



# Open CASCADE Technology and Products ver. 6.5.4 Maintenance Release

## Release Notes

### Overview

**Open CASCADE Technology and Products version 6.5.4** is a maintenance release, which includes more than **200** improvements and bug fixes over maintenance release 6.5.3.

Version **6.5.4** is binary incompatible with the previous versions of Open CASCADE Technology and Products, so applications linked against a previous version must be recompiled to run with this Version 6.5.4.

### Highlights

- ➡ General code clean-up against compiler warnings, memory issues, and potential errors
- ➡ Thread safety of B-Spline cache and BRepMesh triangulator
- ➡ Multiple bug fixes in modeling algorithms (intersections, Boolean operations)
- ➡ Improvements of naming mechanism (OCAF)
- ➡ Improved stability of Delaunay triangulation algorithm (BRepMesh)
- ➡ Improved Visualization (Open GL operations, image processing, display of shading with edges)
- ➡ FTGL version 2.1.3rc5 supported
- ➡ Express Mesh performance boosted through parallel execution





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## Modifications

### Foundation Classes

23040	<p><i>Summary:</i> Annoying warnings in <code>NCollection_Vector</code></p> <p>The order of class members initialization in <code>NCollection_BaseVector</code> constructors has been changed to avoid warnings.</p>
23072	<p><i>Summary:</i> Eliminate compiler warnings (level 3) on Windows / MSVC++</p> <p>A great number of small changes have been introduced in OCCT to avoid warnings during building on Windows under MSVC compiler.</p>
23116	<p><i>Summary:</i> Method <code>Poly_MakeLoops::GetHangingLinks</code> is unavailable from the external .dll</p> <p><code>Standard_EXPORT</code> declaration has been added to method <code>Poly_MakeLoops::GetHangingLinks</code>.</p>
23131	<p><i>Summary:</i> Unhandled case in <code>CSLib::Normal(...)</code></p> <p>Local variable <code>Vsui v</code> in <code>CSLib::Normal</code> is now initialized by zero to avoid compiler warning.</p>
23250	<p><i>Summary:</i> Missing include in <code>OSD_MemInfo.cxx</code></p> <p>Header <code>unistd.h</code> has been removed from <code>OSD_MemInfo</code> class to avoid compilation error with gcc 4.7 on Linux.</p>
23274 23369 23370 23373	<p><i>Summary:</i> MSVC++ warnings during compilation for 64bits</p> <p><code>Standard_Integer</code> has been replaced with <code>Standard_Size</code> in <code>NCollection_SparseArray</code>, <code>Materials</code> and <code>WNT_FontMapEntry</code> classes to avoid compilation warnings.</p> <p>Additionally, redundant casting to <code>Standard_Size</code> and code checking if <code>Standard_Size</code> value is negative has been removed from <code>NCollection_SparseArray</code>.</p>
23275	<p><i>Summary:</i> restore command set name of result variable incorrectly if absolute path is used</p> <p><code>Standard Draw</code> command <code>restore</code> has been corrected to set the default shape name equal to the filename without extension.</p>
23276	<p><i>Summary:</i> Add generated files to <code>.gitignore</code></p> <p>Build scripts and other files generated by WOK and reported by Git as untracked have been added to <code>.gitignore</code> to avoid confusion.</p>





23277	<p><i>Summary:</i> Buffer underflow using memset in OSD_path. cxx</p> <p>List of parameters used in memset has been corrected in OSD_Path. cxx.</p>
23278	<p><i>Summary:</i> Buffer underflow using memset in OSD_host. cxx</p> <p>ZeroMemory operator in method OSD_Host: : OSD_host has been fixed to give the size of TCollecti on_Asci i Stri ng instead of the array size.</p>
23279	<p><i>Summary:</i> Accessing NULL pointer</p> <p>Standard. cxx has been protected against null pointer.</p>
23280	<p><i>Summary:</i> Pointer to local array is stored outside the scope of this array.</p> <p>The array buff has been moved so that it can be visible while str still refers to it in OSD_Real 2Stri ng: : CStri ngToReal .</p>
23393	<p><i>Summary:</i> Improve usability of OSD_MAI l ocHook: : Col l ectBySi ze</p> <p>It has become possible to access the contents of OSD_MAI l ocHook: : Col l ectBySi ze programmatically, not only via a dump file generated by MakeReport().</p> <p>New field myMaxAI l ocSi ze specifies maximum tracked size.</p>
23403	<p><i>Summary:</i> Crash when parsing an expression with lexical error</p> <p>The problem caused by double freeing of memory when a lexical error is detected by the parser has been fixed by nullifying the global buffer after its freeing in Expr l ntrp_stop_stri ng().</p>
23404	<p><i>Summary:</i> Create SquareConfusi on function.</p> <p>New function TKMath: : SquareConfusi on returns a square of Preci si on: : Confusi on(). It replaces the squares of Preci si on: : Confusi on() throughout the code.</p>
23466	<p><i>Summary:</i> Move OSD_FontMgr class outside TKernel</p> <p>New package Font has been added in TKService. Classes FontMgr and SystemFont have been moved from OSD package to Font package.</p>



Application Framework

21977 23086 23355	<p><i>Summary:</i> Unsafe implementation of <code>TNaming_Builder</code></p> <p>The implementation of <code>TNaming_Builder</code> has been improved:</p> <ul style="list-style-type: none"> <li>Plain C pointers in class fields have been replaced by <code>Handles</code>, to avoid possible use of freed memory if an attribute is deleted while an instance of <code>TNaming_Builder</code> is still alive.</li> <li>Method <code>TNaming_Builder::Modify</code>, which constructs a dummy vertex to store the orientation, has been simplified.</li> <li>Instances of <code>TNaming_Builder</code> class are now dynamically allocated in <code>TNaming_NamedShape</code> and <code>DNaming_TransformationDriver</code>.</li> </ul>
23071	<p><i>Summary:</i> Comparison of file extension is case sensitive</p> <p><code>FWOSDriver_Driver</code> now performs case insensitive filename comparison on Windows platform.</p>
23119 23205	<p><i>Summary:</i> Naming improvement</p> <p>The following improvements have been introduced in the Naming mechanism.</p> <ul style="list-style-type: none"> <li><code>WIREFIN</code> name re-computation algorithm now separates re-computation of outer wires of the underlying face and internal wires. Internal wires are re-computed as a set of building edges.</li> <li>Shell re-computation is now done with help of a separate name <code>SHELLIN</code>. The algorithm separates re-computation of the outer shell of the underlying solid and internal shells. Internal shells are re-computed as a set of building faces.</li> <li>Naming shape evolution <code>TNaming_REPLACE</code> has been removed because it is not supported by Naming solver. This makes the supporting algorithm more consistent.</li> <li>Commands <code>SelectShape</code> and <code>SolveSelection</code> from <code>DNaming_SelectionCommands</code> have been redesigned.</li> </ul>
23304	<p><i>Summary:</i> Copy constructor fails to copy both <code>myIndex</code> variables</p> <p>Copy constructor has been corrected in <code>BRepMesh_PairOfIndex.hxx</code>.</p>
23306	<p><i>Summary:</i> Impossible to read some attributes of <code>BinOcaf</code> document</p> <p>The missing data field is now properly written during the procedure of saving <code>TColStd_Array1OfExtendedString</code> OCAF attribute to a binary file.</p>
23326	<p><i>Summary:</i> Pointer <code>aSbling</code> is used before it is verified against <code>NULL</code></p> <p>The code of <code>LDOM_Element.cxx</code> has been fixed to check the pointer first and then access it.</p>
23327	<p><i>Summary:</i> Identical sub-expressions to the left and to the right of '&amp;&amp;' operator</p> <p>Redundant sub-expressions have been removed from the code of <code>TObj_Model.cxx</code>.</p>
23392	<p><i>Summary:</i> Memory leak in OCAF in debug mode</p> <p><code>TDF_LabelNode::Destroy()</code> has been fixed to properly free memory for <code>TColletion_AsciiString</code>.</p>



