6.3
- CD-ROM Drive

HP Platform Requirements

Minimum

- HP 9000 Model 715/100
- 100MHz CPU Speed

- 64 Mbytes RAM
- CRX-24Z Graphics*
- HP-UX 10.2
- CD-ROM Drive

Optimal

- HP 9000 Model 735/125
- 125MHz CPU Speed
- 128 MBytes RAM
- CRX-24Z Graphics*
- HP-UX 10.2
- CD-ROM Drive

*Other 24-bit graphics cards may work, but have not been tested.

Release 1.8 Enhancements & New Features (HP Users Only)

Significant enhancements were made in Maestro's functionality in release 1.8. However, release 1.8 was only available for SGI users. Release 1.9.1 upgrades HP users to include all of the 1.8 functionality, as well as the specific additions and enhancements found in release 1.9.1.

This section describes the enhancements included in release 1.8 and is intended to familiarize HP users with information on the differences between release 1.7 and release 1.8 functionality. Some functions which were added or modified in release 1.8, were further changed in release 1.9.1. To avoid confusion, the text indicates where this has occurred.

SGI users should skip to the section headed **Release 1.9.1 Enhancements & New Features**.

ZSlice

Description

The ZSlice module, like CSlice, is a contour slicing software algorithm. Slicing is performed by sectioning a **.stl** file into layers and performing a layer-to-layer comparison to determine vector types needed to draw the layer shape. ZSlice differs from CSlice by compensating for Z-directional inaccuracies inherent in stereolighography's (SL) resin curing process.

There are three types of Z-directional inaccuracies present in SL:

- Overcure Error,
- Build Quantization Error, and
- Print-through Error.

Overcure Error is caused by the overcure on the first down-facing layers of a part. Overcure is necessary to create a total cure depth strong enough to withstand the forces of layer recoating. The Overcure Error Z-directional inaccuracy is approximately equal to the amount of border overcure, or the X and Y Fill vector cure depth specified by the user in Part Manager.

Build Quantization Error is the result of **.stl** part features not having their lowest and highest Z-dimensional points at multiples of the slice thickness. This error varies depending on the actual Z-height and the locations of the lowest and highest points, but is never more than plus or minus one-half the layer thickness.

Print-through is the physical result of the additive nature of resin curing. Because each layer of curing provides energy to the layer below, up to a certain depth, extra resin curing occurs at the down facing part of a feature. This additional cured material is a function of light refractive characteristics of the cured material and the amount of light exposure specified by the part cure depth parameters. It is usually between one and two layers thick in depth.

ZSlice compensates for these Z-directional errors by first determining the position of down-facing features during the layer-to-layer comparison. Next, the down-facing feature is shifted up a number of layers to compensate for Overcure Error and Print-through. The number of layers to shift is automatically calculated by Part Manager. Optionally, the number of layers compensated may be determined by the user.

NOTE: SLA-190 and SLA-250 users should note that for both the ACES ™ and QuickCast ™ buildstyles, ZSlice uses only X & Y fill on upfacing and downfacing layers (no hatch). Therefore, it is essential that X & Y fill be left ON (the default). This change does not affect users of the SLA-350/3500, SLA-500, and the SLA-5000 because these machines determine hatch on the fly at the buildstation.

ZSlice Parameters

The Z-correction options, **Auto ZCorrect** toggle button and **#Layers** parameter, are accessed through the new **Slice Options** menu in Part Manager's Component pop-up menu. For more information regarding the **Slice Options** menu, see below under **Part Manager, Slice Options Menu**.

When on, **Auto ZCorrect** automatically calculates and displays the **#Layers** parameter. The **#Layers** parameter is then assigned to the lowest assigned buildstyle in a component's Z-directional range. When **Auto ZCorrect** is on, the user is not permitted to modify the **#Layers** parameter.

When **Auto ZCorrect** is off, the user may enter a **#Layers** value.

The user may turn off all Z-correction by toggling off the **Auto ZCorrect** button and setting the **#Layers** value to 0.

Auto ZCorrect and **#Layers** values are saved in the buildstyle file. To save custom settings, modify the values as desired, then save the buildstyle using the Edit function.

NOTE: **Auto ZCorrect** is a function of D_p & E_c in the style files (*.sty). Therefore, when a customized .sty file is created, the user must enter the correct D_p & E_c values.

The **#Layers** parameter is the number of layers of Z correction. For example, if the component layer thickness is 0.15 mm (0.006 in) and the amount of error to correct is 0.30 mm (0.012 in), the number of layers to correct is 2 (0.30 mm/0.15 mm = 2, or 0.012 in/0.006 in = 2). The #Layers parameter is a function of the D_p and E_c values, the layer thickness, the Border and Hatch vector overcure values, and the Fill vector cure depth. The Z-directional error calculations are always rounded to the next whole number for slicing. The user may change the **#Layers** parameter as desired, however, the user-specified correction will always be rounded to the next slice layer during slicing.

NOTE: Because the layer thickness, Border and Hatch vector overcure values, and Fill vector cure depth buildstyle parameters are all used when calculating the **#Layers** value, any changes to these build style parameters may result in a modification to the **#Layers** value. If **Auto ZCorrect** is toggled on, Part Manager will perform and display this calculation automatically. If **Auto ZCorrect** is toggled off, the user must perform this calculation.

