

Open CASCADE 5.2.3 Maintenance Release

Release Notes

Overview

Open CASCADE Technology 5.2.3 is a maintenance release, which includes improvements and bug fixes, over previous maintenance release 5.2.2.

Version 5.2.3 is binary incompatible with any of the previous versions of Open CASCADE Technology, so applications linked against a previous version (major, minor or maintenance) must be recompiled to run with this Version 5.2.3.

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Highlights

- Visualization of 3D elements in MeshVS has been added;
- The TKSTEP library has been split;
- Draw Test Harness User Guide has been updated in part of Visualization, OCAF and Topology;
- Distribution of data through OCAF tree has been described in a new white paper;
- Dump of a 3D viewer scene into vector graphics in PS, EPS and EMF (under MS Windows) formats has been implemented;
- Now it is possible to compile Open CASCADE Technology on DEC platform.

New Features



Visualization

- A new exporter of graphic objects has been implemented in Open CASCADE Technology (Visual 3d_View: : Export). This tool dumps objects displayed in 3D viewer into a vector graphics file in PS, EPS and EMF formats (under MS Windows), preserving such geometrical settings as display mode, colors, thickness of lines and others.

For correct presentation in shading and shrink modes the tool uses an algorithm similar to “Hidden lines removing”. The tool is able to save different colors or gradient fills of faces of an object in the PostScript document with these features, if this is the case.

An object extracted from 3D viewer is split into a set of primitives that can be stored in the PostScript document. OpenGL feedback buffer is parsed to obtain information about their properties.

The tool can sort primitives either using the BSP tree or by “simple sort”, comparing center point depths of primitives. The building of the BSP tree takes quite a time, but guarantees proper visualization of objects, while “simple sort” takes less time, but in some cases produces incorrect results.

The mechanism of feedback mode in OpenGL allows rendering the text using vector fonts and omitting line width, text strings and other properties.

Apart from PostScript format support, export to such platform-dependent format as EMF has been implemented. Since it is necessary to use the gradient fill feature, the version of Windows must be Win98, 2000 or later.



In its present state the tool imposes some limitations:

1. It supports PDF, PS, EPS and EMF (for Windows OS only!) formats. However, support for other formats can be introduced easily.
2. As the EMF format does not support transparent images, all markers in the documents become rectangular.
3. Open CASCADE Technology supports numerous interior styles, but currently the objects can be solid only. Note that line pattern is supported in produced documents.

The tool is used as follows:

- o `Handle(V3d_View) aView = ...`
- o `aView->View()->Export("myfile.ps", Graphic3d_EF_PostScript);`

- The **MeshVS** package now supports visualization and interactive selection of linear (first order) 3D mesh elements (for example, prism, pyramid and other). These elements can be shown as a set of polygons corresponding to faces. To use 3D elements, the application must provide the method `DataSource::Get3DGeom`, which returns a description of 3D element topology by `MeshVS_Array1OfSequenceOfInteger`. The array index corresponds to the face number. The value describes a set of vertices, placed in a correct order, of which the face-polygon consists. In order to simplify the filling of this structure, class `DataSource3D` provides methods to fill an array with pyramid or prism topology. The sensitive entities for 3D elements are constructed automatically when the `MeshVS_ET_Volume` selection mode is computed using `Get3DGeom`.
- The user can now control presentation of objects in the Viewer during their transformation. Using method `SetTransformPersistence()`, it becomes possible to forbid object rescaling, or to force an object to behave like static trihedron in the corner of the view scene, etc.

Obviously, the implementation of this functionality should take into account both visualization and selection of presentations. However, for this release 5.2.3 only the visualization part has been implemented, however, this improvement still remains very helpful in certain cases when it is necessary to display non-selectable objects with some degree of invariance with respect to view scene transformations.