Modeling Data

22883	<p><i>Summary:</i> Extrema can not find projection of 3D point on surface.</p> <p>The process of surface discretization has been optimized: the number of parametric points in case of a complex surface geometry (B-Spline and Bezier surfaces) has been increased. The following modifications have been implemented:</p> <ul style="list-style-type: none"> <li>Method <code>Extrema_GenExtPS::BuildGrid()</code> has been implemented for creation of a grid of parametric points instead of method <code>Extrema_GenExtPS::Initialize()</code>. It is complemented with method <code>BuildTree()</code> for creation of a <code>UBTree</code>. This method allows creating parametric points for B-Spline and Bezier surfaces or surfaces based on B-Spline or Bezier curves taking into account the Degree and NbKnots of the geometry.</li> <li>Comparison of a new solution with the previously found ones has been added in classes <code>Extrema_FuncExtPS</code> and <code>Extrema_FuncExtPC</code>.</li> <li>The last found solution is now preserved in class <code>math_FunctionSetRoot</code> for cases when the precise minimum can not be found.</li> <li>Protection for surfaces with infinite boundaries by U or V has been added in class <code>Extrema_ExtPS</code>.</li> </ul>
22939	<p><i>Summary:</i> Make B-Spline internal cache thread-safe to be used in multithreaded mode</p> <p>Thread-safety of B-Spline cache has been improved in <code>Geom</code> and <code>Geom2d</code> packages. Internal cache in classes implementing B-Spline curves and surfaces has been protected from possible concurrency by adding mutex as a class field in each instance.</p>
23165	<p><i>Summary:</i> Wrong bounding box for edge on periodic B-Spline with target range beyond own range</p> <p>Methods <code>BndLib_Add3dCurve::Add</code> and <code>BndLib_Add2dCurve::Add</code> have been improved to avoid incorrect segmentation of the original B-Spline.</p>
23175	<p><i>Summary:</i> Failed to segment a periodic B-Spline when a parameter coincides with the existing knot</p> <p>Method <code>BSplCLib::PrepareInsertKnots</code> has been corrected to provide a correct number of poles for periodic curves.</p>
23285	<p><i>Summary:</i> Ignoring Bezier curves</p> <p><code>Geom_BezierCurve</code> and <code>Geom2D_BezierCurve</code> are now properly taken into account in <code>GeomLib_Tool.cxx</code>.</p>
23330	<p><i>Summary:</i> Redundant copying</p> <p>Redundant copying has been removed from method <code>Geom2d_OffsetCurve::Geom2d_OffsetCurve</code>.</p>



Modeling Algorithms

22809	<p><i>Summary:</i> BRepIntCS does not find intersections of an ellipsoid and a line passing through it's apex (and near it)</p> <p>The algorithm finding intersections has been improved in method BRepTools::AddUVBounds.</p>
22850 23221 23260	<p><i>Summary:</i> Sometimes incmesh command with parallel parameter raises an exception or produces different results on Linux.</p> <p>New class TopTools_MutexForShapeProvider has been implemented providing the means to protect the parallel code dealing with shapes against simultaneous access to a sub-shape (for example, to protect BRepMesh triangulator against possible data races).</p>
23029	<p><i>Summary:</i> Splitshape algorithm works incorrectly in some cases</p> <p>The following modifications have been implemented to improve the work of the algorithm:</p> <ul style="list-style-type: none"> <li>▪ Handling of periodic bsplines has been corrected in Extrema_GExtPC class. If the edge range is out of the period, boundaries interval are recomputed.</li> <li>▪ Face orientation has been changed in method LocOpe_SplitShape::AddOpenWire to simplify creation of wires.</li> <li>▪ Bounding box evaluation for periodic splines has been corrected in method BndLib_Add3dCurve::Add.</li> </ul>
23100	<p><i>Summary:</i> Wrong adjustment of p-curves on a cylinder</p> <p>Range of curve adjustment has been extended in method BOPTools_ToolS2D::AdjustPCurveOnFace.</p>
23103	<p><i>Summary:</i> Regression in bsection</p> <p>Boundary points of the intersection curve, which do not belong to the faces, have been removed from the set of checking points in method IntTools_FaceFace::ComputeTolReached3d().</p>
23125	<p><i>Summary:</i> Wrong results done by classifier algorithm for a point and a solid</p> <p>Method BRepClassifier3d_SolidExplorer::OtherSegment has been modified to create the object of type Extrema_ExtPS using real parametric ranges (U, V) of the surface.</p>
23140 23145 23147	<p><i>Summary:</i> Suspicious operators</p> <p>Some algorithms have been corrected in classes GeomFill_NSections, BRepFill_TrimEdgeTool and LocalAnalysis_SurfaceContinuity.</p>
23144	<p><i>Summary:</i> Extrema algorithm throws the exception.</p> <p>Threshold value has been added in method Extrema_GExtCC::Perform() to prevent the oversize of inner arrays.</p>







23129	<p><i>Summary:</i> BRepTools::OuterShell() always returns the first shell</p> <p>New method TopoDS_Shell BRepClass3d::OuterShell() has been introduced to find the outermost shell of the solid.</p>
23137	<p><i>Summary:</i> Class BRepAlgoAPI_Cut does not made correct result on attached shapes</p> <p>The order of testing point selection has been changed in method BOP_ShellFaceClassifier::ResetElement.</p>
23139	<p><i>Summary:</i> BRepFillAPI_MakeFill algorithm builds edges with wrong first and last parameters</p> <p>Check of extremities of the second pcurve of FaceInterference has been added in method from ChFi3d_Builder_C1::Update.</p>
23158	<p><i>Summary:</i> ApproxInt_PrmPrmSvSurfaces raises FPE (division by zero) signal</p> <p>Method ApproxInt_PrmPrmSvSurfaces::Compute has been protected against division by zero.</p>
23160	<p><i>Summary:</i> Cut operation produces a wrong result.</p> <p>The number of points used to compute the face state has been increased in method BOPTools_Tool3D::ComputeFaceState.</p>
23162	<p><i>Summary:</i> BRepOffsetAPI_MakePipeShell works wrong.</p> <p>Method BRepFill_CompatibleWires::ComputeOrigin creating a prism by scaling its base faces has been improved to provide correct orientation of wires. Now wire origins are superposed before checking the distance between vertices.</p>
23170	<p><i>Summary:</i> A full sphere face created incorrectly</p> <p>Method EISLib::SphereVISO() has been protected against creation of a circle with negative radius when <math> V  &gt; \pi/2</math>. In this case an analytic continuation of the sphere behind poles is used, so the returned circle always has a positive or a zero radius.</p>
23174	<p><i>Summary:</i> BRepLib_MakeFace(Wire) creates an invalid face on a wire of cylinder bottom</p> <p>The following improvements have been introduced in BRepLib package:</p> <ul style="list-style-type: none"> <li>▪ New argument OnlyClosed has been added in the constructor of BRepLib_FindSurface class: If it is set to true, it is checked if its wire is closed in parametric space of the found surface, and the surface is rejected if the wire is not closed.</li> <li>▪ Method BRepLib_MakeFace(wire, OnlyPlane) has been modified to call BRepLib_FindSurface with OnlyClosed=true.</li> <li>▪ New function BRepLib_FindSurface::Is2DConnected returns true if the last vertex of theEdge1 coincides with the first vertex of theEdge2 in parametric space of theFace.</li> <li>▪ BRepLib_FindSurface::Is2DClosed returns true if edges of theShape form a closed wire in a parametric space of theSurface.</li> </ul>