Maestro System Files

Global Configuration Assignment for partman.* Files

With the release of Maestro 1.7, Part Manager's configuration menu, **Config,** was enhanced to tie directory paths for style files to the environment variable (***$TDLIBDIR**) or user account specified paths. While this approach provided significant value to systems with multiple user accounts by allowing each account to specify the intended path, it eliminated the forced or global path functionality to which some existing customers were accustomed. Maestro 1.8 provided both types of configuration; it allows both global paths and user account specified paths.

For global paths, the user inputs the intended path into the default partman.* file (i.e. /usr/3d/lib/styles/sla250/in) in the default directories, as was the previous practice.

For example, a forced path specified by the user in the default directory ($TDLIBDIR) partman.* files should read:

…
bffDir = /usr/people/3dsys
styleDir = /usr/people/3dsys/styles
…
styDir2 = "/usr/3d/lib/Modified_styles/"
...

The result is global .bff and style directories for all users. Additionally, a sub-tree of potentially modified system wide files is found under:

/usr/3d/lib/Modified_styles/<Machine Type>/<Units>/

To use the default user account specified behavior, the same partman.* file(s) should read:

…
bffDir = “”
styleDir = “”
…
styDir2 = “”
…

This default configuration ties the default style file directories to

$TDLIBDIR/styles/<Machine Type>/<Units>

and the default “write to” style file directory to

<Home Directory>/styles

***$TDLIBDIR** is the environment variable found in the **.cshrc** file located in the home directory of each user account.

Configuration Assignment through Maestro Start-Up

Machine and unit type command line options have been added to the ‘maestro’ and ‘partman’ commands. This change allows machine and unit type configuration at startup without entering the **Config** menu. The machine-unit option syntax is as follows:

-190in	**;** configures Maestro to the SLA-190 and inch units
-190mm	**;** configures Maestro to the SLA-190 and millimeter units
-250in	**;** configures Maestro to the SLA-250 and inch units
-250mm	**;** configures Maestro to the SLA-250 and millimeter units
-350in	**;** configures Maestro to the SLA-350 and inch units
-350mm	**;** configures Maestro to the SLA-350 and millimeter units
-500in	**;** configures Maestro to the SLA-500 and inch units
-500mm	**;** configures Maestro to the SLA-500 and millimeter units

NOTE: Maestro 1.9.1 added unit type commands for the new Millenium machines as discussed in the Maestro 1.9.1 Additions and Enhancements section.

Eight corresponding partman.<machine><unit> files have been added to the $TDLIBDIR directory. These files are utilized by Maestro for configuration when one of the above corresponding options is selected. These files may be customized. The new configuration files are:

partman.190in

partman.190mm

partman.250in

partman.250mm

partman.350in

partman.350mm

partman.500in

partman.500mm

NOTE: Maestro 1.9.1 added partman.<machine><unit> files corresponding to the new Millenium machines as discussed in the Maestro 1.9.1 Additions and Enhancements section

Both types of configuration files can be saved within the Part Manager **Config** dialog box. To save a partman.cnf file, select the **Save as default** button. To save a partman.<machine><unit>, select the **Save** button.

A corresponding order of hierarchy has been established. The following describes both the standard configuration and machine-unit option hierarchy:

Standard (No Machine-Unit Option)	Machine-Unit Option Used
<current work directory>/partman.cnf	<current work directory>/ partman.<machine><unit>
〃	〃
$TDLIBDIR/partman.cnf	$TDLIBDIR/partman.<machine><unit>
〃	〃
$TDLIBDIR/styles/<machine>/ <unit>/partman.cnf	$TDLIBDIR/styles/<machine>/ <unit>/partman.cnf

When ‘maestro’ or ‘partman’ is typed at the UNIX command line, configuration is determined by first looking for a partman.cnf file in the current working directory. If none is present, the default partman.cnf in the $TDLIBDIR directory will be read for bffDir, styleDir, styDir2, machine, and units. The last two parameters, machine and units point to the $TDLIBDIR/styles/sla<machine>/<units> directory for all other parameters.

When ‘maestro -<machine><units>‘ or ‘partman -<machine><units>‘ is typed at the command line, configuration is determined by first looking for a partman.<machine><units> file in the current working directory. If none is present, the default partman.<machine><units> in the $TDLIBDIR directory will be read for bffDir, styleDir, styDir2, machine, and units. The last two parameters, machine and units point to the $TDLIBDIR/styles/<machine>/<units> directory for all other parameters.

File Content Modifications for partman.cnf Files

SLA-350 Replaces SLA-400

The default partman.cnf files in the **$TDLIBDIR/styles/<machine>/<units>** directory paths have the following new parameter values:

vat350_xmax = 13.8
vat350_ymax = 13.8
vat350_zmax = 15.7

The machine and vat information for the SLA-400 have been deleted. Remember, existing partman.cnf files cannot be used for Maestro 1.8 or 1.9.1. Newly created partman.cnf files will be modified appropriately.