Example:

- o `Handle(PrsMgr_PresentableObject) anObj = ...`
- o `anObj -> SetTransformPersistence(Graphic3d_TMF_ZoomPers);`

- A new Draw command `vtext` has been added to implement the text alignment parameter (horizontal & vertical)

Implementation:

`vtext string [x y z] HorizontalTextAlignment VerticalTextAlignment`

For example: `vtext Hello HTA_CENTER VTA_HALF`



Improvements

✓ OCAF

- Binary persistence on Linux did not work, because after reopening the document file for appending the data the file was replaced by a new empty one. As a result, the stored file had no header. Now this bug is fixed.

✓ Modeling Algorithms

- Thanks to Mr. Christian R. Krug, user of Open CASCADE Technology some errors concerning operator precedence in `Correct_Wire.cxx` have been detected and eliminated.
- A bug in the algorithm of `BRepFillCompatibleWires`, through which the resulting shape that should have been non-twisted became twisted, has been fixed.

✓ Data Exchange

- The algorithm `ShapeAnalysis_FreeBounds` has been optimised for performance by avoiding the quadratic dependence of the computation time on the number of free boundaries. The algorithm `BRepAlgo_Sewing` has been improved so as to generate the same stable result repeatedly on the same input data.

✓ Visualization

- The `MeshVS_Mesh::Compute` method is now up to 20% faster than before. Earlier, in order to indicate which elements or nodes must be shown, this method filled the map of integer to Boolean with values, but since the quantity of nodes and elements is already known, now we use the array instead of the map.

To make the `Compute` method faster its interface has been changed. Now the successors of `MeshVS_PrsBuilder` use `Array1OfIntegerBoolean` instead of `MeshVS_MapOfIntegerBoolean`. If the application searches for an array element, it can use binary search because the array passed to `PrsBuilder` is sorted by integer key. To iterate through the array, it can use indices from `Array.Lower()` to `Array.Upper()`.

- Now it is possible to switch interpolation of texture color with light. Just call the method `AI_S_TexturedShape::EnableModulate()` and the colors will interact with the light. Call `AI_S_TexturedShape::DisableModulate()` in order to forbid the change of texture colors according to the light.
- Earlier, in case when:
 - method `Triangl eSet` was used with array `Graphi c3d_VertexC`; and when
 - an array of polygons with colors assigned to its vertices was added to `Graphi c3d_Group`, the resulting shapes were non-transparent shapes even if the material of the fill area aspect was set to transparent. Now, this bug has been fixed and transparency is displayed properly in both cases.
- Thanks to the help of Mr. Sangsu Lee and Mr. Huques (OCC users), memory consumption by the application during the processing of a Z-buffered trihedron in a `V3d_View` object was greatly reduced through some changes implemented in the algorithm.
- A problem connected with internal iterator in the class `AI_S_Selecti on` after the removal of the current interactive object from the context was fixed.



 **Test Harness**

- Command `i gesbrep` in the previous version of DRAW always read all entities from an IGES file (visible and invisible) independently of the specified mode (whether it is ALL ROOTS or ONLY VISIBLE). Now this bug is corrected and the command reads entities in DRAW according to the mode.

 **WOK**

- A command line for bison parser has been updated to avoid some compilation problems on Linux. Actually the old version of bison created output files with extension `*.tab.c` regardless of the input file extension, while the modern version of bison added the extension of the input file to the extension of the output file. As a result, the generated file was not seen by WOK. Direct definition of the output file name with the `-o` option resolved the problem.

 **Products****Express Mesh**

- The Express Mesh algorithm has been improved to avoid hanging and excessive memory consumption when meshing some narrow long faces.
- The objects of class `QMData_Curve2d` dynamically allocated and stored in the field `myPCurves` of class `QMData_Edge` were not deallocated if the method `RemovePCurve` was called, which lead to a significant memory leak on meshing operation. Now this memory leak in Express Mesh algorithm is eliminated.

