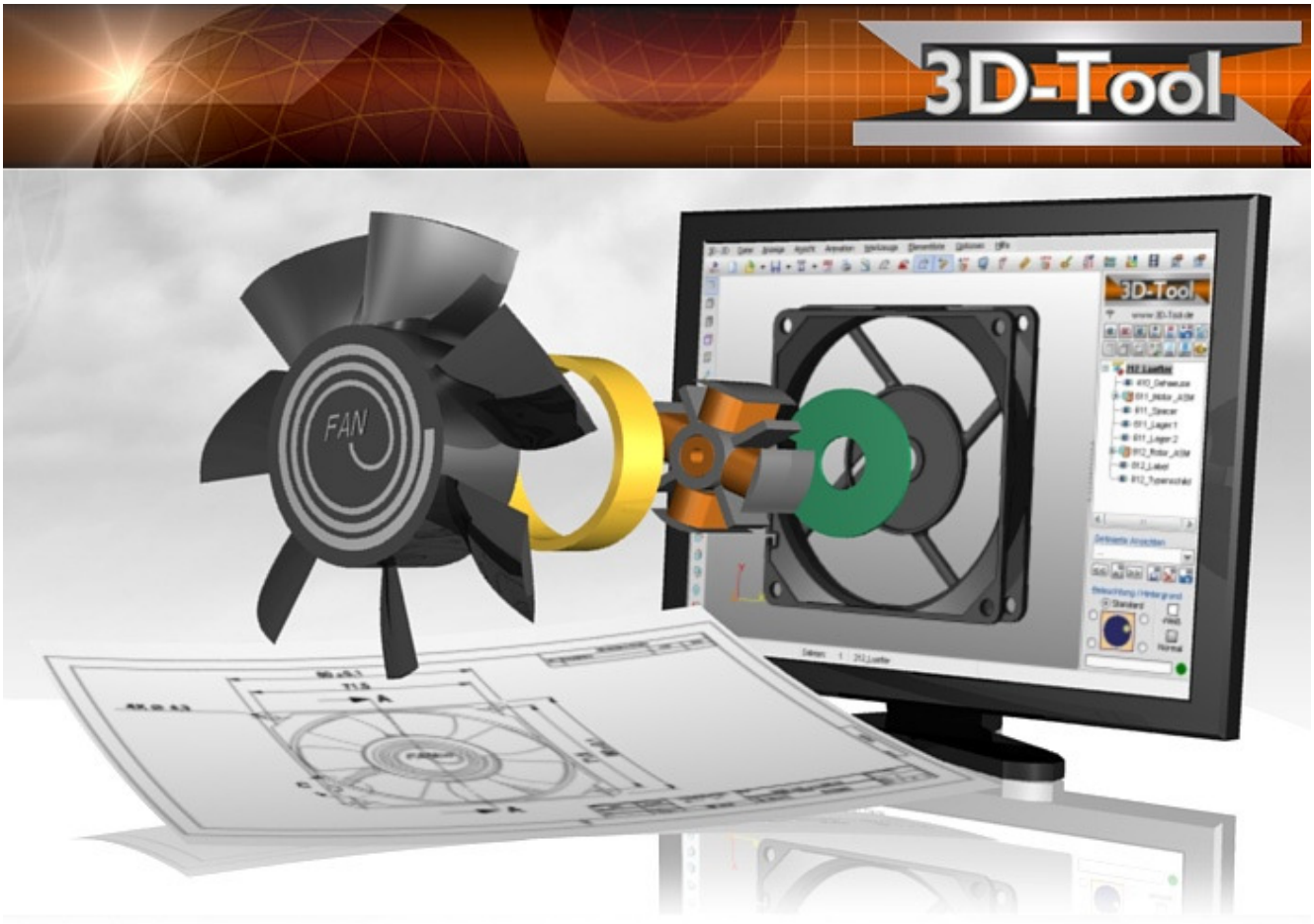

3D-Tool Version 10 - Manual

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1. Comparison: Free Viewer, Basic, Advanced, And Premium

Use the following comparison of 3D-Tool versions to find the version that matches your needs.

The major difference between the Basic, the Advanced, and the Premium version is the file formats that are supported. Addtionally the Premium Version of 3D-Tool contains the 3D-NativeCAD Converter.

The supported file formats can be seen by following:
Import Data > Supported File Formats.

The 3D-Tool Free Viewer supports the 3D-Tool EXE and DDD file format and the STL format.
It is not possible to load more than one model at a time. Also, the Free Viewer cannot publish/save files and has limited features.

Function	Free Viewer	3D-Tool Basic	3D-Tool Advanced	3D-Tool Premium
3D-NativeCAD-Converter Convert CATIA, Pro/E, Inventor, Unigraphics, Solidworks, STEP, IGS, VDA, SAT, and Parasolid files to CATIA, STEP, IGS, VDA, SAT, SAB, ASAT, and STL.	✗	✗	✗	✓
3D Premium Import CATIA V4 - *.exp, *.model, *.session *(Catia 4.1.9 - Catia 4.2.4)* CATIA V5 - *.cat, *.catpart *(R2 - R21)* ProEngineer - *.prt, *.asm, *.xpr, *.xam *(16 - Wildfire 5, Creo 1.0)* Autodesk Inventor - *.iam, *.ipt *(11 - 2012)* Unigraphics - *.prt *(11 - 18, NX - NX7.5)* Solidworks - *.sldprt, *.sldasm *(98 - 2012)*	✗	✗	✗	✓
3D-Premium 64bit Interfaces 64bit interfaces for import and conversion of CATIA V4/V5, Pro/E, Inventor, Solidworks, UG, STEP, IGES, VDA, SAT, and Parasolid files.	✗	✗	✗	✓
3D Advanced Import 3D Advanced Formats: STEP, IGS, VDA, SAT, and PARASOLID.	✗	✗	✓	✓
3D Basic Import 3D Basic Formats: STL, VRML, SLP, XGL, OBJ, PLY, 3DS, ASC, DXF, IV	✗	✓	✓	✓
Import STL files Import models in STL file format.	✓	✓	✓	✓
Import 2D file formats 2D file formats: DXF, DWG, HPGL / HPGL2	✗	✓	✓	✓
Load 3D-Tool EXE/DDD files Import 3D-Tool EXE and DDD files.	✓	✓	✓	✓
Load multiple files simultaneously Merge multiple 3D-models and 2D-drawings.	✗	✓	✓	✓
Publish EXE/DDD files Publish 3D-models and 2D-drawings together with the 3D-Tool Viewer as directly executable EXE-files. DDD-files can be viewed using the 3D-Tool Free Viewer.	✗	✓	✓	✓
Publish 3D-PDF files Publish models as 3D-PDF files to be viewed with the Acrobat Reader.(7.0.7 or higher).	✗	✓	✓	✓
Save STL, VRML, 3DS and PLY Save imported models asSTL,VRML, 3DS, or PLY files.	✗	✓	✓	✓
Support of 3D mouses Use 3Dconnexion 3D mouses e.g. SpaceNavigator, SpaceExplorer, SpacePilot, SpaceTraveller	✓	✓	✓	✓
Print Print any 3D and 2D view or a combination of views.	✓	✓	✓	✓
Create BMP/JPG pictures Save any 3D or 2D view or a combination of views as BMP or JPG file.	✓	✓	✓	✓

Capture to clipboard Select and copy a section of the screen to the Clipboard.	✓	✓	✓	✓
Hide and show parts Hide and show parts, assemblies, and models.	✓	✓	✓	✓
Change the display of parts Change the color of parts and assemblies, switch them transparent, and show them in different render modes, e.g. shaded, shaded with edges, hidden lines.	✓	✓	✓	✓
Custom Views Save any 3D or 2D view as Custom View. Custom Views contain the state and orientation of the model as well as all display settings.	✓	✓	✓	✓
Cross sections Create cross sections of the model, its assemblies, and parts. Save the cross section line to a DXF-file.	✓	✓	✓	✓
3D annotations and dimensions Measure distances, angles, radii, wall thickness, and clearances, or make annotations.	✓	✓	✓	✓
2D markups and dimensions Measure distances, angles, radii, add redline markups, and insert text and pictures.	✓	✓	✓	✓
Assembly explode Create exploded views of the model.	✓	✓	✓	✓
Animation Combine Custom Views to animations.	✗	✓	✓	✓
Animation export as AVI video Export 3D-Tool animations as AVI video.	✗	✓	✓	✓
Tooling analysis Display drafts and calculate the projected area.	✓	✓	✓	✓
Wall thickness analysis Calculate and display the wall thicknesses of a model.	✓	✓	✓	✓
Information Display the volume, the surface area, and the dimensions of models and parts.	✓	✓	✓	✓
Position and copy parts Move, rotate, mirror, scale, and copy parts.	✓	✓	✓	✓
Property Editor Change names, colors, and transparencies of parts and assemblies.	✗	✓	✓	✓
Custom View Editor Change the order and the names of Custom Views.	✗	✓	✓	✓
Placement Position and align parts.	✗	✓	✓	✓
Repair Delete faces, reposition flipped faces, and connect open edges.	✗	✓	✓	✓
RP-Layout Place parts on a Rapid Prototyping System platform.	✗	✓	✓	✓

2. Hardware And Software Requirements

Consider the following hardware and software requirements when you install 3D-Tool.