Default partman.cnf files have been added to the **$TDLIBDIR/styles/sla350/<units>** directory paths and contain the following new parameter value:

MachineType = 350

Minimum Area

The minimum area parameter is not used by ZSlice in the partman.cnf file. It has been replaced by the Minimum Width For Fills parameter found in the Slice Options menu.

NOTE: CSlice is no longer supported in Maestro 1.9.1.

Buildstyle File Content Modifications (*.sty)

The following parameters have been added or modified in the build style files:

MinSkinWidth = 0.004	Minimum width for fills parameter from the Slice Options menu
Zlayers = [value]	#Layers parameter from Slice Options menu
ZCalculate = 1	Not Used
D_p = [value]	Resin value, used in #Layers calculation
E_c = [value]	Resin value, used in #Layers calculation
MBNumBorders = [value]	Additional Boundaries parameter - now available for solid and QuickCast™ builds
MBOffsetValue = [value]	Boundary Compensation parameter - now available for solid and QuickCast builds
QCMinSkin = 0.01	Minimum Skin Width parameter from the QuickCast Hatch Type menu
uhflag	New parameter for eliminating upfacing hatch vectors on the SLA-190/250 machines where fill vectors are to be drawn. If set to 0, no hatch vectors will be drawn where there are fill vectors. If set to 1, hatch vectors will be drawn where there are fill vectors.

dhflag	New parameter for eliminating down-facing hatch vectors on the SLA-190/250 machines where fill vectors are to be drawn. If set to 0, no hatch vectorswill be drawn where there are fill vectors. If set to 1, hatch vectors will be drawn where there are fill vectors.
StyleFlags	Currently not used

New Style Files (*.sty) and Recoat Style Files (*.rcs)

New style and recoat files have been added to correspond with each of the variables in the recently issued Resin Specific Parameters. The files names can be interpreted as follows:

SLXXXX	Resin type
A	ACES build style
Q	QuickCast buildstyle
W	Star Weave buildstyle
P	Part
S	Support
Z	Zephyr
L	Large Flat
T	Trapped volume (in all build styles except QuickCast
T	Triangle Build Style (when used with the Q (QuickCast) designation.
B	Box (in QuickCast only)
NV	No Vents
4	.004 in. layer thickness
6	.006 in. layer thickness
8	.008 in. layer thickness
10	.10 mm layer thickness
15	.15 mm layer thickness
20	.20 mm layer thickness

An example of the new style file designation:

SL5180APZ6.rcs	Resin type SL5180, ACES part, Zephyr recoater, .006 in. layer thickness.

Recoat Style File for the SLA-350

During the testing of the SLA-350, it was determined that modifying certain acceleration and velocity parameters to move the elevator faster can be detrimental to the accurate performance of the elevator. Very fast movement exceeds the system capabilities to decelerate and stop the elevator at the desired distance. This typically results in parts which are oversized in the Z direction.

With Maestro 1.8.0, the default recoat style files contain a **ZDipAccel** value of 0.2 which is the correct value and will prevent the above mentioned inaccuracies. If custom recoat styles are created by SLA-350 users, the **ZDipAccel** value should not exceed 0.2.

System Files

The Slice and Slice150 executable files are not provided with Maestro 1.8.0 or 1.9.1. The standard $TDLIBDIR file structure has been modified to eliminate the sla400 directory path and associated style files, and add the sla350 directory path with associated style files, which coincides with SLA product line changes.

Part Manager

Slice Options Menu

A new menu, Slice Options, is available in Part Manager to access the **ZSlice** parameters. The Slice Options menu is available through the **Component** pop-up menu. The **Slice Options** menu contains the **Beam Comp** toggle button and parameter, **Auto ZCorrect** toggle button and **#Layers** parameter, **Additional Boundaries** parameter, **Boundary Compensation** parameter, and the **Minimum width for fills** parameter.

In Maestro 1.7, **Beam Comp** was located in the **Beam Comp** menu from the **Component Menu**. All of the **Beam Comp** parameters have been moved to the **Slice Options** menu.

The **Additional Boundaries** and **Boundary Compensation** parameters have been moved from the Maestro 1.7 QuickCast **Hatch Style** menu location to the **Slice Options** menu. This allows customized solid or QuickCast build styles with additional boundaries. All functionality of the parameters remains the same.

Minimum width for fills, a new parameter, has been added**. Minimum width for fills** replaces the hidden partman.cnf **Minimum Area** parameter. With **Minimum Area**, vectors for a specific geometry would be eliminated from the **.sli** file if the surface area of the geometry was less

than the **Minimum Area** parameter value. Instead**, Minimum width for fills** uses the X/Y directional width of a geometry as the determining factor in eliminating vectors from the **.sli** file.

All **Slice Option** menu values are saved in the buildstyle file except for the **Beam Comp** parameter. To save custom settings (except **Beam Comp** parameter), modify the values as desired, then save the buildstyle through the edit function. The **Beam Comp** parameter can be saved separately in the partman.cnf file.