OMF

- A new parameter `i sTopo` has been added to the `SMDSControl_BoundaryEdges` class. This parameter manages the way the edges are considered by the algorithm. The previous behaviour is preserved with the default value (`False`). If `i sTopo` is `True`, every edge is considered as a part of the boundary, if it has different numbers of occurrences on mesh faces for (+) orientation and for (-) orientation. In this mode an edge between two faces with topologically opposite orientations is considered as a boundary. The topological boundary of a mesh can be used to check if the mesh is well defined with respect to orientation of its faces. This improvement adds a dependence of `SMDSControl` to the package `SMDSTool s`.

Changes

✓ Modeling Algorithms

- The history of Prism & Revolution algorithm has been redesigned to take into account use-cases when the resulting shape is an open shell.

✓ Visualization

- In `TPrsStd_AISPresentation::UnsetMode()`, `method AIS_InteractiveContext::UnsetDisplayMode()` is now used instead of `AIS_InteractiveContext::SetDisplayMode()`.
- A certain regression in the implementation of transparency was registered in the previous version of OpenCASCADE Technology. This problem was eliminated, however, the transparency problem in general partially remains even for a single transparent object. Certain undesirable visual effects can be still seen. They are caused by lighting calculations performed by OpenGL: the calculated color of two triangles A and B is different (one lying on a part of the shape more distant from the eye, another on a closer part, both oriented differently with respect to light direction). Therefore, the result of blending "background color -> 0.9 * A color -> 0.9 * B color" is different from blending "background color -> 0.9 * B color -> 0.9 * A color". In other words, the resulting image still depends on the order of triangles in the object triangulation. We hope to improve the situation in future releases.

✓ Data Exchange

- As TKSTEP toolkit became too large to handle, including 1548 objects and having a size of more than 10M, it was divided into four toolkits: TKSTEPBase, TKSTEPAttr, TKSTEP209 and TKSTEP.

✓ Compilation

- **Warnings are now produced in case of a wrong compilation environment (e.g. missing WNT macro);**

If compilation is performed by the Visual Studio compiler but "WNT" option is not defined, the pre-processor returns the following error: "Wrong compiler options have been detected. Add /DWNT option for proper compilation!!!!!"

For UNIX platforms if neither HAVE_I OSTREAM nor HAVE_I OSTREAM_H is defined in confi g. h file or in compiler options, the pre-processor returns error: "check config.h file or compilation options: either HAVE_I OSTREAM or HAVE_I OSTREAM_H should be defined".

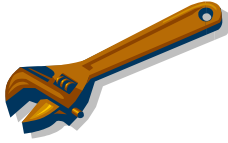
The pre-processor returns a similar error if neither HAVE_LI MITS nor HAVE_LI MITS_H are defined.

✓ Products: OMF

- Application crash when deleting an interactive object in the OMF Sample has been fixed.



Bug Fixes



- Open CASCADE 5.2.3 incorporates **64** modifications (bug fixes, enhancements and other corrections) over version 5.2.2. For details, refer to [Appendix 1](#).





Appendix: Open CASCADE 5.2.3 Bug Fixes

- [Foundation Classes](#)
- [Modeling Algorithms](#)
- [Visualization](#)
- [Application Framework](#)
- [Data Exchange](#)
- [Shape Healing](#)
- [Test Harness](#)
- [WOK](#)

Products

- [OMF](#)
- [Express Mesh](#)
- [Surfaces from Scattered Points](#)