Hardware Requirements

3D-Tool does not require any specific hardware. A desktop-PC or laptop with a main memory of 1GB or more and a screen resolution of 1024 x 768 pixels or more will suffice. Most current computers will import and display 3D-models with adequate speed. The speed of import and display depends on the complexity of the models, the speed of the CPU, and the performance of the graphics adapter. Complex and large models may cause low-efficiency computers (netbooks, older PCs) to reach their performance limits.

Tip

To increase the display speed of the models try the OpenGL hardware acceleration.

The hardware acceleration is activated in the *Preferences* group of the *Options* tab. After a warning has appeared the hardware acceleration is active and the model should move smoother. If there are no problems, it can be set permanently through *Options* tab > *Preferences* group > *Preferences* button > *Hardware*.

Software Requirements

Supported Operating Systems

- Windows XP SP2 (32/64bit)
- Windows Vista (32/64bit)
- Windows 7 (32/64bit)

Software Requirements to use the Premium Import

The following software will be installed together with 3D-Tool as it is required for the Premium Import:

- Dassault Systemes Software VC9 Prerequisites x86 - x64

64bit Interfaces

3D-Tool Premium features 64bit interfaces to import and convert CATIA V4/V5, Pro/E, Inventor, Solidworks, UG, STEP, IGES, VDA, SAT, and Parasolid files. To use the 64bit interfaces one of the following operation systems is required: Windows XP x64, Windows Vista x64, or Windows 7 x64.

3. Activation and Licensing

Run 3D-Tool and use the 3D-Tool license dialog to activate a 3D-Tool License, request a Trial License, or start 3D-Tool as Free Viewer.

Run as Free Viewer

Without a valid License Key or Trial Key, 3D-Tool can only be used as Free Viewer with limited features.

Note
The Free Viewer can be downloaded separately from our website: **www.3D-Tool.de**. The Free Viewer can be used to view the small, easily sent 3D-Tool DDD files.

License Activation

Request a License Key

For each license you order, you will receive a License Certificate with an Authorization Key on it. After starting 3D-Tool, click *Get License Key* in the license dialog and enter your Authorization Key. Next, enter the e-mail address to which you want the License Key to be sent. 3D-Tool will connect to the 3D-Tool website, your license data will be checked, and within 60 minutes you will receive the License Key by e-mail. Requesting a License Key this way requires an active internet connection.

If your computer does not have a connection to the internet or the connection fails, you can obtain a License Key by e-mail or fax. To do so, please provide the following:

- The Registration-ID from the 3D-Tool license dialog.
- The Authorization Key from the 3D-Tool License Certificate.
- The e-mail address to which you want the License Key to be sent.

Activation with the 3D-Tool License File

The e-mail with the Licensing Key has a license file (license.dat) attached. Saving this license file in the 3D-Tool installation directory, will make 3D-Tool available to all user accounts on the computer.

Activation with the License Key

After receiving the License Key, enter it in the license dialog, and click on *Activate Key*. Now 3D-Tool can be used. You must enter the License Key separately for each user account on the computer.

Note

A 3D-Tool Single User License may only be used on a single computer. A License Key will work only on the computer for which it was requested. If the computer is replaced or newly setup, you have to request a new License Key. The previous 3D-Tool installation may not be used anymore and has to be deleted or uninstalled.

Reactivation After Changing Computers

If you replace the computer or newly install the operating system, you have to request a new License Key. See *License Activation* above for further instructions.

Activating an Upgrade

If you have ordered an upgrade and received the new License Certificate run 3D-Tool, select the *Options* tab and click *Licensing* in the *Licensing* group. The 3D-Tool license dialog is displayed. See *License Activation* above for further instructions.

Activating an Update

After you have ordered an update and received the new License Certificate, download and install the newest version of 3D-Tool from our website **www.3D-Tool.de**. See *License Activation* above for further instructions.

14 Day Trial License

Obtaining a Trial Key

To try all features of 3D-Tool, a 14 Day Trial License can be requested once. Run 3D-Tool and click *Get Trial Key* in the licensing dialog. Next enter your e-mail address and contact information, and click *Get key*. 3D-Tool will connect to the 3D-Tool website, your request will be checked, and within 60 minutes you will receive the Trial Key by e-mail.

If your computer does not have a connection to the internet or the connection fails, you can obtain a Trial Key by e-mail or fax. To do so, please, provide the following information:

- The Registration-ID from the license dialog.
- The e-mail address to which you want the Trial Key to be sent.
- Your contact information (company, address, and contact person).

Note

The Trial Key will only work on the computer for which it was requested. Only one Trial Key can be requested online. If you need further Trial Keys, please send us an e-mail.

Activating the Trial Key

After receiving the Trial key, enter it in the license dialog and click on *Activate Key* to activate 3D-Tool for the 14 day trial period. To start select a license for the current session: Basic, Advanced, or Premium. Only the respective features and interfaces will by available during the session. That way you can try the 3D-Tool version you intend to buy.

Note

The 3D-NativeCAD Converter is a discrete application and will work regardless of the license selected for a 3D-Tool session.

4. File Formats and Limitations

This section informs you about the file formats supported by 3D-Tool and about the limitations when viewing and converting the files.

Supported File Formats

Get informed of the file formats that can be opened and saved in the different 3D-Tool versions.

Load

3D-Formats	Free Viewer	3D-Tool Basic	3D-Tool Advanced	3D-Tool Premium	NativeCAD Converter*
CATIA V5 files, R2 - R22 (*.CATPart, *.CATProduct)	✗	✗	✗	✓	✓
CATIA V4 files, 4.1.9 - 4.2.4 (*.model, *.exp, *.session)	✗	✗	✗	✓	✓
ProEngineer files, 16 - WF5, Creo 1.0 (*.prt, *.prt.*, *.asm, *.asm.*, *.xpr, *.xas)	✗	✗	✗	✓	✓
Autodesk Inventor files 6 - 2012 (*.ipt), 11 - 2012 (*.iam)	✗	✗	✗	✓	✓
Solidworks files, 98 - 2012 (*.sldprt, *.sldasm)	✗	✗	✗	✓	✓
Unigraphics files, 11 - 18, NX – NX 8 (*.prt)	✗	✗	✗	✓	✓
Parasolid files V10 - V24 (*.x_t *.x_b)	✗	✗	✓	✓	✓
STEP files (*.stp)	✗	✗	✓	✓	✓
IGS files (*.igs)	✗	✗	✓	✓	✓
VDA files (*.vda)	✗	✗	✓	✓	✓
SAT files (*.sat, ASIC-Text)	✗	✗	✓	✓	✓
SAB files (*.sab, ASIC-Binary)	✗	✗	✗	✓	✓
STL files (*.stl)	✓	✓	✓	✓	✗
VRML1, VRML2 - files (*.wrl)	✗	✓	✓	✓	✗
Render files (*.slp)	✗	✓	✓	✓	✗
PLY files (*.ply)	✗	✓	✓	✓	✗
XGL files (*.xgl *.zgl)	✗	✓	✓	✓	✗
OBJ files (*.obj)	✗	✓	✓	✓	✗
3DS files (*.3ds *.prj *.pli)	✗	✓	✓	✓	✗
ASC files (*.asc)	✗	✓	✓	✓	✗
DXF files (3D-Faces, *.dxf)	✗	✓	✓	✓	✗
Inventor files (*.iv)	✗	✓	✓	✓	✗
3D-Tool files (*.ddd)	✓	✓	✓	✓	✗
3D-Tool EXE files (*.exe)	✓	✓	✓	✓	✗
2D-Formats	**Free Viewer**	**3D-Tool Basic**	**3D-Tool Advanced**	**3D-Tool Premium**	**NativeCAD Converter***
DXF files (*.dxf)	✗	✓	✓	✓	✗
DWG files (*.dwg)	✗	✓	✓	✓	✗
HPGL files (*.plt *.plo *.hpg *.hp2)	✗	✓	✓	✓	✗

*) The 3D-NativeCAD Converter is part of 3D-Tool Premium.

Notes

- To load a 3D DXF file, you have to select *DXF file-3D* in the File Open dialog explicitly otherwise the DXF file will be opened as 2D file by default.
- HPGL/HPGL2 files can be created on any computer by printing with a HPGL compatible print driver.