Vista

Z Compensation in Vista

A new parameter, **Z Compensation**, is used by Part Manager to communicate the Z-directional compensation amount to Vista. This enhancement is provided to ensure overlap in the part to support connection. Essentially, the new parameter tells Vista to push up the supports by the **Z Compensation** value during support creation. **Z Compensation** is passed to Vista via the **TmpVista_<partname><Vista style file>.srg** file. This file is created during the Vista automatic support creation process and contains all parameters assigned in the Vista style file (*.srg) and the **Z Compensation** parameter.

NOTE: The user must always ensure Z-directional compensation values are set in Part Manager prior to creating supports, or else part-to-support connection may not occur, resulting in a failed build. Additionally, any parts that are re-sliced using ZSlice with Z-directional compensation must have the supports recreated before re-slicing.

Z Compensation from the UNIX Command Line

When using **Vista** or **generate_defaults** from the UNIX command line, a TmpVista_<partname><Vista style file>.srg file may be specified. This option uses the same syntax as specifying any .srg file:

Vista partname.odf -p TmpVista_<part file><Vista style file>.srg

Additionally, the Z-Compensation parameter may be manually added to any .srg file through the use of a text editor. If a file different from TmpVista_<partname><Vista style file>.srg is specified as the command

line argument to the Vista or generate_defaults executables, then the value for Z Compensation will be automatically set to zero, or the parameter value specified in the .srg file will be used.

Brace Push Up in Vista

A new hidden parameter, -**Brace Push Up,** was included in Maestro 1.8 to enhance the use of support cross-braces when creating supports. The intent of this parameter is to allow users to push the support cross brace up into the part for added support on Line Regions. This parameter is currently not in any Vista Viewer dialog box. Hence, it must be added and modified in the *.srg file directly. The parameter appears in the .srg file as follows:

Brace Push Up .01

Custom Draw

In the new **Custom Draw** support window, it is possible to zoom, pan and rotate while drawing custom supports. Rotation is provided for completeness but is less useful than zoom or pan since supports cannot be added while in a non-orthogonal orientation.

The Custom Draw window may be in edit or view mode in the same way that the main Vista window may be in select or view mode. Move to edit mode by clicking the “arrow” button in the **Custom Draw** window. Move to view mode by clicking the “hand” button.

Editing the supports in the new **Custom Draw** window is different from the manner in which it was done in earlier versions of Maestro. There are two separate methods for editing the supports, add-mode and delete-mode. While in add-mode, lines can be added, and while in delete-mode, lines can be deleted. Follow the instructions in the hand draw window to use these two modes. The instructions on the screen change appropriately when a selection of one or the other mode is made.

View

Colors

An environment variable has been added to allow **Vents and Drains** color changes shown in View. The default for **Vents and Drains** is set to cyan and yellow, respectively. For some people, these colors are difficult to distinguish from each other. This enhancement allows the user to set the colors to any RGB (red, green, blue) color format values. To modify the colors, add the following lines in the .cshrc file in the user account home directory:

setenv ALT_COLOR_FOR_VENT "<Value> <Value> <Value>"

setenv ALT_COLOR_FOR_DRAIN "<Value> <Value> <Value>"

It is important that both lines be added to the .cshrc file or that no changes be made. It is not acceptable to add only one of the two lines. All <Value> parameters must be set in the RGB numerical range of 0 to 255.

Maestro Part Preparation Procedure

With ZSlice, the part preparation process requires a step-by-step part preparation procedure. Users should conform to the following sequence when preparing parts:

1. Initiate Maestro - Part Manager module and configure the spreadsheet.
2. Load all part .stl or .slc files.
3. Enter View module and layout/orient the part files, ensuring that the part files are all translated to the appropriate minimum z-height for supporting.
4. Save the part files and exit View. This step ensures that Part Manager is updated with part extents information.
5. Assign buildstyle files (Range Menu) and edit the Slice Options menu (if necessary) for each part file. This step ensures that the appropriate Z Compensation value will be passed to the Vista module.
6. Create Vista supports.
7. Edit supports (if necessary) using the Vista Viewer, then save supports *and* regions. This step ensures, upon re-entering the Vista Viewer, that the regions/supports shown will reflect those saved.
8. Exit the Vista Viewer back into Part Manager.
9. Assign the support buildstyles and all recoat styles.
10. Save the spreadsheet to an appropriate filename, then select Prepare to create build files.

Maestro Release 1.9.1 Enhancements & New Features

New Styles

- Includes part, support and recoat styles, and style directories for the new Millenium series SLA-5000 machine using SL 5195 resin.
- Includes new recoat styles for faster part building on SLA-500 with Zephyr Recoaters.
- Includes part, support, and recoat styles for the 0.05 mm (0.002 in) layer thickness **Tooling** buildstyle on SLA-350/ 3500 and SLA-5000 machines.
- Includes part, support, and recoat styles for the 0.635 mm (0.0025 in) layer thickness buildstyle on the SLA-250/50HR high resolution machine.
- Includes part, support, and recoat styles for the new SL 5410 resin on the SLA-500.
- Includes part, support, and recoat sytles for the QuickCast Hexagon buildstyle

Vista Support Generation and Editing

- Simplifies the user interface in Vista when viewing and modifying supports.
- Vista now generates default supports sufficient to support the part without over-supporting, thus significantly reducing the need for support editing by the user. Specifically, Vista better compensates for supports that intersect either the part or another support, there is less supporting of vertical holes and cylinders, Vista minimizes the number of supports created with large patterned surfaces, and provides supports for small downfacing features.
- Vista includes a new support feature, called Separators, that places a sierra demarcation just above the build platform making it easier to remove parts from the platform.
- Vista no longer overrides the **Minimum Part Height** with 0.4 inches when saving a style in the Vista Viewer.
- The Create Supports function automatically adds the corresponding support style for the selected part to the support range column of the spreadsheet.