23201	<p><i>Summary:</i> Projection algorithm produces wrong results</p> <p>Method <code>ProjLib_ProjectedCurve::Load</code> now uses <code>myTolerance</code> instead of a hard-coded tolerance value.</p>
23214	<p><i>Summary:</i> BOP section operation produces incorrect result</p> <p>Method <code>IntTools_FaceFace::CheckPCurve</code> has been implemented to improve the results of BOP section operation.</p>
23218	<p><i>Summary:</i> Wrong value of tolerance for the intersection curve.</p> <p>Search of the maximal value of the distance function has been replaced by Fibonacci search in method <code>IntTools_FaceFace::ComputeTolReached3d</code>.</p>
23219	<p><i>Summary:</i> Triangulation is not built on a planar face</p> <p><code>BRepMesh_Classifier</code> has been modified to take into account the possibility of a consecutive set of degenerate edges during <code>OpenWire</code> checking.</p>
23224	<p><i>Summary:</i> Empty result done by intersection algorithm</p> <p>Cutting of the original surface has been removed from <code>IntCurveSurface_Inter.gxx</code>.</p>
23244	<p><i>Summary:</i> Tolerance not taken into account</p> <p><code>BRepClassifier_Intersection::Perform</code> has been fixed to take tolerance into account.</p>
23248	<p><i>Summary:</i> Wrong result done by solid classifier algorithm for infinite point</p> <p>The value of angular tolerance in class <code>IntCurveSurface_Inter</code> now corresponds to <code>Precision::Angular()</code>. New command <code>xclassify</code> has been added in <code>BRepTest::OtherCommands</code>. This command computes the state of an infinite point regarding a solid.</p>
23252	<p><i>Summary:</i> Fillet regression</p> <p>The protection, which prevents adding faces to the shell that has already been added to the solid, has been added in classes <code>WireEdgeClassifier</code>, <code>CompositeClassifier</code> and <code>ShellFaceClassifier</code> from <code>TopOpeBRepBuild</code> package.</p>
23259	<p><i>Summary:</i> C4101 warning - unreferenced local variable</p> <p>Unreferenced local variables have been removed from methods <code>IntTools_FaceFace::SetList</code> and <code>QANewDBRepNaming::QANewDBRepNaming_CheckNaming</code>.</p>
23287	<p><i>Summary:</i> Identical sub-expressions</p> <p>A sub-expression has been corrected in method <code>IntPolym_MailageAffinage::CalculateInterTriangleCoproanaires</code>.</p>





23288	<p><i>Summary:</i> IntCurve_IntConicConic_1.cxx: if(A) {...} else if(A){...} pattern detected</p> <p>Impossible condition has been removed from class IntCurve_IntConicConic.</p>
23294	<p><i>Summary:</i> Identical sub-expression in 'if-clause'</p> <p>A duplicate sub-expression has been removed from BOP_ArgumentAnalyzer.cxx</p>
23295	<p><i>Summary:</i> A part of conditional expression is always true</p> <p>A conditional expression has been corrected in BOPTools_PaveFiller_3.cxx.</p>
23296	<p><i>Summary:</i> Not verifying method return flag</p> <p>The returned flag is checked in method BOPTools_Tool3D::DoSplitSEAMOnFace.</p>
23299	<p><i>Summary:</i> Identical sub-expression in 'if-clause'</p> <p>Method ShapeCustom_BSplineRestriction::ConvertSurface now verifies both affected variables (U and V).</p>
23300	<p><i>Summary:</i> Identical sub-expression in 'if-clause'</p> <p>Method ShapeFix_EdgeProjAux::Init2d now properly verifies LastParameter().</p>
23301	<p><i>Summary:</i> Comparing variable to itself</p> <p>A self-comparison has been fixed in method ShapeUpgrade_WireDiode::Perform().</p>
23303	<p><i>Summary:</i> Expression always true</p> <p>Always true if-clause conditions have been corrected in methods ShapeFix_Face::Perform() and ShapeFix_Face::FixSmallAreaWire()</p>
23305	<p><i>Summary:</i> Index value verified twice in BRepFill_TrimShellCorner.cxx</p> <p>Method BRepFill_TrimShellCorner::Perform() has been corrected. Now both affected indexes are verified.</p>
23307	<p><i>Summary:</i> The same variable value verified twice</p> <p>Method TopOpeBRepTool_TOOL::OnBoundary has been corrected. Now both variable values (onf and onl) are verified.</p>
23308	<p><i>Summary:</i> A typo in if-clause</p> <p>A typo has been corrected in TopOpeBRepDS_EXPORT.cxx.</p>
23311	<p><i>Summary:</i> Duplicated check in if-clause</p> <p>Method ChFi2d_Builder::AddChamfer has been corrected to properly check that the second provided edge is neither a line nor a circle.</p>





23313	<p><i>Summary:</i> Return Standard_False in case of an unsupported case</p> <p>Standard_False is now returned in case of an unsupported case in IntAna_Curve.cxx.</p>
23341	<p><i>Summary:</i> Wrong result done by 2D classifier algorithm for a point and a face</p> <p>Class IntCurve_IntConicConic has been modified so that the intersection point, which is definitely out of both domains, is rejected.</p>
23367	<p><i>Summary:</i> New functionality restoring the middle path of pipe-like shape</p> <p>New class BRepOffsetAPI_MiddlePath implements the algorithm that takes at input a pipe-like shape (shell or solid) and its start and end faces (or wires) and creates a wire that represents a path made by gravity centers of consequent sections of the initial shape.</p>
23374	<p><i>Summary:</i> BOP Common between a sphere and a box gives wrong result</p> <p>Method BOP_FaceBuilder::IsHole now applies procedure SameParameter to the auxiliary face to correct the tolerance values of sub-shapes.</p>
23388	<p><i>Summary:</i> Boolean operations hang up trying to build section of two shapes</p> <p>Definition of surfaces boundaries has been corrected in IntWalk_PWalking class.</p> <p>Duplicate points have been removed from IntPatch_Wline::ComputeVertexParameters method.</p>
23389	<p><i>Summary:</i> BRepAlgoAPI_Cut returns invalid solid</p> <p>Wrong breakdown exit has been removed from method IntPolylh_Intersection::PerformMailage.</p>
23394	<p><i>Summary:</i> Problem with BrepOffset_MakeOffset on a cylindrical face</p> <p>BrepOffset_MakeOffset::MakeMissingWalls() now takes into account the case of a planar face bounded by two edges that have circular curves.</p>
23405	<p><i>Summary:</i> BOP common produces one face instead of a solid</p> <p>Method IntTools_FaceFace::ComputeTolReached3d() now uses a more precise definition of tolerance of intersection curves in 3D for the case of plane/sphere intersection.</p>
23429	<p><i>Summary:</i> BrepFeat_SplitShape algorithm misses some section edges while building result from a shape</p> <p>New flag SetCheckInterior has been implemented in class BrepFeat_SplitShape. It defines if it is necessary to check possible interior intersections of new edges with boundary edges of the face.</p> <p>Processing of new edges based on C0-continuous curves has been introduced in LocOpe_WiresOnShape class.</p>