Save

Formats	Free Viewer	3D-Tool Basic	3D-Tool Advanced	3D-Tool Premium	NativeCAD Converter*
3D-Tool EXE-files (*.exe) Viewer + 3D-models + 2D-drawing + Annotations + Dimensions + Custom Views + Animations	✗	✓	✓	✓	✗
3D-Tool files (*.ddd) 3D-models + 2D-drawing + Annotations + Dimensions + Custom Views + Animations	✗	✓	✓	✓	✗
3D-PDF files (*.pdf) triangulated 3D-models	✗	✓	✓	✓	✗
CATIA V5 files (*.catpart, *.catproduct) 3D-Catia V5 models	✗	✗	✗	✗	✓
CATIA V4 files (*.model, *.exp) 3D-Catia V4 models	✗	✗	✗	✗	✓
STEP files (*.stp) 3D-STEP models	✗	✗	✗	✗	✓
IGS files (*.igs) 3D-IGES models	✗	✗	✗	✗	✓
VDA files (*.vda) 3D-VDA models	✗	✗	✗	✗	✓
SAT, SAB files (*.sat, *.sab) 3D-SAT models (ASIC-Text, ASIC-Binary)	✗	✗	✗	✗	✓
STL files (*.stl) triangulated 3D-models	✗	✓	✓	✓	✓
VRML 2.0 files (*.wrl) triangulated 3D-models	✗	✓	✓	✓	✗
PLY files (*.ply) triangulated 3D-models	✗	✓	✓	✓	✗
3DS files (*.3ds) triangulated 3D-models	✗	✓	✓	✓	✗

*) The 3D-NativeCAD Converter is part of 3D-Tool Premium.

Limitations

Consider the following limitations when opening files with the 3D-Tool Viewer and converting files with the 3D-NativeCAD Converter.

Limitations of the 3D-Premium Import

The following limitations apply to CATIA V4/V5, Pro/E, Inventor, Solidworks, UG, STEP, IGES, VDA, and SAT files during the Premium-Import into the 3D-Tool Viewer and during conversion using the 3D-NativeCAD Converter.

Common

- **Assembly attributes**
  Attributes assigned on the assembly level are not read by the viewer and the converter; for example: Colors assigned on the assembly level get lost and Elements hidden on the assembly level will be loaded.
- **Assembly features**
  Features (e.g. cuts, bodies, holes) added on the assembly level are not supported and ignored by the viewer and the converter. The support of patterns added on the assembly level is limited in the viewer and the converter.
- **Product Manufacturing Information**
  PMI-data is not supported by the viewer or the converter.
- **2D-data** / **2d-sketches**
  2D-data and 2D-sketches are not supported by the viewer or the converter.
- **Visualization data** / **Facetted data**
  Visualization data and facetted data embedded in CAD files are not supported by the viewer or the converter.
- **Layers**
  Layers are not displayed in the viewer. In the converter the translation of layer information is limited.
- **Free parts, faces, and curves**
  The converter supports free parts, faces, and curves only on the top assembly level and not within sub-assemblies.
- **Axes, planes, and local coordinate systems**
  The support of axes, planes, and local coordinate systems is limited in the converter.
- **User-defined views**
  User-defined views, component views, and simplified views are not supported by the viewer or the converter.

Catia V5

- File names may only contain characters of the ISO-646 character set.
  Additionally the characters < > * : " ? \ | / cannot be used.
  During the conversion to CATIA V5 all invalid characters in file and part names will be replaced by an underscore.
- During the conversion to CATIA V5 the attributes line-type and line-thickness will only be translated for free wires and curves, not for edges.
- Due to hardware requirements, it may not be possible to view or convert CATIA V5 files when using an older computer (approx. before 2003). If you plan to use the CATIA V5 import on such a system, request a free Trial Key to test the import.

IGES

- Binary and compressed IGES files are not supported by the viewer or the converter.

Inventor

- All parts and sub-assemblies of an assembly file (*.iam) have to be in the same folder, otherwise they will not be read by the viewer or the converter.
- Attributes, such as color and layer, are not read by the viewer or the converter. This also applies to the hidden attribute. Hidden elements will always be displayed and converted.

- Some special Inventor features, such as "Lofting" and "Weld Symbols", are not supported by the viewer or the converter.
- Sketches are not supported by the viewer or the converter.

Pro/Engineer

- All parts and sub-assemblies of an assembly file (*.asm) have to be in the same folder, otherwise they will not be read by the viewer or the converter.
- Instances in family tables are read by the viewer and the converter only if the corresponding XPR and XAS files are present, even though these are only optional in Pro/E. Without the XPR and XAS files always the generic parts are read.
- The converter translates local coordinate systems only to file formats that support assemblies (CATIA V5, STEP, IGES, ASAT).
- The curves "using equation" and "local push" are not supported by the viewer or the converter.
- Cosmetic features are not supported by the viewer or the converter.

Solidworks

- Colors are supported by the viewer and the converter starting with Solidworks 2004.
- Colors assigned to instances of parts and assemblies are not read by the viewer or the converter.
- The units of a model are read by the viewer and the converter starting with Solidworks 2001. With earlier versions, the units are always assumed as meters.
- Hidden bodies and features within parts are not supported by the viewer or the converter.
- The attributes "Show", "No-show" and "Hidden" will be read by the viewer and the converter starting with Solidworks 2004.
- When reading assemblies (*.SLDASM) and parts (*.SLDPRT), there is no selection of configurations available in the viewer or the converter. Generally, the default configuration will be read. However, the parts within assemblies are displayed correctly and converted in accordance with the assembly configuration. Such assembly configurations are supported starting with SolidWorks98Plus.
- In order to display and convert a part within an assembly in its correct configuration, the according configuration must be saved in the part file. This is not necessarily the case, especially not, if older parts have been opened and saved with a newer version of SolidWorks.
  If configurations are missing, open the part in Solidworks, activate each configuration, and save the part.
- Coordinate systems, work planes, free curves, and free points are not supported by the converter.

VDA

- Errors can occur when reading VDA files with the viewer and the converter, especially if the accuracy of the VDA data is insufficient. If such errors occur, as much data as possible is read.

Limitations of the 2D-Import

The following limitations apply to DXF, DWG, and HPGL files when loaded into the 3D-Tool viewer.

- **Embedded pictures**
  The display of embedded pictures in the viewer is limited.
- **Filled polylines**
  Filled polylines (Trace entities) are not supported by the viewer.
- **AEC Objects**
  AEC (Architecture, Engineering, and Construction) objects are not supported by the viewer.

5. Mouse And Keyboard Controls

This chapter explains how to use 3D-Tool using the mouse and the keyboard.

3D Mouse

Use the 3Dconnexion 3D mouses to move, rotate, and zoom the model in the view.

Supported 3Dconnexion mouses

3D-Tool supports these 3D mouses made by 3Dconnexion:

- SpaceNavigator
- SpaceExplorer
- SpacePilot
- SpaceTraveller
- SpaceMouse Plus USB
- SpaceBall 5000 USB

The mouse buttons are set to *Fit to screen*.

You can adjust the speed and the assignment of the axes in the 3Dconnexion control panel.

Note

In case a supported mouse is not recognized, try updating the 3Dconnexion driver.

Limitations

The following 3D mouses are not supported by newer 3Dconnexion drivers and thus are not supported by 3D-Tool:

- SpaceMouse Plus Serial
- SpaceMouse Classic USB
- SpaceMouse Classic Serial
- SpaceBall 5000 Serial
- SpaceBall 4000
- CadMan

Mouse Actions

Get informed about using the mouse and the mouse buttons during 3D and 2D mode.

3D-Mode

Rotate the model

Press the left mouse button and move the mouse.

Move the model

Press the right mouse button and move the mouse.

Zoom in on and out of the model

- Turn the mouse wheel.
- Press the mouse wheel / the middle mouse button and move the mouse.

Find a part of the model in the Model Tree

- Double-click a part on the model.
- Press Shift and click a part on the model.

Access frequently needed functions

- Right-click a part on the model.
- Right-click parts, assemblies, and models in the Model Tree.

Show hidden parts
Right-click into the background of the model.

Fit assemblies and parts to the view
Double-click assemblies and parts in the Model Tree.

Select multiple parts on the model
Double-click the first part, press Shift and Ctrl, and click more parts.

Activate a model
Double-click the model in the Model Tree

***Measure/Markup* tool**
- Move a dimension/annotation by pressing the left mouse button.
- Right-click a dimension/annotation to change its properties.

***Tooling Analysis* tool**
To pick a custom reference plane, press Shift, and click on the model.

***Painter* and *Repair* tool**
To choose triangles, planes and surfaces, press Shift, and click on the model.

2D Mode

Move the drawing
Press the right mouse button and move the mouse.

Zoom in and out on the drawing
- Turn the mouse wheel.
- Press the mouse wheel / the middle mouse button and move the mouse.

***Annotate* mode**
- Move a dimension/markup by pressing the left mouse button.
- Double-click a dimension/markup to change its properties.
- Right-click a dimension/markup to call-up frequently functions.
- To scale a markup, press Ctrl and scale the markup by pressing the left mouse button.

***2D-Tool* mode**
- To select single elements of the drawing, click on the elements.
- To select multiple elements of the drawing, marquee select the elements while pressing the left-mouse button.

Context Menu

Use the context menu to quickly access frequently needed functions. In a lot of cases, this eases working with the different objects.

Open the context menu by right-clicking:
- On models, assemblies, or parts in the Model Tree.
- On the parts of a model in the view.
- In *3D-mode* in the background if parts are hidden or you are in full screen mode.
- In the 3D-tool *Measure and Markup* on the textboxes of annotations and dimensions.
- In *2D-Mode* under *Annotate* on redline markups and 2D dimensions.

