Concepts Unlimited 1.0

Enhancements and Corrections Guide

CADSoft Solutions, Inc.

Jan 2004

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Introduction

Document Overview

This document contains a list of enhancements and corrections made to Concepts Unlimited since March 2003. These changes are incorporated into the latest release of Concepts Unlimited Service Pack 2.

History of Concepts Unlimited

Concepts Unlimited has an interesting history whose origins date back to 1994 when CSi was founded. Since 1994, the Concepts Unlimited program has over 25 man-years of development effort. Below is a time line showing the history of CU.

1994 Feb—CSi founded by Tim Olson, formerly Chief Engineer of Lockheed's Preliminary Design Methods group and responsible for Lockheed's internal CAD development group. CSi begins full time development of CADD Pro which is a wireframe, surface, solid modeling and drafting package for Mac and PC.

1996 March—Release first commercial version of CADD Pro.

1996 Oct—CSi signs a mostly exclusive OEM license agreement with Ashlar for the marketing and distribution rights for the CADD Pro product. Ashlar markets the CADD Pro product as Vellum Solids and later as Cobalt, Xenon, Argon, and Neon. Throughout the term of the agreement, CSi retains ownership of the CADD Pro product including its trademarks and all modifications and enhancements to it.

2003 Feb—The OEM license agreement with Ashlar terminates. CSi grants to Ashlar a new non-exclusive license to modify and use the CADD Pro source code. CSi begins modifications of the product for Concepts Unlimited which targets the Conceptual Computer Aided Design (CCAD) communities.

2003 Oct—CSi launches Concepts Unlimited.

2003 Nov—Concepts Unlimited Service Pack 1 released.

2004 Jan—Concepts Unlimited Service Pack 2 released.

What's Next

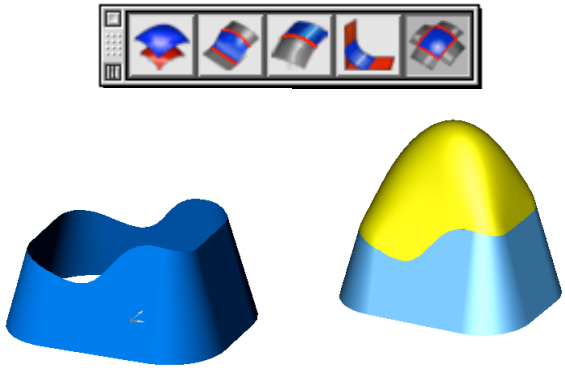
CSi's development plans include releasing frequent service packs and two major upgrades a year. The frequent service packs primarily include technology updates from our third party suppliers (Spatial, OpenDWG, and Lightworks) as well as critical bugs. The major upgrades include new functionality and/or performance improvements.

Enhancements

Modeling
Numerous modeling enhancements were incorporated into the current version of Concepts Unlimited that included updated third party components as well as new wireframe, surface, and solid modeling tools.

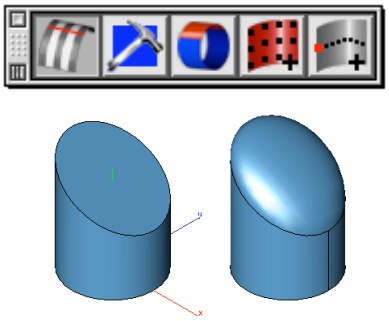
Kernel Update
The most notable component update came from Spatial regarding the ACIS kernel. CU was updated to support ACIS R12 SP3. This ACIS release includes well over 200 kernel improvements that impacted blending, shelling, local operations, booleans, and faceting. In addition, the R12 release included integration of Spatial's Interop translators for IGES, Step, and CATIA V4.

Filling and Covering
Another highlight of CU is associated with the significant enhancements to the tangent cover surface that support the new filling and capping algorithm from ACIS. The new algorithm removed the previous four sided restrictions and added a bulge factor to influence the tangent magnitude at shared edges. The new algorithm supports n-sided filling.