23431	<p><i>Summary:</i> BOP Cut produces invalid shape</p> <p>Processing of closed edges (with the same face for both sides) has been added in method <code>BOP_SDFWESFiller::PrepareWESForCut</code>. Closed edges are added only to the wire edges set twice.</p> <p><code>BOP_WireEdgeSet</code> in class <code>BOP_ShellShell</code> has been refined to remove duplicated edges: for faces of the Object Cut operation is used; for faces of the Tool all operations are used. These duplications are caused by separate processing of the argument faces when the faces contain shared edges and they are of the same domain as the faces of the other argument.</p>
23442	<p><i>Summary:</i> Provide access to <code>Geom2dHatch_Hatcher</code> via <code>IntTools_Context</code></p> <p>New method <code>IntTools_Context::Hatcher</code> returns the reference to 2D Hatcher for the given face.</p>
23453	<p><i>Summary:</i> Infinite loop on cut operation</p> <p>Cycle <code>do {} while {}</code> has been replaced by cycle <code>for ()</code> to avoid possible infinite loop in method <code>IntTools_Fclass2d::IntTools_Fclass2d()</code>.</p>
23467	<p><i>Summary:</i> Wrong exception</p> <p>Class <code>BRepOffsetAPI_MakeOffset</code> has been modified to throw <code>StdFail_NotDone</code> instead of <code>Standard_ConstructionError</code>.</p>
23464	<p><i>Summary:</i> Projection algorithm produces wrong results</p> <p><code>ProjLib_ProjectedCurve</code> class has been improved to provide correct operation of partition algorithm.</p>
23472 23504	<p><i>Summary:</i> <code>BRepAlgoAPI_Section</code> algorithm fails with exception while intersecting two faces</p> <p>Computation of <code>&lt;myNbSamplesU&gt;</code> and <code>&lt;myNbSamplesV&gt;</code> has been corrected in method <code>Adaptor3d_TopoTool::BSplSamplePnts</code>.</p>
23480	<p><i>Summary:</i> New compiler warnings on MS VC 9</p> <p>Some warnings arising during compilation on MSVC 9 have been eliminated.</p>



Visualization

22516 22830 22884 23153 23167	<p><i>Summary:</i> Face cannot be displayed in shading mode</p> <p>The Delaunay algorithm has been improved:</p> <ul style="list-style-type: none"> <li>Intersection between edges is checked in more detail with BRepMesh_Delaunay::IntSegSeg method;</li> <li>The procedure collecting edges to define the contour of the polygon to be meshed has been improved,</li> <li>New mesh cleaning methods have been introduced in BRepMesh_Delaunay class: KillInternalTriangles removes triangles within a polygon; CleanupMesh removes free triangles from a mesh; RemovePivotTriangles removes triangles around the given pivot node; CleanupPolygon removes internal triangles from the given polygon.</li> </ul>
22779	<p><i>Summary:</i> Pixel format should be chosen to support stencil buffer</p> <p>Parameter aStencilSize has been implemented in OpenGL_txxl.cxx to support stencil buffer.</p>
22903	<p><i>Summary:</i> DeviationAngle returns constant value</p> <p>Method AIS_InteractiveContext::SetDeviationAngle has been modified to return myDefaultDrawer-&gt;DeviationAngle() instead of a constant value.</p>
23003	<p><i>Summary:</i> Photos of AIS Viewer are corrupted on Windows if tests are executed remotely</p> <p>The default position of 3D viewer window created by vinit command has been set close to the right-left corner of the screen (0,0) to avoid problems on small screens, e.g. dummy screens of remote desktops</p>
23021	<p><i>Summary:</i> MeshVS_DataSource::GetNormalSByElement returns Standard_False and gives no result even when all normals are OK</p> <p>Method MeshVS_DataSource::GetNormalSByElement has been modified to correctly set variable res to True.</p>
23101 23238	<p><i>Summary:</i> TKOpenGL possible gl_ext header conflicts</p> <p>Conflicts have been resolved between two different gl_ext.h header files: supplied with OCCT and installed with Mac OS X and Linux system.</p>
23123	<p><i>Summary:</i> Bug/Regression in visualization of XDE documents in shaded mode</p> <p>Method XCAFPrs_AISObject::Compute has been modified: a new group is created before adding a styled item.</p>
23156	<p><i>Summary:</i> Class Image_Pixmap doesn't give direct access to transparency information</p> <p>Method Image_Pixmap::PixelColor() now returns transparency value in addition to color. Draw command vreadpixel has been added to read the specified pixel value from a 3D view.</p>





23172	<p><i>Summary:</i> vexport failed on some Intel GPUs</p> <p>A workaround for Intel OpenGL drivers has been added to check GL context before wgl MakeCurrent() call on Windows platform.</p>
23186	<p><i>Summary:</i> Unable to display Graphi c3d_ArrayOfPoi nts</p> <p>OpenGL_Primi tiveArray class constant GL_NONE has been renamed into DRAW_MODE_NONE to disambiguate with GL_POI NTS.</p>
23196	<p><i>Summary:</i> Porting to the latest version of FTGL library</p> <p>OpenGL_FontMgr class has been modified to use FreeType entities instead of private helper classes from FTGL. Freetype.lib and ftgl.lib have been linked with #pragma comment on Windows.</p>
23225 23362 23363	<p><i>Summary:</i> Lost gradient background when switching to the hollow interior style</p> <p>View rendering sequence has been improved to synchronize GL state with the OCCT graphic driver state. This is achieved by calling OpenGL_Workspace: : ResetAppl iedAspect() twice per each frame:</p> <ul style="list-style-type: none"> <li>▪ From OpenGL_Workspace: : Acti vate() at the very beginning</li> <li>▪ From OpenGL_Vi ew: : Render() just after all structures have been drawn but before auxiliary scene elements (trihedron, overlayer, display callbacks).</li> </ul> <p>DRAW command vsetinteriorstyle has been added to set Aspect_I nteri orStyl e into shading aspect.</p>
23226	<p><i>Summary:</i> Extend OpenGL_Context to store map of shared GPU resources</p> <p>The following improvements have been introduced in OpenGL:</p> <ul style="list-style-type: none"> <li>▪ New OpenGL_El ement: : Rel ease method allows managing GPU resources.</li> <li>▪ OpenGL_Primi tiveArray uses new OpenGL_VertexBuffer class (requires OpenGL 1.5+).</li> <li>▪ OpenGL_Context now provides access to shared GPU resources and manages resources queue for delayed release (which replaces the functionality of removed OpenGL_ResourceC leaner).</li> <li>▪ Extensions of GL_ARB_texture_buffer_object and GL_ARB_draw_i nstanced have been loaded.</li> <li>▪ Global maps of views, workspaces and structures have been moved to OpenGL_Graphi cDri ver members.</li> <li>▪ UserDrawCal l back() function has been moved to OpenGL_Graphi cDri ver methods.</li> <li>▪ Aspect_Graphi cCal l backStruct now holds handle of OpenGL_Context instead of system-dependent pointers to GL context definition.</li> <li>▪ New classes NCol l ection_Vec2, NCol l ection_Vec3 and NCol l ection_Vec4 implement interface to low-level data (points, vertices, colors) in GLSL-style.</li> <li>▪ Enabl eVBO argument has been removed from vdrawparray Draw command.</li> <li>▪ Several cases of incorrect memory management in TKV3d package have been fixed.</li> <li>▪ In method Vi sual 3d_Vi ewManager: : Remove() structures destroyed before the last view have been removed for correct GPU resources management.</li> <li>▪ In method Graphi c3d_Structure: : Graphi cCl ear() groups have been removed to avoid usage of dead OpenGL_Group pointers.</li> </ul>