Some features can only be accessed through the context menu.

Example
When displaying cross sections parts of the model can be excluded from the cross section by selecting *Cross section on/off* from the context menu.

Tip
The context menu makes full screen presentations easier because the most important menu items, as well as default and customs views, can be accessed.

Function Keys

Use the function keys to quickly access certain functions.

[ESC]
Stop an animation or a *Custom View Show*.
Exit the full screen mode.
Abort the file import (if possible)
Abort the calculation in the *Wall Thickness Analysis* tool.
Abort the creation of annotations and dimensions.

[DEL]
Delete the assemblies and parts selected in the Model Tree.
Delete the selected 3D/2D dimension or annotation.

[F1]
Open the Help.

[F2]
Zoom in.

[F3]
Zoom out.

[F4]
Fit to screen.

[F5]
Previous view

[F9]
Load view.

[F10]
Save view.

[Ctrl] + F
Search in the Model Tree.

6. Data Import

The first step of any 3D-Tool project is to import CAD data. In this chapter you will find everything you need to know to import CAD files.

Load 3D And 2D Files

Load 3D models and 2D drawings into 3D-Tool. You can load multiple models and drawings into one session.

Load 3D Files

You can load one or multiple 3D files.

To import a 3D file, use the *Open* function in the *File* tab or click on the  icon in the Quick Access Toolbar. Then select the file(s) and click *Open*.

3D-CAD files are triangulated during their import into 3D-Tool. This means they are divided into numerous triangles. To do so, a dialog offering triangulation setting is displayed when opening the following files:

- STEP, IGS, VDA, SAT, and PARASOLID files
- Native files of Catia V4/V5, Pro/Engineer, Autodesk Inventor, Solidworks, and UG.

See **Advanced/Premium Import Settings** for further details.

 **Tip**

The 3D files will be put into the scene according to their coordinate systems. If a model is not positioned correctly, it can be repositioned with the *Placement*, *Move,* or *Rotate* tool.

 **Note**

Loading multiple files is not supported by the 3D-Tool Free Viewer.

Load 2D Drawings

You can load one or multiple 2D drawings in DWG, DXF, and HPGL/HPGL2 file format .

To import a 2D file, use the *Open* function in the *File* tab or click the  icon in the Quick Access Toolbar. Then select the file(s) and click *Open*.

If a 2D-drawing is already loaded, the *Load Position of 2D File* dialog will be displayed offering the following options:

Replace current data

The new drawing replaces all currently loaded drawings.

Add at original position

The new drawing will be added at its original position. This may cause the new drawing to be placed over drawings that are already displayed.

Add right of drawing

The new drawing will be added to the right of the existing drawing.

Add top of drawing

The new drawing will be added on top of the existing drawing.

Abort

The new drawing will not be loaded.

Recommended File Formats and Data Volume

Some formats work better than others with certain CAD programs. Here you can find some recommendations and notes concerning the amount of data.

Recommended File Formats

Catia V5
CATPart, CATProduct, STEP, IGES, VRML, STL

Catia V4
MODEL, EXP, STEP, IGES, VRML, STL

Pro/Engineer
PRT, ASM, STEP, IGES, VRML, SLP, STL

Autodesk Inventor
IPT, IAM, STEP, IGES, VRML, SLP, STL

SolidWorks
SLDPRT, SLDASM, STEP, IGES, XGL, VRML, STL

UG
PRT, STEP, IGES, VRML. STL

SolidEdge
STEP, IGES, XGL, VRML, STL

IDEAS
STEP, IGES, STL, VRML

All other CAD programs
STEP, IGES, STL, VRML

Tip
Use the filter settings in the *File Open* dialog to select the file formats.

Data Volume (Number of Triangles)

3D-Tool uses triangulated data to display 3D models i.e. they are pictured through numerous triangles. Generally, there is no limit to the number of triangles. Even though the quality of the display increases analogous with the number of triangles, the number of triangles should not be set to the largest number possible. Too many triangles will slow down 3D-Tool, and eventually the model cannot be handled properly. Most computers should be able to display up to one million triangles.

The number of triangles that are produced may be adjusted when importing native Catia, ProE, Inventor, Solidworks and UG files and STEP, IGS, VDA, SAT, and PARASOLID files (see *Advanced/Premium Import Settings*).

For all other formats the number of triangles is affected by the output precision during the export of a model. To adjust the output precision of triangulated files, see the Help menu or manual of your CAD software.

Example
A lot of CAD programs let you control the number of triangles when STL files are exported by setting the chord height parameter.

Advanced / Premium Import Settings

Change the triangulation settings during the Advanced and Premium import to optimize the number of created triangles and the display speed of the models.

Import Settings

3D-CAD files are triangulated during their import into 3D-Tool. This means they are split into numerous triangles. To do so, a dialog offering triangulation setting is displayed when opening the following files:

- STEP, IGS, VDA, SAT, and PARASOLID files
- Native files of Catia V4/V5, Pro/Engineer, Autodesk Inventor, Solidworks, and UG.

The parameters *Chord Heigth* and *Angle Control* affect the number of triangles created and:

- The quality of the display.
- The display speed of the models.
- The size of the file when published.
- The loading time.

Chord height *(Default: 0,05 mm / 0.002 inch)*

The chord height has the strongest impact on the number of triangles. The smaller the value of the chord height is, the more precise the display of the models but also the larger the number of created triangles will be.
Usually, the default value will assure decent results. It is a compromise between quality and speed. However, large and complex models can make it necessary to increase the chord height, e.g. if the display speed of the model is too slow. Also, if complex models are shared, the capacity of the recipient's computer should be kept in mind. Most computers should be able to display up to one million triangles.

Angle control *(Default: 20)*

Smaller values will produce a more precise display but also more triangles. Usually, the default value will assure decent results. However, it can be necessary to increase the value if the display speed of the model is too slow and increasing the chord height does not lead to the wanted improvement.

Read hidden entities *(Default: inactive)*

Import hidden elements with the imported files.

Note

The default values of the chord height and angle control can be adjusted through:
Options tab > *Preferences* group > *Preferences* > *3D-Import Advanced/Premium*

Extended Import Settings (3D-Tool Premium)

In 3D-Tool Premium, additional triangulation parameters are available by selecting *Show extended settings* in the 3D-Tool preferences:
Options tab > *Preferences* group > *Preferences* > *3D-Import Adv/Prem*

Max. edge length *(Default: 0 = not used)*

This value determines the maximal length of the edge of a triangle. Triangles with long edges will be divided into multiple smaller triangles.

Max. aspect ratio *(Default: 0 = not used)*

The aspect ratio of a triangle is equal to the relation between its longest edge and its height.
The maximal aspect ratio determines how thin a triangle may be before it is split into smaller triangles.

Note

Since they are very specific for each file and have to be determined by trial and error, these values should only be used by experienced users. Unfavorable values may cause large files, long loading times, or errors when importing files.

7. Publish and Save

This section informs you about the different strategies to publish and share your CAD models.

Comparison of EXE, DDD and 3D-PDF Files

Consider the following characteristics, pros, and cons when publishing 3D-Tool EXE/DDD files and 3D-PDF files.

3D-Tool EXE Files

Characteristics

3D-Tool EXE files contain:

- The 3D-Tool viewer.
- The 3D models and/or a 2D drawing.
- 3D annotations and 3D dimensions.
- 2D redline markups and 2D dimensions.
- Custom Views and animations.

Pros

- Direct start without installation.
- Offer a lot of tools, such as *Cross Section, Measure/Markup, Explode.*

Cons

Difficulties may arise when sharing files by e-mail because the firewall may block exe files.

Tip

Creating a zip file or changing the file ending manually e.g. to *.ex_ or *.dat may prevent this problem depending on the firewall, but the recipient has to manually change back the file ending to exe.

3D-Tool DDD Files

Characteristics

3D-Tool DDD Files contain:

- The 3D models and/or a 2D drawing.
- 3D annotations and 3D dimensions.
- 2D redline markups and 2D dimensions.
- Custom Views and animations.

Pros

- No difficulties if sent by e-mail.
- Smaller than 3D-Tool EXE files.
- The Free Viewer needed to view the files can be downloaded for free from **www.3D-Tool.de**.
- The Free Viewer offers a lot of tools, such as *Cross Section, Measure/Markup, Explode*.

Cons

The recipient has to download and install the 3D-Tool Free Viewer. However, the Free Viewer can be installed without administrative rights.

3D-PDF Files

Characteristics

3D-PDF files contain:

- All loaded 3D models.
- An optional interface with additional features: cross section, color change, explode elements.

Pros

- Easily sent by e-mail.
- Models can be viewed with the Adobe Acrobat Reader (Versions 7.07 or higher) i.

Cons

In contrast to the 3D-Tool Free Viewer, only a limited number of features are available with 3D-PDF files:

- No annotations and dimensions.
- No Custom Views and animations.

Publish EXE File (not available with the Free Viewer and EXE files)

Publish all loaded 3D models and 2D drawings together with the 3D-Tool Viewer as a directly executable EXE file. 3D-Tool EXE files run on any windows computer without further installations.