Filling and Covering

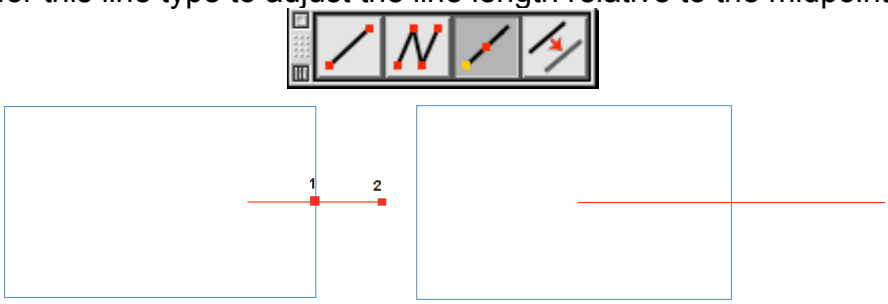
Edge Matching
Significant work went into replacing the previous edge matching tools in favor of those from ACIS. The new algorithm from ACIS allowed us to remove the prior restriction that limited edge matching to untrimmed surfaces. In addition, CSi modified the user interface to allow selection of faces of solids for edge matching. When you select a face, all edges of that face are matched to their respective neighboring surfaces.



Edge Matching

Midpoint Line

In CU SP2 a new tool for creating a line from two points was added. Unlike the other line tools, the first point provided by the user is the midpoint. This is appropriately called the line from midpoint tool. The data entry window was also modified for this line type to adjust the line length relative to the midpoint.



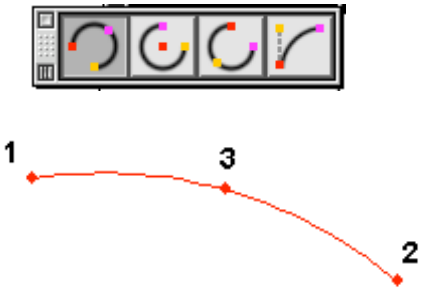
(a) MidPoint,EndPoint (b) Length Modify from Data Entry

Line From Midpoint

Arc Start/End

A new arc tool was added that supports creation of arcs using a different order of user supplied input points. This new arc tool accepts inputs as follows:

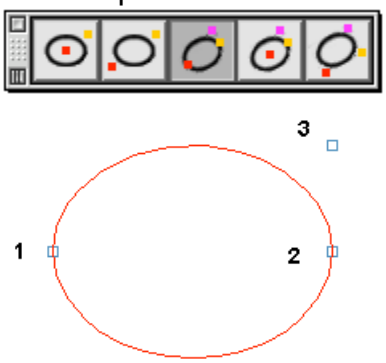
--Specify arc starting location
--Specify arc end location
--Specify point on arc



Arc Creation Tool

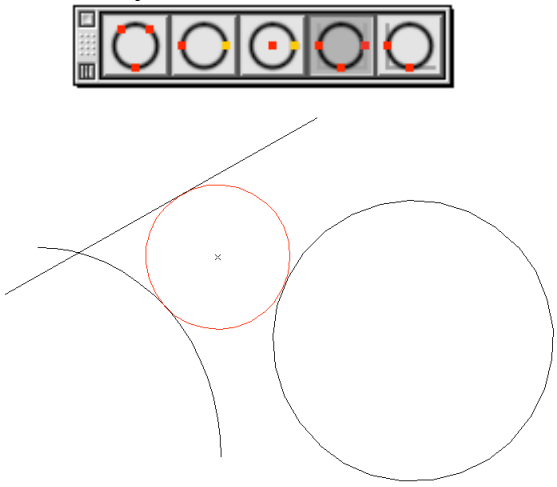
Use the instructional color-coding of the icons to help remember the difference between the various arc creation tools (1-Red, 2-Yellow, 3-Magenta)

Opposite Point Ellipse
In CU SP2 a new ellipse tool was added for creating an ellipse using opposite points on the major axis. The third point defines the radius along the minor axis.



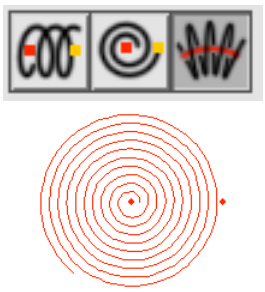
Opposite Point Ellipse

Circle Three Tangents
In CU SP2 a new tool was added that creates a circle from three curves. You may pick the three curves in any order.