23234	<p><i>Summary:</i> Incorrect behavior of AIS_Trihedron</p> <p>A newly created AIS_LocalContext is now bound to map AIS_InteractiveContext::myLocalContexts before this map can be accessed.</p>
23246	<p><i>Summary:</i> TKOpenGL viewer created without depth buffer on some X11 implementations</p> <p>The workaround ensuring GL context creation with depth buffer has been extended to Mac OS platforms.</p>
23261	<p><i>Summary:</i> Checking handle value against NULL</p> <p>Check with IsNull() has been implemented in methods V3d_LineItem::V3d_LineItem and NIS_Surface::SetDisplayMode instead of direct check against NULL</p>
23264	<p><i>Summary:</i> Logical conjunction always evaluates to false</p> <p>Operator '&amp;&amp;' has been replaced with '  ' in Visual3d_Light.cxx</p>
23268	<p><i>Summary:</i> Using size of pointer WIDTHMAP instead of size of its data.</p> <p>Size * sizeof(float) is now correctly used in method CGMDriver::InitializeWidthMap.</p>
23272 23414 23425	<p><i>Summary:</i> Image comparison algorithm</p> <p>The possibility to compare images produced on different computers has been introduced:</p> <ul style="list-style-type: none"> <li>▪ New class Image_Diff compares two images pixel-by-pixel. This class aims to take into account only the meaningful difference. The following options can be used to ignore the difference between images caused by the difference between computers: <ul style="list-style-type: none"> <li>○ Black/White comparison. The images are converted to monochrome bitmap before the comparison.</li> <li>○ Equality with tolerance. The colors of two pixels are considered the same if the color difference is less than tolerance.</li> <li>○ Border filter. The algorithm ignores standalone pixels, which are different on both images and the "border effect" difference caused by triangles located at angle about 0 or 90 degrees to the user.</li> </ul> </li> <li>▪ Class Image_Pixmap has been redesigned to provide interface for low-level image operations.</li> <li>▪ New class Image_AlienPixmap provides Save/Load functionality.</li> <li>▪ Obsolete classes Aspect_Pixmap, Xw_Pixmap and WNT_Pixmap have been removed. ToPixmap methods now retrieve Image_Pixmap as argument.</li> </ul>
23315	<p><i>Summary:</i> Duplicate comparison in an if-clause</p> <p>The length of myTxt2 is now correctly tested in Prs2d_ToleranceFrame::Draw.</p>
23316	<p><i>Summary:</i> OpenGL package can not be compiled on RedHat40-64</p> <p>OpenGL_Window has been modified to avoid early unprotected inclusion glx.h, which may cause glx.h system inclusion.</p>







23317	<p><i>Summary:</i> Using the iteration variable in the inner and outer loop</p> <p>Method <code>GGraphi c2d_SetOfCurves</code> : Save has been corrected.</p>
23318	<p><i>Summary:</i> <code>If</code> statement is equal to <code>else</code> statement</p> <p>The <code>else</code>-clause has been corrected in method <code>AI S_Concentri cRel ation</code> : <code>ComputeEdgeVertexConcentri c</code>.</p>
23319	<p><i>Summary:</i> Typo in <code>AI S_Concentri cRel ation</code>. <code>cxx</code></p> <p>Method <code>AI S_Concentri cRel ation</code> : <code>ComputeTwoVerti cesConcentri c</code> has been corrected to check if <code>Vertex2</code> is on plane.</p>
23320	<p><i>Summary:</i> The body of <code>OpenCol l ector</code> function is fully equivalent to the body of <code>CI oseCol l ector</code> function</p> <p><code>AI S_I nteracti veContext</code> : <code>OpenCol l ector()</code> has been modified to set <code>myI sCol l CI osed</code> to <code>Standard_Fal se</code>.</p>
23322	<p><i>Summary:</i> Identical sub-expressions</p> <p>A copy-paste error has been fixed in <code>Vi sua l 3d_Vi ew</code>. <code>cxx</code></p>
23325	<p><i>Summary:</i> Always getting the transparency of the back face</p> <p><code>Break</code> operators have been added in the <code>switch</code> statement in <code>Prs3d_Shadi ngAspect</code>. <code>cxx</code>.</p>
23345	<p><i>Summary:</i> Crash when destroying <code>OpenGL_El e ment</code></p> <p>The following modifications have been introduced in <code>OpenGL</code> package:</p> <ul style="list-style-type: none"> <li>▪ Possible <code>NULL</code>-pointer dereference is avoided in method <code>OpenGL_Pri mi ti veArray</code> : <code>Rel ease()</code>.</li> <li>▪ <code>GL</code> resources are released when the last view is removed in method <code>OpenGL_Graphi cDri ver</code> : <code>RemoveVi ew()</code>.</li> </ul>
23365	<p><i>Summary:</i> Name collision of global <code>IsEqual ()</code> leads to overriding user's definition</p> <p>Name collision of global <code>IsEqual ()</code> is now avoided in class <code>AI S_ConnectedShape</code>.</p>
23383	<p><i>Summary:</i> Bugs in CDL documentation of visualization classes</p> <p>CDL descriptions for methods <code>Graphi c3d_Structure</code> : <code>SetDi spl ayPri ori ty</code> and <code>V3d_Vi ew</code> : <code>SetVi ewi ngVol ume</code> have been corrected.</p>
23385	<p><i>Summary:</i> Bug in <code>AI S_TexturedShape</code> : <code>Compute()</code></p> <p>Correct shading mode representation has been restored in <code>AI S_TexturedShape</code> : <code>Compute()</code>.</p>
23397	<p><i>Summary:</i> Marker aspect is not applied to points drawn by Primitive Arrays</p> <p>Color and point size properties defined by <code>OpenGL_AspectMarker</code> are now correctly applied in <code>OpenGL_Pri mi ti veArray</code> when points are drawn.</p>





23407	<p><i>Summary:</i> Draw face outlines for XDE objects</p> <p>Drawing of face boundaries for objects displayed in shading mode has been implemented at the level of StdPrs_ShadedShape tool. This solution is available for all presentations built with the tool and in particular for AIS_Shape and XCAFPrs_AISObject.</p> <p>The boundaries are built using edge vertices computed by Poly_PolyTriangulation tool. "On/off" state is controlled via special flag IsFaceBoundaryDraw provided by Prs3d_Drawer::SetFaceBoundaryDraw() method. The line aspect for face boundaries is also controlled by Prs3d_Drawer via flag FaceBoundaryAspect and method Prs3d_Drawer::SetFaceBoundaryAspect.</p> <p>On the level of AIS_InteractiveObject, which has its own AIS_Drawer the above methods are redefined to provide the flag and the line aspect attributes from the linked drawer. Local attribute settings can be cleared in the same way as for other attributes owned by AIS_Drawer (ClearLocalAttributes() method).</p> <p>Two Draw commands have been implemented to test the drawing of boundaries:</p> <ul style="list-style-type: none"> <li>▪ XShowFaceBoundary in XDEDRAW package tests face boundaries on XCAF objects.</li> <li>▪ vshowfaceboundary in ViewerTest package tests face boundaries on AIS_InteractiveObject.</li> </ul>
23428	<p><i>Summary:</i> Extend OpenGL_Context to use Geometry Shaders extension</p> <p>Geometry Shaders extension has become available from GL context.</p>
23433	<p><i>Summary:</i> Compiler warnings in Graphi c3d_ArrayOfPrimitives.Lxx</p> <p>Conversion of color components from real [0, 1] to char [0, 255] has been corrected to avoid compiler warnings in method Graphi c3d_ArrayOfPrimitives::SetVertexColor.</p>
23488	<p><i>Summary:</i> Make video capture functionality in TKOpenGL optional</p> <p>As Video capture functionality is limited to Windows platform and rarely used, it is not build by default now. To build OCCT with this functionality HAVE_VIDEOCAPTURE parameter can be defined in compiler options (directly in project settings or in CSF_DEFINES environment variable which is defined in env. bat).</p>