Publish an EXE file by clicking *Publish EXE/DDD* in the *File* tab or click on the Icon in the Quick Access Toolbar.

Characteristics of EXE Files

3D-Tool EXE Files contain:

- The 3D-Tool Viewer.
- The 3D models and/or 2D drawings.
- 3D annotations and 3D dimensions.
- 2D redline markups and 2D dimensions.
- Custom Views and animations.

The EXE files can passed on by e-mail or data carrier. The recipient can open the EXE files on any windows computer without further installations.

Settings When Publishing an EXE File

Include 3D data

Publish all currently loaded 3D-models.

Include 2D data

Publish all currently loaded 2D-drawings.

ZIP the file

Create the EXE file and pack it into a ZIP archive (*.zip).

Password

Enter a password to protect a ZIP archive against unauthorized use.

Include short message

Enter a message of up to 2000 characters that will appear at the startup of the EXE file. Use *Load* to load a text file (*.txt) as a message.

Tip
Creating a ZIP archive will make sending the file easier since the file will not be blocked by firewalls or anti-virus software.

Options When Publishing an EXE File

Options
Click the [>>] button to make further adjustments.

- **Viewer Help:** Publish a help file with the viewer. The viewer is published without a help file by default, and starting the help of the viewer will open the 3D-Tool online help.
- **3D-Tool icon:** Use the 3D-Tool icon for the EXE file.
- **Create icon:** Creates the icon for the EXE file from the current view. The option *Transparent* will make the background of the icon transparent.
- **Start with:** Start the EXE file with a *Custom View Show*, a certain Custom View, or an animation.
- **View only:** Hide all measuring tools in the Viewer, and prevent the EXE file from being re-imported into 3D-Tool. The EXE file can still be loaded with the Free Viewer, but the measurement tools will remain hidden.
- **3D - Shade mode:** Designate the shade mode of the models on startup.
- **3D - Back faces:** Designate the display mode of the back faces on startup.

Publish DDD File (not available with the Free Viewer and EXE files)

Publish all loaded 3D models and 2D drawings as a 3D-Tool DDD file. DDD files can be opened and viewed with the 3D-Tool Free Viewer on any computer with a Windows operating system.

Publish a DDD file by clicking *Publish EXE/DDD* in the *File* tab and then click *Publish as *.ddd*.

Characteristics of DDD files

3D-Tool DDD files contain:

- The 3D models and/or a 2D drawing.
- 3D annotations and 3D dimensions.
- 2D redline markups and 2D dimensions.
- Custom Views and animations.

The DDD files can be passed on by e-mail or data carrier. The recipient can view the DDD files with the 3D-Tool Free Viewer.

The Free Viewer can be downloaded free of charge from **www.3D-Tool.de**.

Settings When Publishing a DDD File

Include 3D data
Publish all currently loaded 3D-models.

Include 2D data
Publish all currently loaded 2D-drawings.

ZIP the file
Create the DDD file and pack it into a ZIP archive (*.zip).

Password
Enter a password to protect a ZIP archive against unauthorized use.

Include short message
Enter a message of up to 2000 characters that will appear at the startup of the DDD file. Use *Load* to load a text file (*.txt) as a message.

Options When Publishing a DDD File

Options
Click the [>>] button to make further adjustments.
- **Start with:** Start the DDD file with a *Custom View Show*, a certain Custom View or animation.
- **3D - Shade mode:** Designate the shade mode of the models on startup.
- **3D - Back faces:** Designate the display mode of the back faces on startup.

Publish 3D-PDF (not available with the Free Viewer and EXE files)

Publish all loaded 3D models as 3D-PDF file. 3D-PDF files can be sent easily by e-mail and viewed with the Adobe Acrobat Reader.

Publish a 3D-PDF file by clicking *Publish 3D-PDF* in the *File* tab or by clicking the icon in the Quick Access Toolbar.

Characteristics of 3D-PDF Files

3D-PDF files contain:
- 3D models only .

3D models can be published as a 3D-PDF file. The recipient needs the Adobe Acrobat Reader (Version 7.0.7 or higher) to view the file.

In contrast to the 3D-Tool EXE and DDD files, the 3D PDF file does not contain Custom Views or animations. Additionally, no measurement and analysis operations will be available.

Settings When Publishing a 3D-PDF File

Language
Select the language of the 3D-Tool controls in the PDF file (German or English).

Password protected
Protect the 3D-PDF file with a password against unauthorized use.

Password
Enter a password to protect the 3D-PDF file.

Show Navigation Panel
Activate the Navigation Panel in the PDF document which shows the model tree (the part structure of a model), as well as some default views.

Add additional controls
Activate additional 3D-Tool controls in the PDF document that make it possible to:
- Create cross sections.
- Save and load views.
- Change the color of parts and assemblies.
- Explode assemblies.

Open PDF
Open the PDF document right after it was created.

3D projection
Designate whether the model will be displayed *orthogonal* or in *perspective*, when the 3D-PDF file is opened.

Background color
Designate the background color of the 3D-PDF.

Save as ... STL, VRML, 3DS, PLY (not available with the Free Viewer and EXE files)

Save a 3D model or 2D drawing under a new name and in one of the available file formats.

Save a model or drawing by clicking *Save as ...* in the *File* tab, and then select a model or drawing from the list.

File Formats Available For Export

3D-models can be saved as:
- Executable 3D-Tool EXE file
- 3D-Tool DDD format
- Colored STL binary format
- STL binary format (without colors)
- VRML 2.0 format
- PLY format
- 3D-Studio format
- POV Ray / Moray

2D-drawings can be saved as:
- Executable 3D-Tool EXE file
- 3D-Tool DDD format

Note
If you want to publish a whole scene with multiple models, use *Publish EXE/DDD.*

Batch Mode

Convert files to executable 3D-Tool files (viewer and data) via command line or create your own batch files.

Requirements

To use any directory to start 3D-Tool, the installation directory of 3D-Tool has to be included in the “Path” variable (see *Windows Help*) or you have to enter the complete installation path in the command line to startup 3D-Tool.

[InstallationPath\]3D-Tool.exe InputFile -s [-helpde] [-helpen] [-m:ShortMessage] [-zip] [-zippw:Password] [-o:OutputFile.exe]

The parameters in parentheses are optional.

The parameters can be in any order. To use special characters or blanks, set the parameter values in quotation marks, e.g. -m: “Project version 2.1”

Required Parameters

InputFile
Name of the file to be used.

-s
Activates the batch mode.

Optional Parameters

[InstallationPath\]
Installation drive and directory of 3D-Tool. This is only necessary if the installation directory of 3D-Tool is not in the “PATH” variable of Windows.

-helpde
Publish the viewer including a German language help file. By default the viewer is published without a help file, and starting the help of the viewer will open the 3D-Tool online help.

-helpen
Publish the viewer including an English language help file. By default the viewer is published without a help file, and starting the help of the viewer will open the 3D-Tool online help.

-m:*"ShortMessage"*
Enter a message that shall appear in the start window. Put the message in quotations marks to use blanks or special characters.

-zip
Creates a Zip archive.

-zippw:*Password*
Assigns a password to a ZIP archive. The **–zip** parameter will be selected automatically.

-o:*OutputFile.exe*
Declares the name of the created file. Without this parameter, the name of the input file will be used.

-w
By default the *3d-tool.exe* starts the conversion and then immediately is terminated.
This parameter forces the *3d-tool.exe* to wait for the end of the conversion.

Examples

3D-Tool demo.slp -s
Creates the file demo.exe. The 3D-Tool installation directory must be part of the “PATH” variable of Windows.

"C:\Program files\3D-Tool V10\3D-Tool.exe" D:\demo.stl -s -helpen
Creates the file d:\demo.exe including an English language help file. The 3D-Tool installation directory does not have to be part of he “PATH” variable of Windows.

3D-Tool demo.stl-s -zippw:password
Creates the file demo.zip containing the file demo.exe, secured with the password "password".

3D-Tool Assembly.wrl -s -m:"Project 75246" -o:Project_75246.exe
Creates the file Project_75246.exe out of the VRML file Assembly .wrl and includes the short message "Project 75246".

8. Print and Create Pictures

Create print-outs and pictures of the current view or your Custom Views.

The functions to create print-outs and pictures are located in the *File* tab and in the Quick Access Toolbar.

Print

Print the current view or any available Custom View. To do so, a number of options, including a preview, are available.

To print views click *Print* in the *File* tab or click the icon in the Quick Access Toolbar.

Template
Select a predefined template for printing. You can select the orientation of the paper (horizontal or vertical) and the number and type of views to be used.

Include file info (in 3D mode only)
Add the file path and name of a 3D-model in the lower right corner of the print-out. The file information is available only when one file is loaded or the Information tool is activated.

Printer and paper size
Select a printer and paper size from the two drop down lists.

Printer setup
Open the printer settings of the selected printer to make further adjustments.

Note
Selecting the horizontal or vertical paper orientation will not affect the format because the format of the *Template* selected in 3D-Tool will be used.

Improve quality (Antialias)
Use Antialias when printing to smooth the edges.

Transparent background
Do not print the background.