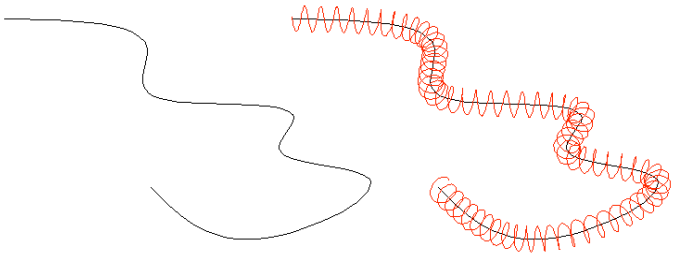


Circle From Three Curves

Helix Along Curve & Spiral
Two new user interfaces were added to support additional curves based upon the helix. The two new options support the creation of spirals and a helix about a path.



(a) Spiral From Two Points

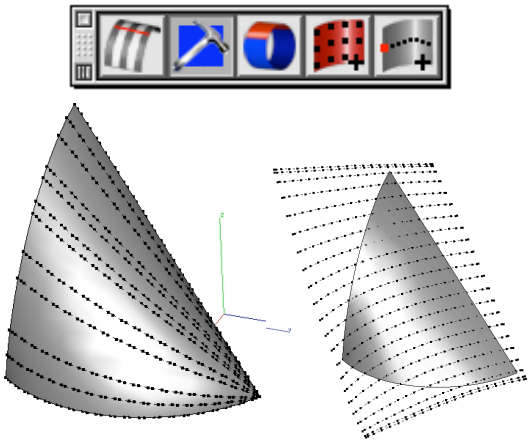


(b) Helix Along Path

New Helix Tools Helix Along Path

Surface Rebuild

The Rebuild Surface tool was enhanced to support repairing of degenerative surfaces. A new four sided surface is created that matches the shape of the original surface. Repairing degenerative surfaces will typically create a new surface that is trimmed.



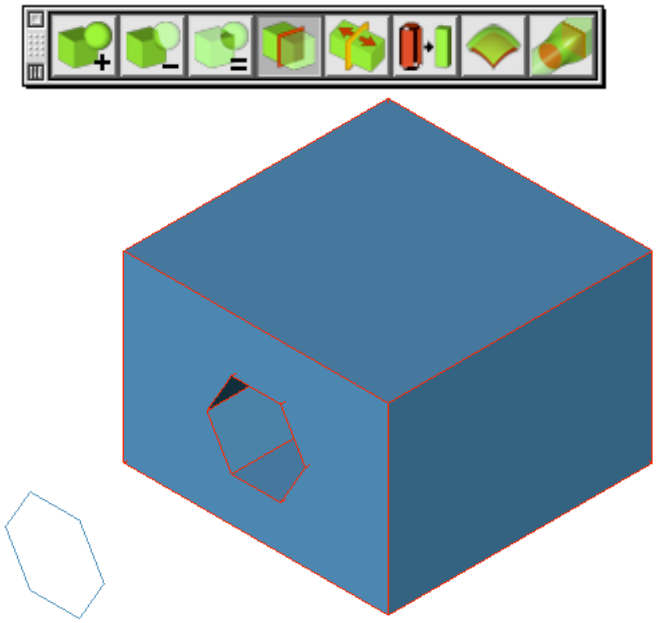
(a) Before Rebuild (b) After Rebuild

Surface Rebuild

The rebuild tool also allows selection of a face of a solid. When rebuilding a face, the recreated surface is automatically inserted and stitched back into the original solid.

Smart Polygons with Trimming

The trim tool allows removal of material from a solid using open or closed curves. In the latest version, you can now use smart polygons to trim a solid.



Trimming with Smart Polygons

User Interface

Instructional, Adaptive Icons

All the icons in the tool palettes were designed to be functional. The function the icons serve is to provide instructional cues to the user. This is accomplished by color coding the steps needed by the user to perform certain commands. Color coding is used not only for specifying order of point locations, but also selection order of objects. The surface tool palette icons provide instruction order for curves used to create surfaces. Likewise the conic tool palette shows the importance of point specification order to create the curve.

Red	First Input
Yellow	Second input set
Magenta	Third input set

Another interesting feature of the new icons is that they adapt to the characteristics of the host system and user defined preferences. This is accomplished by using an alpha-blending algorithm on each pixel to display an image onto a window background specified by the user. For example on OS9, the icons have a grey background but on OSX they have a white with light stripping background. On Windows, the user may select the background.