Data Exchange

22826	<p><i>Summary:</i> Increasing performance of fixes applied during translation of STEP files</p> <p>The ability to use UBTree algorithm to find projection in Extrema_GenExtPS has been added in <code>GeomAPI_Proj ect Poi nt On Surf</code>.</p>
22871	<p><i>Summary:</i> Step Reader raises exception on invalid entity (null swept curve)</p> <p>Check for null swept curve has been added in method <code>StepToGeom_MakeCurve: : Convert</code> to avoid exception.</p>
23047	<p><i>Summary:</i> Behavior of XDE sample is non-stable</p> <p>Function <code>XCAFDoc_ShapeTool : : RemoveShape(const TDF_Label &amp; L)</code> has been modified: if L is a shape location the function removes the label together with the shape. New Boolean flag <code>removeCompl etely</code> allows choosing to delete either a complete shape (if True) or an instance (if False).</p>
23148	<p><i>Summary:</i> Error in stepstcmp</p> <p>Check for comparison of complex entity types has been corrected in <code>StepData_StepReaderData.cxx</code> to be able to translate files containing complex entities written in a non-alphabetical order.</p>
23157	<p><i>Summary:</i> Exception reading STEP file in Debug mode</p> <p>Unsafe Debug printout has been removed from <code>STEPCAFControl _Reader.cxx</code>.</p>
23182	<p><i>Summary:</i> Flag <code>IsClosed</code> is not checked for validity during STEP translation</p> <p>Check for consistency of closure properties and for free boundaries in a shell has been added in <code>ShapeFix_Shel l : : Perform</code>.</p>
23251	<p><i>Summary:</i> Crash during reading materials from STEP file for case when name of material is not set.</p> <p>The reading of incorrectly written STEP files has been fixed in <code>STEPCAFControl _Reader.cxx</code> to avoid exception.</p>
23258	<p><i>Summary:</i> Missing parenthesis</p> <p>Missing parenthesis has been added in <code>IGESGeom_Tool OffsetCurve.cxx</code></p>
23332	<p><i>Summary:</i> Expression '<code>anIndex &lt; 0</code>' is always false.</p> <p><code>Vrml Data_Geometry.cxx</code> has been modified to check the index sign before casting to <code>Standard_Si ze</code>.</p>
23333	<p><i>Summary:</i> The same variable 'i' is used for the inner and the outer loop</p> <p>A separate variable 'j' has been implemented in <code>Vrml data_ShapeConvert.cxx</code> to iterate the inner loop.</p>





23335	<p><i>Summary:</i> Array overrun is possible. The value of 'i' index could reach 200 in Interface_MSG.cxx</p> <p>Index 'i' has been restricted to the interval between 1 and 199 to avoid array overrun.</p>
23336 23337 23339	<p><i>Summary:</i> strcmp function returns 0 if the corresponding strings are equal.</p> <p>Modifications have been introduced in some classes to check if the return value from strcmp is '0'. The following classes are concerned: IGESGraph_ToolDrawingUnits, RWStepShape_RWAngularSize, RWStepShape_RWAngularLocation, RWStepFEA_RWFeaAxis2Placement3d and RWStepElement_RWElementDescriptor.</p>
23340	<p><i>Summary:</i> The values of different enum types are compared: switch(ENUM_TYPE_A) { case ENUM_TYPE_B: ... }.</p> <p>The enumeration type has been corrected in StepToTopoDS.cxx.</p>
23377	<p><i>Summary:</i> Error with rational spline IGES surface import</p> <p>Method IGESGeom_BsplineSurface::IGESGeom_BsplineSurface has been fixed to address Rational surface with non-unitary weights at the last index.</p>
23384	<p><i>Summary:</i> Translate sub-shape names between XDE document and STEP</p> <p>In the previous implementation of XDE &lt;-&gt; STEP translation the names were recorded only for top-level shapes (free parts, assemblies and their components). The possibility to write/read names of sub-shapes has been implemented in the following way:</p> <ul style="list-style-type: none"> <li>STEPCAFControl_Writer checks whether any sub-shapes exist for the top-level shapes in XDE document and attributes their names to the corresponding STEP Representation Items.</li> <li>STEPCAFControl_Reader checks whether STEP topological representation Items have non-empty 'Name' attributes and hangs the corresponding sub-shapes to the dedicated OCAF sub-Labels. Sub-Labels for anonymous entities are not created.</li> </ul> <p>This mode of Reader/Writer is optional and disabled by default. It can be activated using parameters write.stepcaf.subshapes.name for Writer and read.stepcaf.subshapes.name for Reader.</p>

### Shape Healing

23195	<p><i>Summary:</i> Method ShapeFix_Face::FixPeriodicDegeneratedMode() is not implemented</p> <p>The absent method ShapeFix_Face::FixPeriodicDegeneratedMode() has been implemented.</p>
23257	<p><i>Summary:</i> Missing return statement</p> <p>Missing return statement has been added in class ShapeFix_Face::IsPeriodicConicalLoop.</p>



Draw

23136	<p><i>Summary:</i> Increase visibility of DRAW samples</p> <p>The following modifications have been introduced to increase the visibility of DRAW samples:</p> <ul style="list-style-type: none"> <li>▪ Tcl samples have been moved from <code>src/DrawResources</code> to <code>samples/tcl</code>.</li> <li>▪ Scripts <code>VisualisationDemo.tcl</code> and <code>ModelingDemo.tcl</code> have been enabled to work on Windows.</li> <li>▪ File <code>wi ng. brep</code> has been moved from <code>src/DrawResources</code> to <code>data/occ</code>.</li> <li>▪ <code>DataExchangeDemo.tcl</code> has been corrected.</li> <li>▪ <code>OCAFDemo.tcl</code> has been removed.</li> <li>▪ A sample Tcl script creating a model defined on the 'Open CASCADE challenge' web page has been added.</li> </ul>
23152	<p><i>Summary:</i> Possibility to have echo of DRAW commands in log file</p> <p>Two commands have been added in DRAW to echo DRAW commands in a log file:</p> <ul style="list-style-type: none"> <li>▪ <code>decho</code> allows switching on/off echo of commands and their results. When echo is on, all commands implemented as OCCT DRAW procedures will be echoed to standard output as well as their result. This can be useful to trace the execution of the script evaluated by <code>source</code> command.</li> <li>▪ <code>dl og</code> implements off-screen log for recording DRAW commands and their output for further processing in a Tcl script.</li> </ul>
23185	<p><i>Summary:</i> <code>DrawAppl i l ni t</code> must be loaded from current directory</p> <p>The following modifications have been made:</p> <ul style="list-style-type: none"> <li>▪ File <code>DrawAppl i l ni t</code> has been removed from package <code>DrawResources</code>. The code loading QA commands has been moved to <code>DrawDefault s</code>.</li> <li>▪ In <code>DrawDefault s</code> the code loading file <code>i ni t. tcl</code> has been removed as obsolete.</li> <li>▪ If environment variable <code>CSF_DrawAppl i l ni t</code> is defined, it is assumed to be the name of the application-defined file to load; otherwise it is searched as file <code>DrawAppl i l ni t</code> in the current directory.</li> </ul>
23192	<p><i>Summary:</i> Regression in <code>wri testl</code> command</p> <p>Processing of arguments in <code>wri testl</code> command has been corrected.</p>
23197	<p><i>Summary:</i> Draw executable does not detect update of environment variables on Windows.</p> <p>The following modifications have been implemented:</p> <ul style="list-style-type: none"> <li>▪ New DRAW commands <code>dgetenv</code> and <code>dsetenv</code> have been added to query and set environment variables defined in C subsystem from Tcl.</li> <li>▪ A special handler providing automatic update of C environment when Tcl environment (array <code>env</code>) is modified has been added in <code>DrawDefault s</code> to work on Windows. Note that this is not needed on Linux as Tcl does this internally.</li> </ul>
23227	<p><i>Summary:</i> Command to estimate current geometry complexity of OpenGL scene</p> <p>New command <code>vfeedback</code> allows capturing GL info using <code>GL_FEEDBACK</code> functionality</p>