Differential Hatch/Fill Values

Although included in this release, the differential hatch/fill feature is reserved for future development. 3D Systems recommends you set all four hatch values to the same value, and set the x and y fill values to the same value.

Help Facility

A significant improvement in on-line help is provided by a new Help Facility. Using Netscape™ to display .html help pages allows the use of color and graphics to aid understanding.

Significant reduction in the number of known bugs

All outstanding Trouble Reports were addressed and much development time was spent investigating, evaluating, solving or developing workarounds for these issues. All known problems are documented in the **Known Problem Listing** section.

Specific Changes in Maestro Modules

Partman

General Bug Fixes

Part Manager will not allow preparing more than 20 components when the configuration is set to SLA-190 or SLA-250 to prevent a buildstation crash.

Part Manager prevents changing the layer thickness on .slc components.

Part Manager now allows translations with both .stl and .slc files loaded without crashing when the Apply button is clicked.

Default .prt Filename

The default Partman .prt filename is now “newpart” (all lowercase).

File/Configuration Menu

Added a new build machine type 5000, and changed the build machine type 350 to 350/3500, to allow configuring the spreadsheet for the new SLA machines.

File/Query Menu

Added the total X, Y, Z extents to the dialog box.

Component/Create Supports Menu

Added a new button called **Support Small Features**. Enabling **Support Small Features** reduces the grid by 50% with the effect that small part features will more likely be supported when the user invokes the **Create Supports** function.

Note: Using small features will create more downfacing regions for the part. Also, it is not feasible to use this option for very large .stl models.

Component File/Query Menu

Added the total X, Y, and Z extents to the dialog box.

Component/Combine Menu

You can now select several files at once to combine. While holding down the <Shift> key, depress the left mouse button and drag down the file list. Release the mouse button when the last file has been selected. Click on Select. All files will transfer to the Selected box. To remove a file from the selection list, click the left mouse button while positioned on the desired file.

Component/Analyze Menu

Added a **Cancel** button to the dialog box.

Range/Edit Menu (SLA-350/3500, 500 and 5000 machines)

Added x and y parameters to **Fill Cure Depth**, and added **Hatch #1 … Hatch #4** parameters to **Hatch Overcure.** This allows the user to create different Hatch and Fill values for each pass. This feature is designed to support future development. At this time, we recommend setting the Hatch values to the same value for each pass, and likewise, setting the x and y fill values to the same value.

Range/Edit/Tooling Style Parameters Menu

Added a new style called Tooling to the Hatch Type parameters. The Tooling Style creates a 0.05 mm (0.002 in) layer part by drawing the borders at 0.05 mm (0.002 in) layers and hatching and filling in 0.10 mm (0.004 in) layers. Essentially, hatching and filling is done every other layer. This style is available for the SLA-350/3500 and SLA-5000 machines.

View

General Bug Fixes

View now refreshes the screen to display the correct part position following small transformations.

View/Configuration

Added a new Configuration menu to View. The functions of the buttons and parameters provided in the menu are as follows:

Machine: selects/displays the SLA model of the simulated workspace.

Units: selects/displays the units (mm or in) of the simulated workspace.

Vat Size: displays the X, Y and Z dimensions simulated build envelope (vat) using the parameters selected in the Machine and Units boxes.

Vat Display: Enables (green)/disables (red) display of the simulated workspace envelope (vat) extents using the parameters selected in the Machine and Units boxes.

Snap-to-Origin: Enables (green)/disables (red) the snap origin feature. When enabled, components loaded into the viewer are automatically translated to originate at the coordinates specified in the x, y and z edit boxes.

When disabled, components are loaded into the viewer with the origin of components reflecting the way each component was saved to disk.

Note: As with any transformations in View, the snap-to-origin translation is only a display modification and is not made permanent until the file is saved.

View/Object/Transformation

Rearranged the dialog boxes within Transformation and added a new button: **Apply**.

All functions within **Object Transformation** remain the same with the exception that the **Apply** button temporarily saves the component display modifications in the viewer. Further transformations are based on the modified values, not the values that were loaded when entering View.

The **Apply** function does not save the transformations to the original file. To permanently save the modifications, component file must be saved.

View/Object/Copy

Added a new menu called **Object Copy**.

The **Copy** option can be selected only when an object is loaded and has been selected in the viewer. The copy dialog box will pop up and the **Object Transformation** dialog will close automatically if it was open.