Deep Select

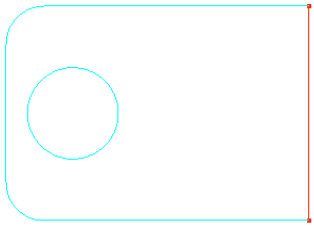
The first release of CU included a new tool called the Deep Select tool. The Deep Select tool aids picking into nested objects or buried definitions. Example

nested objects and definitions include groups and defining points of curves. Picking the lowest level object provides the ability to get access to data that may not be easily accessed because of the nature of the nested object.

One use of the Deep Select tool is quickly modify the control points that define curves such as the Bezier curve. For example, selecting a Bezier curve with the deep select tool will automatically turn on all the control points and handles for easy modification. Clicking away from the curve or selecting a new tool turns the control points back off.

Automatic Handle Show/Hide

Another example of using deep select is associated with picking objects within a group. Deep select ignores the group and allows you to change color, fonts, and other attributes of the object and not the group. In addition, you can modify or translate items in the group.

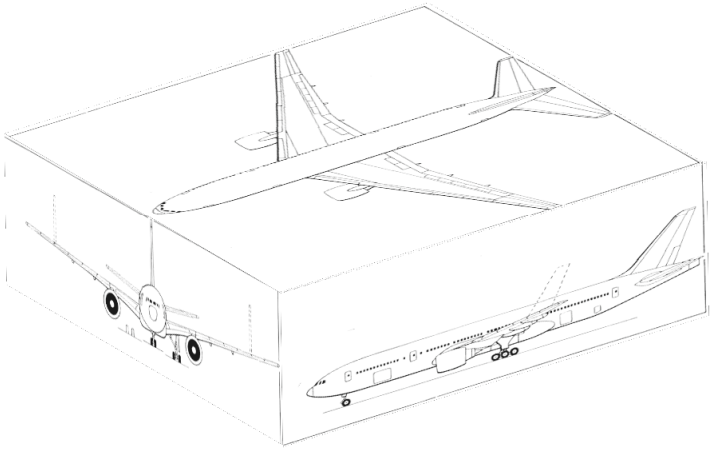


Individual Group Entity Modification

The Deep Select tool also has some exciting implications for selecting and modifying faces and edges nested within solids which we hope to explore in future versions of CU.

3D Image Support

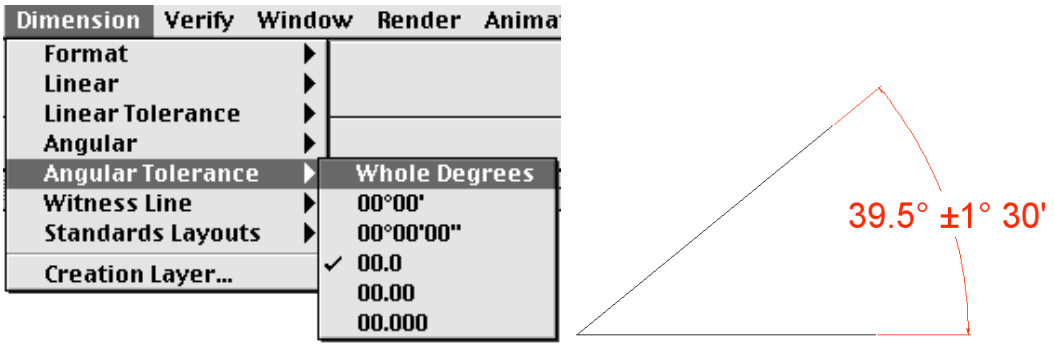
2D images that are imported into CU can now be displayed in 3D. This is accomplished through our OpenGL implementation. This is a very useful feature if you scan an image and want to trace over the image with geometry. You can also adjust the transparency of 2D images using the existing OpenGL settings.



OpenGL 3D Bitmaps

Angular Tolerance Menu

In CU SP2 a new menu option was added for supporting the accuracy of angular dimension tolerances.



Angular Tolerance Menu

Additionally, numerous issues related to Angular formats were resolved in the later Service Packs of CU.

Dimension Selecting

You can now select dimensions by picking locations along the leader and extension lines. In addition, the Partial Select option located under the preferences dialog box now supports partial selecting of dimensions.

Additional Dimension Selection Locations

Performance
Up to 10x faster OpenGL performance for Mac OSX when using dynamic viewing commands. We also added a frame per second (fps) indicator for users to verify OpenGL hardware board performance.