Zoom

- **Zoom all:** (in 2D mode only) Print the complete drawing.
- **View:** Print the current view.
- **Scale:** Define a scale for the print-out.

Depending on the template selected and the zoom setting, you can adjust the position and zoom of the view(s) using the sliders or the zoom buttons near the preview picture.

Note
If *Perspective View* is activated in 3D-Mode, the *Scale* option is not available.

Pen assignment (in 2D mode only)
Assign different line thicknesses to the different colors of the drawing for the print-out.

Create Picture

Create a BMP or JPG image of the current view or any available Custom View. To do so, a number of options, including a preview, are available.

To create pictures, click *Create Picture* in the *File* tab or click the icon in the Quick Access Toolbar

Template
Select a pre-defined template for the picture. You can select the orientation (horizontal or vertical) and the number and type of views to be used.

Depending on the template selected, you can adjust the position and zoom of the view(s) using the sliders and the zoom buttons near the preview picture.

Include file info (in 3D mode only)
Add the file path and name of a 3D-model in the lower right corner of the picture. The file information is only available when one file is loaded or the Information tool is activated.

Improve quality (Antialias
Use Antialias when printing to smooth the edges.

Transparent background
Do not show the background.

File type
From the drop down list, select the file format (JPG, BMP, or Icon).

Resolution
Select one of the pre-defined output sizes or activate *Custom* for a custom resolution.
Unselect the *Maintain aspect ratio* option to set the picture width and height independently.

Notes

- The maximum resolution depends on the graphics card and the operating system, therefore it could be less than 10000 pixels.
- Pictures of 10000x10000 pixels will use a lot of working memory.

9. Common Functions

This section informs you about common functions which are available in the 3D and the 2D mode. An important feature is the Custom Views because it is used by other functions.

3D Mode, 2D Mode and Converter

Use the 3D Mode to view 3D-models, the 2D Mode to view 2D-drawings, and the 3D-NativeCAD Converter to convert 3D-CAD files.

To switch between 3D and 2D mode and to open the Converter go to the *Mode* group of the *3D-Mode* or *2D-Mode* tab.

3D Mode
Turn on the 3D Mode to view 3D-models. Clicking the *3D-Mode* tab will do the same.

2D Mode
Turn on the 2D Mode to view 2D-drawings. Clicking the *2D-Mode* tab will do the same..

Converter (3D-Tool Premium only)
Use the 3D-NativeCAD Converter to convert CATIA V4/V5, Pro/E, Inventor Solidworks, UG, STEP, IGS, VDA, and SAT files to CATIA V4/V5, STEP, IGES, VDA, SAT, and STL.

The File Tab

Use the *File* tab to load, save, publish files, and create print-outs or picture files. Additionally, a list of recently used files is shown.

New Scene
Delete the 3D and/or 2D content that is currently loaded.

Open
Open 3D models and 2D drawings. You can open multiple files by selecting them in the file open dialog.

Save
Save a 3D model or 2D drawing. If the original file format is available, the file will be saved under its original name and format. Otherwise, you will be asked to choose a file name and format.

Save ... as
Save a 3D model or 2D drawing under a new name or file format. Choose the model or drawing you want to save from the list.

Publish EXE/DDD
Publish all currently loaded 3D models and 2D drawings. DDD files can be viewed using the 3D-Tool Free Viewer. Choose the desired type of publishing:

- **Publish EXE**
  EXE files contain the 3D-Tool Viewer and are directly executable.
- **Publish DDD**
  DDD files can be viewed using the 3D-Tool Free Viewer.

Publish 3D-PDF
Publish all currently loaded 3D models as 3D-PDF file that can be viewed using the Adobe Reader.

Print
Print the current view or any available Custom View.

Create Picture
Create an image of the current view or any available Custom View. Choose the desired picture format:

- **Create JPG**
  Create an image in the JPG file format.
- **Create BMP**
  Create an image in the BMP file format.

Capture to Clipboard
Select and copy a section of the screen to the Clipboard.
Click the screen, hold the mouse button, and marquee select the desired section.
To copy the complete screen, just click the screen.
Afterwards the picture can be pasted from the Clipboard into other applications.

You can adjust settings for the capture function in the Preferences:
Options tab > *Preferences* group > *Preferences* > *Common*

Exit
Close 3D-Tool.

Notes

- The functions to save and publish files are not available with the Free Viewer and 3D-Tool EXE files.
- The functions to create a new scene and to open files are not available with 3D-Tool EXE files.

Custom Views

Save any 3D and 2D view as Custom View. Custom Views contain the state and orientation of 3D-models, the position and zoom of 2D-drawings, as well as all display settings.

Save and Select Custom Views

The functions to save and select Custom Views are located in the right info panel beneath the Model Tree.

[<<] Previous Custom View
Load the previous Custom View from the Custom View List.

Master View
Show all parts, fit the parts in the screen, and apply the default display settings.

[>>] Next Custom View
Load the next Custom View from the Custom View List.

Save Custom View
Save the current view as Custom View. Enter a name in the succeeding window or overwrite an already existing view.

Delete Custom View
Delete the currently displayed Custom View.

Undo View
Return to the previously displayed view.

Select a View from the list
Click the list or Custom Views to open the list. Move the cursor over the views in the list. A preview of the views will be displayed to the left of the list. Click the view you want to be displayed.

Notes
- Custom Views will be added to the end of the list.
- You may change the order and names of the Custom Views by using the *Custom View Editor: 3D-Mode* tab > *Tools* group > *More tools*

Why Use Custom Views?

3D-Tool offers many possibilities to show important aspects of a construction:
- Rotate the models into the desired position and zoom in on important sections.
- Hide distracting parts
- Assign transparencies, or display parts graphically distinct.
- Use cross sections to show the inside of the model.
- Explode assemblies to show their structure.

Save these setting in Custom Views. If you publish 3D-Tool DDD or EXE files, your Custom Views are included and can be recalled by you or the recipient of your data whenever needed.

Note
Animations are also based on Custom Views. Custom Views can be used with the templates when printing or creating pictures.

What Is Stored in Custom Views

Custom Views store:
- The orientation, position, and zoom of the model or the drawing.
- The render mode of parts (transparent, shaded, shaded with edges, etc).
- The shown and hidden parts.
- The exploded position of parts.
- All cross section settings.
- All display settings
- The color settings of the background.
- The lighting position.

Note
The color and coordinates of 3D parts and elements of 2D drawings are global values. When you change the color or coordinates of an element (move, turn, scale, mirror, delete), the change will affect all Custom Views. This may cause Custom Views not to be displayed as they were previously saved. Create Custom Views only if the color and coordinates of elements are final.

Presentation

Use the following features to present your models, Custom Views and animations.

The presentation functions are located in the *Presentation* group of the *3D-Mode* and *2D-Mode* tab.

Full Screen
Switch the display to full screen mode. The 3D-Tool user interface will be hidden so that only the 3D-model or the 2D-drawing is displayed.

In full screen mode, right-click into the display to access often needed functions.

To exit the full screen mode press [Esc].

Note
During the full screen mode, the Hardware acceleration is not available and the display will respond slower than usual.

Custom View Show
Start a slide show of all available Custom Views. All Custom Views will be displayed in order.
Stop the Custom View Show by pressing [Esc] or by clicking the display.

Start Animation
Start an animation, e.g. *Rotate right*, and animations created with the *Animation* tool.
Stop the animation by pressing [Esc] or by clicking the display.

Change the Width of the Info Panel

Adjust the width of the right info panel to your personal needs.

Show and hide the info panel
To hide and show the info panel, click on the button on the left side of the list.

Normal and double size
To toggle the width between normal and double size, click the icon underneath the 3D-Tool logo.

Adjust the size
The size of the info panel can be changed. Place the cursor on the left border of the panel and, after the cursor has changed into the <||> icon, hold down the left mouse button and drag the border.

10. 3D Mode

This section informs you about the 3D mode of 3D-Tool. The 3D mode offers a large number of functions and tools to analyze models, assemblies and parts.

To display 3D-models, click the *3D Mode* tab or the *3D Mode* button in the *Mode* group.

Zoom and Fit Models

Beside the mouse wheel or the middle mouse button, you can use the following functions to zoom in on and out of, as well as fit 3D-models.

The functions to zoom and fit the models are located in the *Zoom* group of the *3D-Mode* tab.

Fit View
Fit all visible parts in the display.

This function is also assigned to the function key [F4].

Zoom In
Zoom into an area. Click into the display, hold down the mouse button, and move the marquee across the area to be zoomed.

This function is also assigned to the function key [F2].

Zoom Out
Zoom out of the view. You may also zoom in and out using the mouse wheel.

This function is also assigned to the function key [F3].

Previous Zoom
Undo the last zoom, move, or rotation of the view.

This function is also assigned to the function key [F5].

Rotate and Align Models

Use the following functions to rotate, fit and align the models in the view.

The functions to rotate and align the view are located in the Orientation group of the *3D-Mode* tab.

Align View
Rotate the current view of the model so that the three axes x,y,z of the coordinate system are aligned horizontally, vertically, and in the viewing direction.