In the dialog box, the X, Y, and Z translate fields are used to specify the location of the new copy to be made. After entering the desired location in these fields, the **Copy** button can be used to make copies of the selected object and the **Clear** button can be used to delete the selected object from the viewer. The **Reset** button is used to reset the translation values in the dialog box.

Note: Each new copy of a component will be named automatically with an appended number added to the original name to maintain unique file names.

View/Object/Modify

Added a new menu called **Modify Triangles**.

This option provides the ability to modify the triangles in a .stl file. To select a triangle, point to the triangle with the mouse, press the **Ctrl** Key and then click the right mouse button. A selected triangle can be deselected using the same method. The object must be in an ‘unselected’ state, so that the highlighted triangles are visible.

Note: Use of these features will cause a components to be modified. Modifications must be saved to become permanent in the file.

The functions of the buttons provided in the dialog box are as follows:

Remove: removes all selected triangles.

Blank: temporarily removes all selected triangles. Used to temporarily remove overlapping triangles which may be causing difficulties in selecting the desired target triangles.

Invert: reverses the unit normals for all selected triangles. Unit normals should point away from the mass of the component. Bad normal directions can cause faulty mass property calculations and shaded surface display errors.

Unblank: recovers blanked triangles.

Reset: undoes all changes and restores the workspace to the state at start of the edit session, or to the state immediately following the last **Apply**.

Apply: applies all changes to the components (but does not make the changes permanent.) Blanked triangles are unblanked.

Select by region: selects a region whereby all the triangles lying fully inside the defined region are modified in the same manner. The Minimum/Maximum x, y and z fields are used to specify the minimum and maximum extents of the region. If the **Inclusive** button is turned on, then all the triangles lying fully within the region are modified. If the **Exclusive** button is turned on, then all the triangles lying fully outside the region are modified. The **Inclusive** and the **Exclusive** options are mutually exclusive.

View/Query/Objects Menu

Added the total X, Y, Z extents to the dialog box.

Vista

Modified the Vista **Viewer Preferences**, **Display Options**, **Select Regions**, **Basic Parameters**, and **Gusset Parameters** menus. Added three new options in the **Vista** menu: **Separator Parameters**, **Brace Parameters** and **Save Regions and Supports**.

Vista/Viewer Preferences

Removed the **Reverse Zoom** option.

Vista/Display Options

Changed the menu orientation from vertical to horizontal and removed the **Points** option from the display method buttons. Displaying the support or part points was a little used option and was removed because it was causing problems in the program.

Vista/Select Regions

Added a box to display the total number of regions and a region **Type** column to the regions list. Also, whenever a support region is edited, the word (Edited) appears next to the region in the dialog box.

Vista/Basic Support

Added three new options: **Use Separators**, **Use Braces** and **Use Solid Braces**. Moved three parameters from the **Basic Support** menu to the **Braces** menu: **Minimum Support Width**, **Minimum Top Width**, and **Brace Interval**.

Use Separators: Separators are a row of triangular or trapezoidal holes on the supports attached to the build platform. Separators aid in detaching the supports from the platform during the support cleaning process. This option enables or disables Separator generation. The default is on.

Use Braces: Braces are cross trapezoidal shaped supports created on the supports under the support line, when they do not intersect another support for more than a **Brace Interval** parameter value. They stabilize the support. This option enables or disables brace generation. The default is on.

Use Solid Braces: By default, all braces attached to the build platform have triangular holes in them. This makes it easier to detach the brace from the platform. If the user desires, this option allows the brace to be made solid. Braces standing on up-facing regions can never be made solid.

See the menu selections below for more information on the parameters associated with these options.

Vista/Gussets

Added two new options: **Use Flags** and **Gusset Sierras**. Added five new parameters: **Top Sierras Intersect**, **Top Sierras Height**, **Side Sierras Intersect**, **Side Sierras Height** and **Maximum Pole Height**.

Use Flags: Flag supports substitute for gussets in some cases. The main disadvantage of gussets is that they mark the vertical wall they are attached to. Flag supports, which do not touch the vertical wall, are formed by dropping a pole away from the vertical wall and attaching the region-supporting triangular lamina to this pole. The parameter **Maximum Pole Height** is of primary importance in determining whether a flag support or a gusset support is created. If a region qualifies to be supported by gussets, and if the vertical distance between the down-facing region and the closest up-facing region or the platform beneath the down-facing region is less than the **Maximum Pole Height**, then a flag support is created instead of a gusset. The Use Flags default is off.

Gusset Sierras: enables or disables the creation of side and top sierras of a gusset, or the top sierras of a flag support. The default is on.

Top Sierras Intersect: specifies the vertical height of the portion of the top sierras which penetrates into the down-facing region of the part it is supporting. The default is 0.300 mm (0.080 in.).

Top Sierras Height: specifies the vertical height of each of the top sierras on triangular gusset lamina. The default is 2.000 mm (0.012 in.).

Side Sierras Intersect: specifies the length of the portion of the side sierras which penetrates the vertical wall of the part. The default is 0.300 m0m (0.080 in.).

Side Sierras Height: specifies the height of each vertical row of sierras. The default is 2.000 mm (0.012 in.).