23253	<p><i>Summary:</i> Additional viewer 3D commands</p> <p>Draw commands <code>vleft</code>, <code>vright</code>, <code>vbottom</code>, <code>vback</code> and <code>vfront</code> have been implemented to show orthogonal projections of displayed object.</p>
23263	<p><i>Summary:</i> Incorrect results displaying of QA command BUC60811 using "printf"</p> <p>A Draw command used for testing has been fixed in <code>QAbugs_3.cxx</code></p>
23265	<p><i>Summary:</i> Mismatching allocation and deallocation</p> <p>Arrays have been deallocated with 'delete []' operator in methods <code>QADNamingIteratorsCommands::GetAllNewShapes</code>, <code>QANewModTopOpe::IsConnected</code> and <code>TestTopOpeToolsTraceCommands::dstrace</code>.</p>
23266	<p><i>Summary:</i> cppcheck warning: Logical disjunction always evaluates to true</p> <p>Logical disjunction has been replaced by conjunction in <code>QANewDBRepNaming_NameBooleanOperationFeat</code>.</p>
23347	<p><i>Summary:</i> Expression '<code>(* q == ' ' ) &amp;&amp; (* q == '\t' )</code>' is always false.</p> <p>The expression has been corrected in <code>Draw_VariableCommands.cxx</code></p>
23348	<p><i>Summary:</i> Expression '<code>i i &gt;= 0</code>' is always true. Unsigned type value is always <code>&gt;= 0</code>.</p> <p>The following modifications have been introduced in the frame of this improvement:</p> <ul style="list-style-type: none"> <li>Command <code>getsourcefile</code> has been corrected to return its result as a Tcl string and simplified.</li> <li>Processing of path to source file has been rewritten using <code>OSD_Path</code> for more clarity.</li> </ul>
23349	<p><i>Summary:</i> Identical sub-expressions.</p> <p>Draw commands <code>bopsinf</code> and <code>bopsonf</code> have been corrected.</p>
23350	<p><i>Summary:</i> The null pointer is passed into 'strcmp' function.</p> <p>Method <code>TestTopOpe_VarsTopo::GetClear</code> has been modified to return if it gets a NULL pointer.</p>
23353	<p><i>Summary:</i> <code>Graphi c3d_NOM_STONE</code> used twice in an if-clause.</p> <p>A redundant string has been removed from <code>ViewerTest.cxx</code>.</p>
23356	<p><i>Summary:</i> Suspicious assignment inside the condition expression of 'if' operator.</p> <p>The assignments to comparisons in if-clauses have been changed in <code>QANewBRepNaming_BooleanOperationFeat.cxx</code></p>
23357	<p><i>Summary:</i> The 'then' statement is equivalent to the 'else' statement.</p> <p>A Draw command used for testing has been fixed in <code>QAbugs_11.cxx</code>.</p>





23358	<p><i>Summary:</i> Uninitialized variables used.</p> <p>A Draw command used for testing has been fixed in QAbugs_3. cxx</p>
23362	<p><i>Summary:</i> Adding DRAW command vsetinteriorstyle</p> <p>New DRAW command vsetinteriorstyle sets Aspect_InteriorStyle into shading aspect.</p>
23409	<p><i>Summary:</i> Tri check command doesn't report problem when triangulation has unexpected holes</p> <p>Tri check command has been improved to detect holes in the triangulation.</p>

### Documentation

22811	<p><i>Summary:</i> Documentation about building 3rd-party products and OCCT is incomplete</p> <p>Complete and consistent step-by-step instructions on building the full set of 3rd-party products on Linux and Windows platforms have been added.</p>
23180	<p><i>Summary:</i> Documentation on MMGT_OPT and MMGT_REENTRANT</p> <p>Documentation on default values of system environment variables MMGT_OPT and MMGT_REENTRANT has been updated.</p>
23181	<p><i>Summary:</i> Wrong statement in Visualization User's Guide</p> <p>A Boolean value has been corrected in Visualization User's Guide.</p>
23217	<p><i>Summary:</i> Reference documentation of V3d_TypeOf... enums is mixed up</p> <p>The automatic generation procedure has been fixed to correctly process documentation remarks about enumerations.</p> <p>Additionally, empty comment "--\n" now does not cause the loss of documentation.</p>
23321	<p><i>Summary:</i> Text is overlaid by picture</p> <p>Page layout has been corrected in Modeling Algorithms User's Guide.</p>
23376	<p><i>Summary:</i> Parameter \$INSUNITS is not taken into account</p> <p>Parameter read.dxf.insunits.scale has been described in DXF Interface User's Guide</p>
23437	<p><i>Summary:</i> Typo in STEP User's Guide</p> <p>A small correction has been introduced in STEP User's Guide.</p>





Development Environment

23098	<p><i>Summary:</i> Cppcheck warnings/errors in QA files</p> <p>Some cppcheck warnings/errors have been fixed in QA files.</p>
21189	<p><i>Summary:</i> Clean up KAS: dev: ros and Products</p> <p>The following modifications have been introduced in the frame of this improvement:</p> <ul style="list-style-type: none"> <li>Package Voxel Client has been removed, the corresponding code has been moved to Voxel Demo sample.</li> <li>Voxel Demo sample has been redesigned to pass without compilation of OpenGL classes. It refers to TKOpenGL.dll as an external library.</li> <li>Minor bugs have been fixed in OCAF and Viewer3D standard MFC samples.</li> </ul>

WOK

23229	<p><i>Summary:</i> Avoid overriding existing custom. bat (or . sh) in workbench</p> <p>Command wgenproj has been modified to avoid overriding the custom. bat (or . sh) file in the current workbench.</p>
23445	<p><i>Summary:</i> Improve configure. ac script to check native products properly</p> <p>Script configure. ac has been modified to detect mandatory native products script without explicit specifying of the corresponding options.</p>
23417	<p><i>Summary:</i> Generation of OCCT documentation in local WOK</p> <p>Recommendations for generation of reference documentation have been added in the Overview.</p>

Samples

22914	<p><i>Summary:</i> Incorrect name LRELASE is used in *. pro files</p> <p>A typo has been fixed in IESample. pro and Tutorial. pro.</p>
23134	<p><i>Summary:</i> Updating Tutorial sample source code</p> <p>The source code of Tutorial sample has been updated to match documentation</p>
23346	<p><i>Summary:</i> Conversion from 'Standard_Real' to 'Standard_ShortReal'</p> <p>Standard_Real values have been replaced by Standard_ShortReal in methods OffsetDlg::SetOffsets and Viewer3dDoc::OnUpdatePolygonOffsets.</p>
23448	<p><i>Summary:</i> Fix QT samples for Mac OS X</p> <p>QT samples have been fixed so that they can be built on Mac OS X with qt-x11.</p>
23456	<p><i>Summary:</i> Update samples</p> <p>About dialog has been updated in MFC samples.</p>





### Third-party Products

23196	<p><i>Summary:</i> The latest version of freetype and ftgl should be used with OCCT – in order to use the native ftgl on recent distributions of Linux platform.</p> <p>Maintenance of freetype 2.4.10 and ftgl 2.1.3 has been implemented. At the same time compatibility with previous versions of freetype and ftgl has been provided for Linux.</p>
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### Products

#### **Advanced Samples**

22772	<p><i>Summary:</i> Menus of Shape Healing sample do not work if built with MS VS 2008</p> <p>The interface of Shape Healing sample now works properly if built with MS Visual Studio 2008.</p>
23109	<p><i>Summary:</i> Update of Ship Builder application</p> <p>Ship Builder Sample application has been updated and ported to new versions of components: qt 4.6.3, python 2.6.6, Salome GUI 6.5.0, etc. User's guide has been provided for this sample.</p>
23173	<p><i>Summary:</i> Porting of Advanced C# Wrapper to OCC 6.5.3 &amp; VC9</p> <p>Advanced C# Wrapper has been ported to OCC 6.5.3 and Visual Studio 9.</p>
23179	<p><i>Summary:</i> Porting Kitchen sample to OCCT 6.5.3</p> <p>Kitchen sample has been ported to OCC 6.5.3. FLTK source has been excluded from the sample packaging. It must be installed and built separately.</p>
23228	<p><i>Summary:</i> Incorrect wrapping of non-handle classes</p> <p>Some gp and TopoDS classes have been properly wrapped as structures by c# wrapper.</p>
23443	<p><i>Summary:</i> Update of Advanced OCAF Sample</p> <p>The following modifications have been introduced in frame of OCAF Sample update:</p> <ul style="list-style-type: none"> <li>▪ Usability of the sample code has been improved;</li> <li>▪ Obsolete evolution REPLACE has been removed;</li> <li>▪ About dialog has been updated.</li> </ul>
23477	<p><i>Summary:</i> Standard product copyright statement is missing in C# Wrapper sources</p> <p>Standard product copyright statement has been inserted in all *.cs, *.i and *.tcl files of C# Wrapper.</p>