Front View
Rotate the view to front view and fit all visible parts in the display.

Back View
Rotate the view to back view and fit all visible parts in the display.

Left View
Rotate the view to left view and fit all visible parts in the display.

Right View
Rotate the view to right view and fit all visible parts in the display.

Top View
Rotate the view to top view and fit all visible parts in the display.

Bottom View
Rotate the view to bottom view and fit all visible parts in the display.

3D View
Rotate the view to the standard 3D view and fit all visible parts in the display.

Rotate Horizontal 180°
Rotate the view horizontally by 180 degrees.

Rotate Vertical 180°
Rotate the view vertically by 180 degrees.

Rotate Normal 90°
Rotate the view by 90 degrees around the screen center.

Save View
Save the current view. To restore the saved view, use *Load View*.

Load View
Restore a saved view. To save views, use *Save View*.

Change the Display of Models

Use different render modes, such as shaded display and the display as wire frame. Also, you may adjust the display, e.g. show the not connected edges of a model.

Change the Render Mode of Models

The functions to change the render mode of models are located in the *Display* group of the *3D-Mode* tab.

Shaded Display
Display all parts shaded.

Shaded with Edges
Display all parts shaded with black edges.

Wire Frame Display
Display all parts as wire frame.

Shaded with Triangles
Display all parts shaded with triangles.

Hidden Line Colored Display
Display all parts as hidden line graphics with lines in the color of the parts.

Hidden Line Black/White Display
Display all parts as hidden line graphics with black lines on a white background.

Triangles
Display all parts as outlines of their triangles.

Points
Display all parts as points.

Tip
Right-click on parts to display them in an individual shade mode.

Note
To change the number of edges displayed with the render modes *Shaded with Edges*, *Wire Frame,* and *Hidden Line*, use *Change Wire Frame Angle* in the *Options* tab.

Adjust the Display

The functions to adjust the display are located in the *Display* group of the *3D-Mode* tab.

Show Dimensions and Markups
Show the 3D dimensions and markups created with the *Measure and Markup* tool.

Show Exploded
Show the models exploded. Use the *Explode* tool to create explosion data for your models.

Perspective View
Use the perspective view instead of the orthogonal view.

Display Back Faces Like Front Faces
Display shaded faces with same colored back faces.

Display Red Back Faces
Display shaded faces with red back faces.

Display No Back Faces
Display shaded faces without back faces. This speeds up the display.

Note
Especially with STL files, it is possible that front faces are inverted. In this case, the faces cannot be seen with the default setting *Display No Back Faces*. Change the display of the back faces to *Display Back Faces Like Front Faces* to solve the problem.

Show Open Edges
Show the edges of planes that are not connected in yellow.

Show Coordinate System
Show the absolute coordinate system as x, y and z axes starting at (0,0,0).

Show Orientation
Show the x, y and z axes as orientation in the lower left corner of the display.

Smooth Display
Display shaded faces smoothed based on their smooth vectors. If smoothing is not satisfactory, use *Adjust Smoothing* in the *Options* tab to calculate new smooth vectors.

Change Lighting, White Background

Change the lighting position to improve the contrast and show details more vividly. Use a white background for screenshots.

Change the Lighting Position

Lighting options
Select one of the five lighting options: *Default, Top left, Top right, Bottom left, Bottom right*.

Custom lighting position
Adjust the lighting position by dragging the yellow light point to any position.

Switch to White Background

Left of the lighting, you can switch between *Normal* and W*hite* background. This is useful:

- To take screenshots of the current view.
- If a model is displayed as wire frame or hidden line and the lines are difficult to see with the normal background.

Note
The color and the gradient of the normal background can be adjusted in the *3D-Display Options* group of the *Options tab.*

The Model Tree

This section informs you about using the Model Tree in the right Info Panel.

Note:
The Model Tree is not available with the 3D tools *Tooling Analysis*, *Information*, *Placement*, *Wall Thickness Analysis*, *Repair, a*nd *RP-Layout*.

Use the Model Tree

Use the Model Tree to show and hide models, assemblies, and parts and to select them for further steps.

Elements of the Model Tree

The Model Tree can contain the following elements:

 Active model /  Inactive model
 Assembly shown /  Assembly hidden
 Part shown /  Part hidden

- Click the icons of assemblies and parts to hide and show them.
- Click the  or the  icon in front of assemblies to expand or collapse them.
- Double-click the names of models, assemblies, and parts to fit them in the view.
  Additionally, models will be activated for the *Placement*, *Wall Thickness Analysis* and *Repair* tool.

Move the cursor over the models, assemblies, and parts in the Model Tree to highlight them for a short time in the display. This can be deactivated in the preferences of 3D-Tool: *Options* tab > *Preferences* group > *Preferences* > *Model Tree*

Selection on the Model Tree

Single selection
Click the names of models, assemblies, and parts to select them.

Range selection
To select a range of parts in the Model Tree, click a part and then press [Shift] while clicking another part. This will select the clicked parts and all the parts in between.

Multiple selection
To select multiple parts in the Model Tree, click a part then press [Ctrl] while clicking additional parts.

Selection on the Model

Single selection
To select a part on the model double-click the desired part or press the Shift key while clicking the part.

Multiple selection
To select multiple parts on the model, double-click a part on the model and then press [Shift] and [Ctrl] while clicking additional parts.

Change the Display of a Selection

Hide and show the models, assemblies and parts selected on the Model Tree or change their graphical display.

The functions to show and hide a selection and to change its graphical display are located in the right info panel above the Model Tree.

Show Selection
Show the parts and assemblies selected in the Model Tree.

Hide Selection
Hide the parts and assemblies selected in the Model Tree.

Show Selection Only
Show the parts and assemblies selected in the Model Tree and hide all others.

Show All
Show all models, assemblies and parts.

Hide All
Hide all models, assemblies and parts.

Undo Show/Hide
Undo the last show or hide.

Display Selection Shaded
Display the parts and assemblies selected in the Model Tree as shaded. To reset all parts to a uniform shade mode, select the shade mode for the whole model from the *Display* group.

Display Selection Shaded with Edges
Display the parts and assemblies selected in the Model Tree as shaded with black edges. To reset all parts to a uniform shade mode, select the shade mode for the whole model from the *Display* group.

Display Selection as Wire Frame
Display the parts and assemblies selected in the Model Tree as wire frame. To reset all parts to a uniform shade mode, select the shade mode for the whole model from the *Display* group.

Display Selection Transparent
Display the parts and assemblies selected in the Model Tree transparent.
Adjust the transparency in the 3D-Tool preferences:
Options tab > *Preferences* group > *Preferences* > *3D-Color*

Display Selection Solid
Display the parts and assemblies selected in the Model Tree solid.

Change Color of Selection
Change the color of the parts and assemblies selected in the Model Tree.

More Model Tree Functions

Delete, combine, move, and sort the parts in the Model Tree.

The Model Tree functions are located in the *Model Tree* Group of the *3D-Mode* tab.

Activate Model
Activate the selected model for the tools *Placement*, *Wall Thickness Analysis* and *Repair*. You can also activate a model by double-clicking it in the Model Tree.

Expand All
Expand all models and assemblies in the Model Tree. To expand a single model or assembly, click on the plus symbols in the Model Tree.

Collapse All
Collapse all models and assemblies in the Model Tree. To collapse a single model or assembly, click on the minus symbols in the Model Tree.

Search in Model Tree
Search for parts or assemblies in the Model Tree.

Highlight Selection
Highlight the parts and assemblies selected in the Model Tree in red.

Delete Selection
Delete all parts and assemblies selected in the Model Tree.

Pick Part
Select a part on the model. Double-clicking a part on the model will do the same.

Combine Selection
Combine all parts selected in the Model Tree to one part. The original names of the parts and their sectioning will be lost. If a model or assembly is selected, all of its parts will be combined.

Rearrange Selection
Move the parts selected in the Model Tree to an existing or new assembly or model that can be specified in the following dialog:

- **Move to existing assembly or model**
  Select the assembly or model in the list and click *OK*.
- **Move to new assembly**
  Select the position of the new assembly in the list, and click on *New assembly*. The new assembly will be created. The name of the assembly can be changed through a slow double-click on the name or with the *Rename* button. Click *OK* to move the selection to the new assembly.
- **Move to new model**
  Click on *New model* and the new model will be created. The name of the new model can be changed through a slow double-click on the name or with the *Rename* button. Click *OK* to move the selection to the new model.

Move Down in Model Tree
Move the selected model, assembly, or part one position down in the Model Tree.

Move Up in Model Tree
Moves the selected model, assembly, or part one position up in the Model Tree.

Sort Model Tree
Sort the parts in the Model Tree. Only the parts of the active model will be sorted by default.
Select *For all parts and models* to extend the sorting to all models in the Model Tree. You can sort by:

- Number of facets
- Volume
- Volume of boundary box
- Number of bad edges,
- Part name.

Selecting *Direction* will let you decide if the parts will be sorted upward or downward.
Rename parts creates new continuing element names after sorting. Caution: Old names will be lost.

3D - Tools

This section informs you about using the 3D-Tools.