Maximum Pole Height: specifies the maximum allowable vertical distance between the down-facing region and the closest up-facing region or the platform beneath the down-facing region, so as to qualify the region to be supported by flag supports. The default is 50.8mm (2.000 in.).

Note: It is not feasible to increase the Maximum Pole Height beyond 2.0 in since this will create a long flexible pole which might sway during the sweeping of the blade and may cause the build to fail.

Vista/Separator

Added this new menu with three parameters: **Opening Height**, **Opening Bottom Width**, and **Separator Height**.

Separators are formed only on those supports that stand on the platform. They are not formed on supports that stand on an up-facing region of the part. They are basically a row of triangular or trapezoidal holes made on the support (triangular by default). The primary function of the separators is to facilitate the removal of the supports from the platform. All the separator holes on the supports of a region are at the same height from the platform.

Note: For a region, if some of the supports stand on an up-facing section of the part and the remaining supports stand on the platform, only that section standing on the platform will have separators. The other section will have bottom sierras that serve the same purpose as the separators.

The parameters associated with the separators are:

Opening Height: specifies the vertical height of each triangular or trapezoidal hole of a separator. Changing this parameter will change the height of all the separator holes for the currently selected region. The default value is 1.250 mm (0.050 in.).

Opening Bottom Width: specifies the bottom width of the triangular or trapezoidal holes of the separators. Changing this parameter will change the width of all the separator holes for the selected region. The default value is 1.750 mm (0.070 in.).

Separator Height: specifies the vertical distance from the platform to the bottom of the separator holes. Changing the parameter changes the vertical distance of all the holes from the platform for the selected region. The default value is 3.000 mm (0.120 in.).

Hint: It is useful to keep the Separator Height parameter the same for all the regions. This helps in easy detachment of the supports from the platform.

Vista/Braces

Added this new menu with three parameters: **Minimum Brace Width**, **Minimum Top Brace Width**, and **Brace Interval**.

The braces are termed Delta Braces. These braces are made up of two independent parts and are of two types:

- Type A. The first type is one which stands on an up-facing region of the object being built. This brace is made up of only part one.
- Type B. The second type is one which stands on the platform of the SLA machine. This is made up of both part one and part two.

Note: The platform of the SLA machine has a matrix of 0.25 in diameter holes. If the brace was only made up of part 1, there is a possibility that the first cured layer of the brace (which is a point) may fall through the hole. The subsequent layers of the brace then will not have a foundation. This accumulation of error will probably cause the build to fail. Hence, part 2 basically blocks the hole on the platform, and then part 1 is constructed over part 2.

Minimum Brace Width: specifies the minimum value for the bottom width of the brace. The default value is 10.16 mm (.400 in.).

Minimum Top Brace Width: specifies the minimum value for the top width of a brace. The default value is 1.27 mm (0.0500 in.).

Brace Interval: specifies the spacing between braces. Braces are only added when a support line is created which does not intersect with another support line for more than the Brace Interval distance. There is a certain amount of slack in this parameter, since a strict interpretation of this distance creates more braces than most people want. Typically, Brace Interval would be the same as Line Spacing.

Usually no braces are necessary since the hatch lines intersect the projected edges often enough. There are times when braces may be necessary. If so, then braces are placed along a support line at brace interval. The default value is 12.7 mm (0.500 in.).

Vista/Save Regions and Supports

Added this new option as a convenience. Performs the **Save Supports** and **Save Regions** functions with a single mouse click.

Vista/Query Menu

Added the total X, Y, Z extents to the dialog box.

Maestro System Files

New Style Files (*.sty) and Recoat Style Files (*.rcs)

New style and recoat files have been added to correspond with each of the variables in the Resin Specific Parameters. New designators for the Tooling and QuickCast Hexagon buildstyles have been added:

T	Tooling buildstyle (layer thickness 0.05 mm (0.002 in) layer thickness
H	Hexagon hatch style (when used with the Q (QuickCast) buildstyle
2	0.05 mm (0.002 in) thickness
2_5	0.0635 mm (0.0025 in) layer thickness (only for SLA-250/50HR)

An example of the new style file designation:

SL5180QPH6.sty	Resin type SL5180, QuickCast Hexagon buildstyle, 0.006 in. layer thickness.

New Style and Recoat Files for SLA-250

Added the following new style files to support the SLA-250 and SLA-250/50HR:

in	mm
SL5170S2_5.sty	SL5170S635.sty
SL5170QPH6.sty	SL5170QPH15.sty
SL5170QSH6.sty	SL5170QSH15.sty
SL5170WP2_5.sty	SL5170WP635.sty

Added the following new recoat style files to support the SLA-250 and SLA-250/50HR:

in	mm
SL5170S2_5.rcs	SL5170S635.rcs
SL5170QSH.rcs	SL5170QSH.rcs
SL5170QPHZ6.rcs	SL5170QPHZ15.rcs
SL5170WPZ2_5.rcs	SL5170WPZ635.rcs