**Parasolid**

23368	<p><i>Summary:</i> Can not read an X_T file</p> <p>Poi nterLi sBl ock retrieval procedure has been corrected for schema v19, so missed i ndex_map_offset entity is now translated.</p>
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**DXF**

22709 22710 22711 22712 22713 22714	<p><i>Summary:</i> Invalid shape translating a DXF file</p> <p>DXF product has been updated to support new versions of DXF format files.</p>
23254	<p><i>Summary:</i> Translation produces misplaced dimensions</p> <p>DXF has become independent from XSTEPResourceAdv resource. Dimensions are now inserted correctly.</p>
23455	<p><i>Summary:</i> DxfFile_WorkLibrary: : WriteFile() fails to write a file keeping by another application</p> <p>A condition checking ofstream status has been added in method DxfFile_WorkLibrary: : WriteFile().</p>

**Express Mesh**

22890 22891 22892 23026	<p><i>Summary:</i> Introduce parallelism in Express Mesh</p> <p>Parallelism has been introduced in Express Mesh to achieve better performance in multithreaded mode.</p> <p>The following modifications have been implemented in the frame of this improvement:</p> <ul style="list-style-type: none"> <li>▪ IsParallel flag has been added in QMShape_Tessellator class to enable running Express Mesh in parallel or sequential modes. If IsParallel is set to True, Parallel Compute() method is called.</li> <li>▪ Classes QMData_Curve and QMData_Curve2d have been modified to avoid data race errors. Now such curves are represented by a vector of points instead of a sequence.</li> <li>▪ QMdiscret DRAW command has been modified to allow testing a parallel version of Express Mesh</li> </ul>
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## Porting to version 6.5.4

Porting of user applications from the previous 6.5.3 OCCT version to version 6.5.4 requires the following issues to be taken into account:

- OCCT has been ported to the latest version of FTGL, 2.1.3rc5. This is a version included with most modern Linux distributions, and this change enables OCCT building with native FTGL on these systems.

Since FTGL is packaged in different way in 2.1.2 and 2.1.3, update of OCCT building tools (WOK and automake scripts on Linux, MS projects on Windows) is required. Please download the updated WOK (Windows and Linux only) from [Resources](#) page, and rebuild.

For Windows users, we have prepared [binary archives](#) of FTGL 2.1.3rc5 and updated FreeType library (version 2.4.10 built as dynamic library).

Building OCCT with previously supported versions of FTGL 2.1.2 and FreeType 2.3.7 should still be possible. On Linux, this should be supported properly by automake scripts. On Windows, use of FTGL 2.1.2 requires rebuilding FreeType as a dynamic library (which in its turn requires rebuilding FTGL). In addition, pre-processor macro HAVE\_FTGL\_UPPERCASE must be defined during compilation of TKOpenGL. For building OCCT by MS Visual Studio, this macro can be added to variable CSF\_DEFINES in env.bat (generated by WOK). For building by WOK, this macro should be defined in WOK EDL files.

- The code using obsolete classes Aspect\_Pixmap, Xw\_Pixmap and WNT\_Pixmap should be rewritten implementing class Image\_Pixmap, which is now retrieved by ToPixmap methods as argument.

A sample code using ToPixmap is given below:

```
#include <Image_AlienPixmap.hxx>
void dump (Handle(V3d_View)& theView3D)
{
    Standard_Integer aWndSizeX = 0;
    Standard_Integer aWndSizeY = 0;
    theView3D->Window()->Size (aWndSizeX, aWndSizeY);
    Image_AlienPixmap aPixmap;
    theView3D->ToPixmap (aPixmap, aWndSizeX, aWndSizeY);
    aPixmap.Save ("c:\\image.png");
}
```

- Now OpenGL resources related to Interactive Objects are automatically freed when the last view (window) is removed from graphical driver.  
To avoid presentation data loss, the application should replace an old view with a new one in the proper order: first the new view is created and activated and only then the old one is detached and removed.
- It is recommended to use NCollection containers with hasher parameter (introduced in 6.5.3) instead of global definition IsEqual()/HashCode() as well as to use explicit namespaces to avoid name collision.



## Supported Platforms and Pre-requisites

Open CASCADE Technology is supported on Windows Intel and Linux Intel platforms.

The table below lists the product versions used by OCCT and its system requirements.

<b>Linux Operating System</b>	32/64-bit: Debian 4.0, Mandriva 2008*
<b>Windows Operating System</b>	32/64-bit: MS Windows SEVEN SP1 / VISTA SP2 /XP SP3
<b>Minimum memory</b>	512 Mb, 1 Gb recommended
<b>Free disk space</b> (complete installation)	650 Mb of disk space, or 1,4 Gb if installed with reference documentation
<b>Minimum swap space</b>	500 Mb
<b>Video card</b>	<p><b>GeForce</b> The following versions of GeForce drivers are recommended:</p> <p><i>For Linux:</i> 64-bit Version: <a href="#">100.14.19 or later</a> 32-bit Version: <a href="#">100.14.19 or later</a></p> <p><i>For Windows:</i> Version 266.58 WHQL or later is recommended: <a href="http://www.nvidia.com/Download/index.aspx">http://www.nvidia.com/Download/index.aspx</a></p>
<b>Graphic library</b>	OpenGL 1.1+
<b>C++</b>	<p><i>For Linux:</i> GNU gcc 4.0. - 4.3.2.</p> <p><i>For Windows:</i> Microsoft Visual Studio .NET 2005 SP1** with all security updates Microsoft Visual Studio .NET 2008 SP1 Microsoft Visual Studio .NET 2010</p>
<b>TCL</b> (for testing tools)	<p><i>For Linux:</i> Tcltk 8.5 <a href="http://www.tcl.tk/software/tcltk/8.5.html">http://www.tcl.tk/software/tcltk/8.5.html</a></p> <p><i>For Windows:</i> ActiveTcl 8.5 <a href="http://www.activestate.com/activetcl/downloads">http://www.activestate.com/activetcl/downloads</a></p>
<b>Qt</b> (for demonstration tools)	Qt 4.6.2 <a href="http://qt.nokia.com/downloads">http://qt.nokia.com/downloads</a>
<b>FreeType</b> (OCCT Text rendering)	freetype-2.4.10 <a href="http://sourceforge.net/projects/freetype/files/">http://sourceforge.net/projects/freetype/files/</a>
<b>Ftgl</b> (OCCT Text rendering)	ftgl-2.1.3 <a href="http://sourceforge.net/projects/ftgl/files/">http://sourceforge.net/projects/ftgl/files/</a>
<b>FreeImage</b> *** (Support of common graphic formats)	FreeImage 3.14.1 <a href="http://sourceforge.net/projects/freeimage/files/Source%20Distribution/">http://sourceforge.net/projects/freeimage/files/Source%20Distribution/</a>
<b>gl2ps</b> *** (Export of OCCT viewer contents to vector graphic file)	gl2ps-1.3.5 <a href="http://geuz.org/gl2ps/">http://geuz.org/gl2ps/</a>
<b>TBB</b> *** (Tool for parallelized version of BRepMesh component)	tbb30_018oss <a href="http://www.threadingbuildingblocks.org/">http://www.threadingbuildingblocks.org/</a>

- \* Mandriva 2010 is a permanently tested platform.
- \*\* The official release of OCCT for Windows contains libraries built with VC++ 2008.
- \*\*\* This product is optional.