The Render Library Dialog box draws and updates 10x faster on MAC OS.

Symbols auto exploded to groups when imported from DXF/DWG. Helps speed up OpenGL and generates less screen flashing.

Significantly sped up the display of the ambient light settings dlg on Mac OSX.

Significantly improved the performance associated with the generation of circle display lists.

Reduced flashing in the data entry window for creating rubber banded line.

Translators
Replaced the previous translators with the all new IGES, STEP, and CATIA translators based upon Dassault's interoperability technology from Spatial.

CATIA, Step, IGES, now supports colors and layers

Updated OPEN DWG library for DXF and DWG import export.

Updated the OpenNurbs library on Mac and PC.

Added support for importing more curve types using OpenNurbs (Rhino).

Rhino importer now supports circles and point clouds from version 3.

Miscellaneous Enhancements
Updated all curve and surface elevation tools to use ACIS. Removed the prior restriction of only elevating untrimmed surface.

Right clicking and selecting the object info item now auto fills in the object info dialog box.

Right clicking and selecting the change object item now auto fills in the object dialog box.

Major rewrite of the Curve on Surface tool, making it easier to use.

Improved robustness of all edge and face based features and their ability to regenerate for more complex changes and modifications.

Improved performance of some model to sheet operations by caching critical data.

Added a flip option to the object info dialog box for trim solids.

Improved Two Rail Surface definition by adding arc length parameterization. This results in less twisting and produces smoother surfaces. This is especially noticeable with rail curves that have large changes in parameterization (curves resulting from surface/surface intersections).

Corrections

Draw View
Certain combinations of draw view settings (Visible, Hidden, Tangent, Outline) would not produce the correct visibility.

Hidden lines in model to sheet were not always drawn correctly.

Draw Views with hidden edges and no tangent edges were not displaying correctly.

Multiple body hatches in draw views now avoid hatching angles of 90 and 180 degrees.

Section dimensions for section views now correctly auto extend around the geometry.

Fixed crash associated with opening and closing files and draw views.

Fixed pen style problem associated with section views and hidden lines.

Corrected a crash associated with generating auxiliary views.

Fixed a major problem with model to sheet and pen styles.

Polyline mode in model to sheet now supports the hidden line style.

Rendered detail views were not copying the parent color.

Corrected a problem where section view hatching would produce incorrect results.

Snaps
Snaps would pick up the 2nd point of certain arcs if it the points were hidden.

Corrected a problem with snaps and groups that could prevent snaps from working with groups.

Wheel button zooming did not work in conjunction with face on snaps.

Fixed a problem where snaps would fail while in the wireframe mode.

Snap alignment information was not turned on for the move feature tool.

You could not correctly create polygons with the snap tool and face on.

Corrected several issues with surface and solid extents that caused snaps to fail, selections to fail, and zoom extents to fail.

Snaps would not allow you to snap to un selected geometry in the move feature tool.

Nested groups were not working with snaps.

Associtivity/ Regens
Fixed a problem that prevented holes from regening.

Corrected regen problem within AeroPack using the replace curve tool.

Corrected the window title for error messages associated with suppressed, reordered, and regened features.

Corrected a problem associated with suppressing features who have children that are already suppressed.

Corrected a recursive crash associated with suppressing features with splits and booleans.

Corrected problem creating points along surface and the points always marked as needing a regen.

Corrected issue with regening edge based features that were previously marked unregenable.

Fixed regen issue with surfaces where if a surface failed to regen the model was left in an unresolved state.

Fixed failed regen issue associated with the change direction tool leaving the model in an unresolved state.

If you modified a circle or line using the data entry window, it did not automatically regen associative children.

Fixed bug with three point primitives where if the third point was in the same plane as the second point, the primitive did not regen correctly.

PC Specific
Box text on PC was not auto wrapping correctly.

Fixed a crash associated with the expression parser on the PC when using localization settings to comma instead of decimal.

Mac OS Specific
The "Bold" label in the Character dialog did not have enough room on OSX.

The "Now" label in the Preferences dialog did not have enough room on OSX.

Editing text > 255 chars in the edit box would crash Mac.

Fixed problem with animation tool not capturing menus on Mac.

The analysis dialogs had a default edit field active which prevented using short cuts while these dialogs were up on Mac.

The linear duplicate radio buttons were not working on Mac.