New Style and Recoat Files for SLA-350/3500

Added the following new style files to support the SLA-350/3500:

in	mm
SL5190TP2.sty	SL5190TP05.sty
SL5190TS4.sty	SL5190TS10.sty

Added the following new recoat style files to support the SLA-350/3500:

in	mm
SL5190TPZ2.rcs	SL5190TPZ05.rcs
SL5190TS2.rcs	SL5190TS10.rcs

New Style and Recoat Files for SLA-500

Added the following new style files to support the SLA-500:

in	mm
SL5180QPH6.sty	SL5180QPH15.sty
SL5180QSH6.sty	SL5180QSH15.sty
SL5410AP6.sty	SL5410AP150.sty
SL5410AS6.sty	SL5410AS150.sty
SL5410QP6.sty	SL5410QP150.sty
SL5410QPZ6.sty	SL5410QPZ150.sty
SL5410QS6.sty	SL5410QS150.sty
SL5410QPH6.sty	SL5410QPH15.sty
SL5410QPHZ6.sty	SL5410QPHZ15.sty

Added the following new recoat style files to support the SLA-500:

in	mm
SL5180QPHZ6.rcs	SL5180QPHZ15.rcs
SL5180QSH.rcs	SL5180QSH.rcs
SL5410AP6.rcs	SL5410AP150.rcs
SL5410APZ6.rcs	SL5410APZ150.rcs
SL5410AS6.rcs	SL5410AS150.rcs
SL5410QP6.rcs	SL5410QP150.rcs
SL5410QPZ6.rcs	SL5410QPZ150.rcs
SL5410QS6.rcs	SL5410QS150.rcs

New Style and Recoat Files for SLA-5000

Added the following new style files to support the SLA-5000:

in	mm
SL5195AP4.sty	SL5195AP100.sty
SL5195AS4.sty	SL5195AS100.sty
SL5195AP6.sty	SL5195AP150.sty
SL5195AS6.sty	SL5195AS150.sty
SL5195QPH4.sty	SL5195QPH100.sty
SL5195WP5.sty	SL5195WP125.sty
SL5195WS5.sty	SL5195WS125.sty

Added the following new recoat style files to support the SLA-5000:

in	mm
SL5195AP4.rcs	SL5195AP100.rcs
SL5195AS4.rcs	SL5195AS100.rcs
SL5195AP6.rcs	SL5195AP150.rcs
SL5195AS6.rcs	SL5195AS150.rcs
SL5195QPH4.rcs	SL5195QPH100.rcs
SL5195WP5.rcs	SL5195WP125.rcs
SL5195WS5.rcs	SL5195WS125.rcs

Configuration Assignment through Maestro Start-Up

New machine and unit type command line options have been added to the 'maestro' and 'partman' commands. This change allows machine and unit type configuration at startup without entering the **Config** menu. The machine-unit option syntax is as follows:

-3500in ;configures Maestro to the SLA-350/3500 and inch units

-3500mm ;configures Maestro to the SLA-350/3500 and millimeter units

-5000in **;**configures Maestro to the SLA-5000 and inch units

-5000mm **;**configures Maestro to the SLA-5000 and millimeter units

Corresponding partman.<machine><unit> files have been added to the $TDLIBDIR directory. These files are utilized by Maestro for configuration when the above corresponding option is selected. These files may be customized. The new configuration files are:

partman.5000in

partman.5000mm

Both types of configuration files can be saved within the Part Manager Config dialog box. To save a partman.cnf file, select the **Save as default** button. To save a partman.<machine><unit>, select the **Save** button.

Known Problem Listing

In Partman

Problem:	**Description:** When a feature is less than the width of the drawn **linewidth**, **beamcomp** removes the feature completely. This especially can be a problem when the epoxy line width is > 0.3mm (.012 in). The problem can cause an entire build to be bad. If the first few layers of a part are a thin-wall geometry, the **linewidth** compensation value overlaps, and the layers disappear.
	Workaround: This problem is geometry dependent. View the .sli file and if necessary, drive the supports up into the part.
Problem (HP)	**Description:** The Part Manager extent information is slightly different than the View extent information. Also, translating a part in View by 1mm, changes the Part Manager extent information by 3mm.
	Workaround: Check to see that the part(s) starts at the desired Z-location before you prepare your build.
Problem (SGI)	**Description:** On the R10000 running IRIX 6.2+, the **Range/Add** display of file names is out-of-order. This makes it difficult to find the appropriate style file to select.
	Workaround: Use the vertical scroll bar to find the desired file name.
Problem	**Description:** The layer thickness is not displayed after reloading an .slc spreadsheet.
	Workaround: After reloading the .prt file, select Range/Add to reload the style file for the .slc component. The layer thickness is displayed (in green.)

InView

Problem (SGI)

Description: On Indigo (but not Indy or Indigo2) workstations with **Flat Shade** turned on, objects may appear coarse.

Workaround: The default lighting model has changed, therefore objects will be displayed differently from previous release when Flat Shade is on.

Problem (SGI)

Description: Volume and surface area dimensions are not updated using the Inch > mm or mm > Inch function.

Workaround: The volume and surface area are calculated based on the parameters in the file. You will need to manually convert the values when desired.

InVista

Problem

Description: In Select mode (arrow), switching to perspective viewing causes an additional refresh.

Workaround: You may notice some performance degradation when viewing very large parts.