Foundation Classes, 6 bug fixes	
ID	Short Description
7639	NCollection_Vector works incorrectly with rare data
7698	Wrong behaviour of NCollection_Vector::operator=
7757	Providing possibility to compile OCCT on DEC platform
8345	Bugs in ExprIntrp and Expr packages (reported by FKL)
8555	Results of FIP "Provide warnings in case of wrong compilation environment"
8595	Accessing freed memory in NCollection_UBTreeFiller
Modeling Algorithms, 19 bug fixes	
ID	Short Description
569	Can not intersect trimmed plane and cone surfaces.
6581	Cases check 002 F2-F5, H2-H5 is not finished. Loop on OFFSETSHAPE for psphere.
6766	Invalid result of intersection of a bspline face with a plane
7189	Analysis of possible regressions in Boolean operations
7372	Invalid conversion 2D periodic BSpline curve to Bezier segments.
7582	Bad result of offset operation
7626	Bad result of bcut operation
7723	Operator precedence in Correct_Wire
7966	Work of BRepClass3d_Intersector3d contradicts documentation
8169	Wrong Geom2dAPI_InterCurveCurve segment
8228	Exeption is raised during the vprops in DRAW on the attached shape
8259	FindColor method in Aspect_ColorScale
8372	Twisted result of ThruSections operation
8445	Bug in Prism & Revolution history
8498	Offset operation crashes the application
8543	Summary of PAL 8284, PAL8293
8545	History of Offset algo is incorrect
8559	Integration of several patches made for SD projects
8561	Set of bugs in OCC Algos linked with Gluing operation





Visualization, 22 bug fixes	
ID	Short Description
978	Transparency problem in AIS
6145	Incorrect rendering of a transparent object
6268	Incorrect functioning of transparency
6562	No default interior colour and interior style in MeshVS_Mesh.
7014	Now user defined markers are drawn
7068	Incorrect behaviour of a method in AIS_InteractiveContext.
7088	MeshVS_Drawer methods should accept integer values instead of enumeration, to ensure customisability
7116	High-level control of view transformations of an object.
7251	Provide some means to control selection activation on displaying an object in global context
7456	Text alignment attributes
7667	Export contents of view to a vector graphic file
7726	Memory leak with the trihedron display
7781	Mistake in TPrsStd_AISPresentation::UnsetMode()
7824	Transparency doesn't work for Graphic3d_VertexC
7833	Transparency doesn't work in the case of array of polygons with colours assigned to vertices
7901	Visualization of 3D elements in MeshVS
7902	Acceleration of MeshVS_Mesh::Compute method.
8306	AIS_Selection becomes invalid after deletion of a selected object
8525	Regression: update of viewer has low performance on Linux
8565	Colour Scale are not updated after change of text height
8568	Regression of transparency implementation as compared to OCC 3.1
8623	An additional method to manipulate the behaviour of texture colors at light.
Application Framework, 2 bug fixes	
ID	Short Description
8041	OCAF Browser displays strange symbols
8621	Binary persistence does not work
Data Exchange, 1 bug fixe	
ID	Short Description
7735	New toolkits for STEP
Shape Healing, 2 bug fixes	
ID	Short Description
6729	Slow performance of ShapeAnalysis_FreeBounds
7624	Problems in ShapeFix_IntersectionTool
Test Harness, 1 bug fix	
ID	Short Description
8526	Mode OnlyVisible does not work in the command igesbrep in DRAW.



WOK, 1 bug fix	
ID	Short Description
8362	Compilation errors at obj.cgen on Linux platform

Product Bug Fixes

The following bug fixes have been performed for Open CASCADE specific development customers.

Open CASCADE Mesh Framework, 6 bug fixes	
ID	Short Description
7615	Adding mesh element with known ID violates MeshIDFactory
7640	Lost faces after adding them using AddFaceWithID method
7643	Migrate SMDSCaf on Lite-OCAF
7697	Calculation of free boundary of a mesh in SMDSCControl should take into account orientation of faces
7905	The OMF sample crash after try to delete Node from mesh (OCCT 5.2.2)
8305	Application crash while deleting interactive object.
Express Mesh, 3 bug fixes	
ID	Short Description
7975	Exception while meshing a shape containing faces without wires
8303	Memory leak in Express Mesh (class QMData_Edge)
8522	Express Mesh exhausts all memory and makes CPU to rest while meshing narrow long face
Surfaces from Scattered Points, 1 bug fix	
Short Description	
8224	Cannot load points from table into PlateFE algorithm.