Background colors were not working for Mac OSX in dynamic OpenGL modes.

Fixed problem where the ambient light preview color did not display inside the dialog box on OSX.

Select mask now follows Mac guidelines for adding/removing selected items.

Fixed crash on Mac OS X associated with scrolling controls.

Changed the default build to have transparency on for Mac.

Control lists (such as short cuts) no longer reset to the top and remember their current position on Mac.

The DrawSize.ini was not installed which prevented the Print Layout from functioning correctly on Mac.

The move tool on Mac would not always update the data entry window text for dx, dy, and dz.

Removed Web Publishing on Mac OSX (not supported by ViewPoint).

Fixed problem of tool tip displaying on top of the menu pull down Mac OS9.

The wheel mouse zoom up/down was not the same on Mac as PC.

The arrow keys were not auto repeating on Mac.

Corrected a file export problem on Mac that would create corrupt SAT files.

Saving helixes would crash Mac.

Fixed crash in the airfoil wizard and invalid formats (Mac only).

Corrected problem where popup menus would occasionally display the wrong menu text strings. (Mac only)

Parting line features could not be moved up one position with the reorder tool.

Translators
Corrected a crash importing certain surfaces from Rhino.

Selecting multi line text imported from DWG or DXF was not working correctly.

Fixed a metric conversion issue with importing Catia V4 files.

Fixed a DXF/DWG crash from Adobe Illustrator exports.

Fixed a specific DXF/DWG crash by updating the OPENDWG libraries.

Miscellaneous Corrections

Corrected a crash associated with two rail sweeps and degenerative sweeps.

Corrected a crash with lofting between certain faces and R12.

Corrected problems with over, under, and breakin angular dimension formats.

Corrected crash within Aeropack for airfoils with too many points.

Corrected problem where angular dimensions did not draw correctly in rendered mode.

Change text title case was not working.

Sometimes selections in 3d views would not select certain curves.

Corrected a long-standing crash associated with selecting parts with numerous faces.

Update Dimension menu and several problems with using tolerance dimensions formats.

Corrected problem with stitching tool introduced with R12.

Corrected crash with blending a deformed edge on cylinder introduced with R12.

Corrected divide tool problem with 180-degree arcs.

Corrected crash with g1/g2 edge matching

Fixed problem where deep select would show deleted objects.

Corrected problem where certain ACIS based curves would corrupt the file with the newer ACIS kernels.

Crash with g1 edge matching.

Fixed crash in Bezier curve tool associated with R12.

Corrected problem with copying parts where the last part was suppressed.

Corrected problem with copying the history of a part that was previously reordered.

Fixed problem associated with creating tangent covers with small gaps.

Undo fillet using the no trim option was not working correctly.

Chamfer curves at angle did not produce correct results.

Fixed issue where relimiting arcs would do nothing.

The parting line tool would previously not accept 0 for the upper draft angle.

Shade options were not getting preserved between sessions.

Fixed numerous problems with trimming/breaking ellipses.

Fixed crash when closing out a file that had a chamfer edge selected in the object info dialog box.

Fixed problem with tolerance dimensions where they would default with a ++ tolerance.

Copied helix along paths did not transform correctly.

Localized the delete layer and file error dialog boxes.

Corrected problem distributing points along certain surfaces.

Helix along curves had several cases where the command failed.

Could not change direction of opposite point circles.

Sometimes the tool palette would get stuck in a tool.

You could not create tangent lines from skewed ellipses.

Undo change direction was not always working correctly.

Corrected several problems with selecting and modifying defining points within groups.

Corrected problems trimming, filleting, chamfering, and cornering associated with the tangent point arc object.

The second radius value of an elliptical blend in the object info dialog box was not converting correctly to metric.

Increased the maximum font size that will display in a window.

Fixed several problems with Bezier curves and the undo redo command.

Fixed hang with offsetting a particular curve profile.

Certain arcs had extents calculated beyond the actual size of the arc.

Additional corrections for G1 & G2 face matching.

Improved Tangent Covers to work with extruded surfaces (multi surfaces).

Fixed a problem with the rebuild face tool and degenerative surface rebuilding.

Corrected a problem where selecting stopped working on solids and surfaces when using the hidden line modes.

Corrected problem where faces and edges were not hilighting in hidden line mode.

The undo message string was incorrect for fairing curves.

Fixed crash selecting deformed faces from Concept Explorer.

Changed default deform resolution for improved accuracy.

Removed specular hilighting in the zebra plot tool for improved clarity.

Modifying circles with the data entry window did not put the command in the undo stack.

Created more room on the short cuts dialog for tool names. Especially important for localized versions.

Increased the number of characters supported in the short cuts dialog box. This change is relevant to localized versions.

Stepperball now saves the user defined rotation angle from session to session.

Changed the zero setback behavior for new constant radius fillets.

Many attributes fields were not appearing in the BOM table.

You can now move the BOM table with the arrow tool without a warning dialog box.

BOM's were not exporting all fields correctly such as price. Attributes for price and price sum were added to BOM templates. These attribute types support two decimal formatting.

The BOM dialog now remembers the last item selected when it is closed than opened.

The BOM dialog now handles selecting multiple templates to a single object.

Fixed problem with deep selecting groups in rendered modes.

Corrected issues with replace curves nested in a group.

Fixed problems with object info options for skin surfaces.

The skin with perpendicular and closed option did not work in previous versions.

Window selecting groups with the deep select tool would crash the application.

The conic entity did not have a data entry line for the modify tool.

Repaired a crash associated with selecting a specific part and Concepts Explorer.

Fixed several problems with the deep select tool and moving items within nested groups.

Circle Three Points tangent to curves was incorrectly drawing construction circles.

Improved accuracy to the second rail curve for two rail sweep command. Corrected problem with displaying very small text.

The move, scale, rotate, mirror tools required that defining points be pre selected prior to picking the transform tool.

Fixed a recursive display issue for bad midplane extrusions.

Improved the match face tool such that more cases can be matched.

Deep select hiliting was not working in rendered modes.

Fixed a metric conversion issue with importing step files.

Corrected selection of colors from the bottom two rows in the color tool palette.

Elliptical blends were not following shared tangent edge behavior.

The remove curve option in Concept Explorer incorrectly added the wrong undo string.

The add curve option in Concept Explorer incorrectly added the wrong undo string.

When you remove a curve using Concept Explorer, the CE will now immediately updates to show the curve is removed.

The remove, add, replace curve option now immediately updates Concept Explorer with the curve removed.

The add, remove, and replace curve options were operating incorrectly if they referenced a previously deleted surface.

Redo on vector splines was not always working correctly.

Match surface was incorrectly matching with trimmed cylinder faces.

Corrected crash associated with pipes and groups.

Repaired a frequent crash or part corruption associated with using undo and redo.

Corrected a problem with undo and redo of vector splines.

Drag copy objects was not correctly working with undo.

The remove spline point command incorrectly allowed removal of one point too many for through point splines.

Made the trim solid much more robust and reliable when modifying the parent geometry.

The data entry window was incorrectly parsing numbers with commas (ie rotate tool) even though the "Use Commas as Decimal" options was selected.

Added bulge factor for fill and cap surfaces.

The move hole feature was not working through Concept Explorer.

Fixed problem with mirroring and black/see through parts.

Fixed a problem where creating a hole center on a vertex would create a hole incorrectly aligned.

Countersink holes would slice into neighboring geometry.

The eye and ref points fields were not working for the Quicktime Object and Panoramic options.

Corrected an issue with thick/thin lines not printing correctly.

Hitting shift key in some of the windows dialog boxes would resulting in automatic closing of the dialog box.

Holes now pre hilight the diameter data entry window field.

Internal handling of BMP's was off in the last column and row.

Undo now works for editing box text entities.

Corrected bug where you could fillet/corner locked objects.

G1/G2 surface edge matching was not working if the surface to modify was 90 relative to the matching surface.

Deleted items were showing up in Concept Explorer (deleted curves from group).

Fixed problem with BOM where undo, update would make a BOM reappear.

Fixed problem with shell not always keeping the core.

Fixed crash/lockup related to assigning perspective key.

QuickTime dialog not showing all the info for paths, walkthrough, and flyby.

The apply button was not showing in the edit object dialog to allow changing of polygon filling and framing.

Fixed crash creating 2 rail sweep solid and grouped rails.

Fixed problem with Object Info dialog response on mac.

Concept Explorer now shows all new faces associated with a feature operation when you select the operation. Before it wouldn't show it if the face did not also exist in the last operation.