Cross Section
Measure and Markup
Explode
Painter
Animation *
Tooling Analysis
Information
Placement *
Wall Thickness Analysis
Custom View Editor *
Property Editor *
Repair *
RP Layout *
Move
Rotate
Scale
Mirror
Drag'n Trans

*) Not available with the Free Viewer and in EXE files

Cross Section

Use cross sections to view the inner structure of a model as well as selecting and measuring parts that are difficult to access.

To create cross sections in *3D-Mode,* click *Cross Section* in the *Tools* group.

After activating the tool, the model is displayed sectioned. The section settings are displayed top of the view. The section controls are displayed in the view.

Position and Align the Cross Section

Choose cross section plane

To choose one of the three standard planes as cross section plane, do one of the following:

- In the section settings choose one of the 3 standard planes:
  XY-Plane
  XZ-Plane
  YZ-Plane
- Click one of the transparent planes of the section controls.

Pick cross section position on the model

To position and align the cross section by mouse click on the model, do one of the following:

- To position the cross section, click the button *Pick cross section position* in the section settings.
- To position and align the cross section, click the little black arrow in the button and choose the mode of alignment:
  Set cross section perpendicular to selected curve
  Set cross section position parallel to selected plane

Move the section plane

To move the section plane, do one of the following:

- Move the slider in the section settings.
- Enter a value in box above the slider.
- Click the small buttons left and right of the slider.
  The << and >> buttons move the section plane in big steps.
  The < and > buttons move the section plane in small steps.
- In the section controls click the shaft of the red arrow, hold down the mouse button and drag the section plane to the wanted position.

Rotate the section plane

To rotate the section plane around the x,y, or z-axis, do on of the following:

- Drag the sliders in the section settings.
- Enter values into the boxes behind the sliders.

Tips

- Use cross sections with the *Measure/Markup* tool to measure inaccessible parts. Also, the points and edges of the section line can be measured.
- Cross sections can be saved as a Custom Views. All cross section settings will be saved, including parts excluded from the cross section.

Display Parts Uncut

To display a part uncut, right-click the part on the model or in the model tree and choose *Cross section on/off*. To display a part cut again, use *Cross section on/off* once more

To display all parts cut again, click the *All* button in the cross section settings.

Cross Section Options

Side 1, Side 2, and Cross section

To display a different side of the sectioned model, do one of the following:

- In the section settings, choose one of the options *Side 1, Side 2*, or *Cross section*.
  C*ross section* will show only the cross section and hide both sides of the model.
- In the section controls, click the head of the red arrow to switch between Side 1 and Side 2.

Fill section

Fill the cross section using the colors of the cut parts.

Section line

Show/hide the section line. Change the color of the line in the 3D-Tool preferences:
Options tab > Preferences group > *Preferences* > *3D section*

Export the Section Line as DXF

To save the current section line as a 2D DXF file, click the *Export DXF* button in the section settings. The *Transform to xy-plane* option transforms the section line to the standard XY-plane, so the cross section will be shown accurately in 2D-CAD programs. Deselect this option to keep the 3D orientation of the section plane for a 3D-CAD program.

Measure and Markup

Use the *Measure/Markup* tool to add 3D dimensions and markups to the models, and images and text to the background.

The *Measure/Markup* tool is located in the *Tools* group of the *3D-Mode* tab..

Measure Distance, Angle, Edge, Wall Thickness and Clearance

Measure distances, angles, edges, boundary boxes, wall thickness, and clearances.

Click the *Measure/Markup* tool in the *Tools* group. Click the *Distance/Angle* button to measure distances and angles or click the little black arrow in the button to select another measure function.

Picking References For Dimensions

Auto-selection

Move the cursor across the model and possible references will be shown in light blue. Click to select a reference. After the references required for a measurement have been selected, the 3D dimension will be created.

Selection filter

For dimensions with two references, the automatic selection of the references can be adjusted with the Reference s*election filter:*

- **Plane**
- **Edge**
- **Vertex**
- **Circle** (Center of circle)

All four filters are active by default. If references are close together, the selection may be difficult. Deactivate all filters that are not needed.

Manual selection of points and centers of circles

References for measuring distances can also be points and centers of circles that are not supported by the automatic selection.

Point

In contrast to the *Vertex* filter, which only allows the selection of the edge points of triangles, use this to select any point on the model.

Circle (Center of circle)

Select three edge points to determine a circle and use its center as a reference.

Undo a selection

Remove an erroneously selected reference by clicking the button of the measure function again or by pressing [Esc].

Distance/Angle

Measure the distance or the angle between two references based on the type and location of the references.

Combination		Measure
Plane	Plane	Measures distance when the planes are parallel. Measures angle when the planes are not parallel.
Plane	Edge	Measures distance when they are parallel. Measures angle when they are not parallel.
Plane	Vertex	Distance of the vertex perpendicular to the plane.
Plane	Circle	Distance of the center of the circle perpendicular to the plane.
Edge	Edge	Measures distance when the edges are parallel. Measures angle when the edges are not parallel but on one plane. No measure when the edges are not parallel and not on one plane.
Edge	Vertex	Distance of the vertex perpendicular to the edge.
Edge	Circle	Distance of the center of the circle perpendicular to the edge.
Vertex	Point	Distance of the vertices
Vertex	Vertex	Distance of the vertex to the center of the circle.
Vertex	Vertex	Distance of one center to the other center of a circle.

Distance

Measure the distance between two references. Only references that can be used for distance measurement can be selected.

Distance in X-, Y- and Z-Direction

Measure the distance between two references along the axes of the coordinate system.
Only references that can be used for distance measurement can be selected.

Distance/Angel to XY, XZ- and YZ-Plane

Measure the distance or the angle between a reference and one of the standard planes based on the type and location of the reference.

Combination		Measure
Standard plane	Plane	Measures distance when they are parallel. Measures angle when they are not parallel.
Standard plane	Edge	Measures distance when they are parallel. Measures angle when they are not parallel.
Standard plane	Vertex	Distance of the vertex perpendicular to the plane.
Standard plane	Circle	Distance of the center of the circle perpendicular to the plane.

Edge Length

Measure the length of an edge.

Boundary Box

Measure the length, width, and height of a model. Activate *Boundary box of a part* to measure the length, width, and height of parts. The model or part under the cursor will be shown in light blue.

Wall Thickness

Measure the wall thickness at any point on the model. The wall thickness is calculated perpendicularly to the surface at the measuring point and independent of the viewing angle. Measuring points under the cursor will be shown in light blue.

Clearance

Measure the clearance between any point on the model and the surface that is across from it.
The clearance is calculated perpendicularly to the surface at the measuring point and independent of the viewing angle. Measuring points under the cursor will be shown in light blue.

Measure Radius And Diameter

Measure radii and diameters.

Click the *Measure/Markup* tool in the *Tools* group. Click the *Radius* button to measure radii or click the little black arrow in the button to select another measure function.

Measure Radius

Measure the radius of a circle. Move the cursor across the model, and the automatic selection highlights possible circles in light blue. Click to select a circle.

If the automatic selection does not find the wanted circle, activate the option *By 3 points* and select three edge points on the circle to be measured. To make the selection easier, the edge points are shown.

Measure Diameter

Measure the diameter of a circle. Move the cursor across the model, and the automatic selection highlights possible circles in light blue. Click to select a circle.

If the automatic selection does not find the wanted circle, activate the option *By 3 points* and select three edge points on the circle to be measured. To make selection easier the edge points are shown.

Measure Points

Display the coordinates of edge points and points on a surface.

Click the *Measure/Markup* tool in the *Tools* group. Click the *Edge Point* button to measure edge points or click the little black arrow in the button to select another measure function.

Measure Edge Point

Display the X, Y, and Z-coordinate of an edge point. To make the selection easier, the edge points are shown. Edge points under the cursor will be highlighted in light blue. Click to select an edge point.

Measure Point On A Plane

Display the X,Y and Z-coordinate of a point on a plane (not an edge point). Measuring points under the cursor will be highlighted in light blue. Click to select a point.

3D-Annotations (Notes)

Attach 3D-notes anywhere on the model.

Click the *Measure/Markup* tool in the *Tools* group.
Then click the *Create Notes* button.

Create Notes

Move the cursor to the point on the model where you want to attach the note.
Points under the cursor will be highlighted in light blue. Click to add the note and enter the text of the note in the tool.

Tip
3D motes can be created without the *Measure/Markup* tool. Right click anywhere on the model and select *Quick note*.

Background Images And Text

Add background pictures in the JPG and BMP format, and add background texts.

Click the *Measure/Markup* tool in the *Tools* group.
Then click the *Add Background Images or Text* button.

Add Background Images Or Text

Add picture
Add a picture in the BMP or JPEG format as background.
Position the picture in the display by dragging it while pressing the left mouse button.

Add text
Add a background text.
Enter the text, and it will be displayed in a text box in the background. Position the text in the display by dragging it while pressing the left mouse button.

Note
The position of background pictures and texts, measured in pixels, is in reference to the upper left corner of the display. The position of background pictures and text changes with different display resolutions, hence positioning them on the top left is favorable.

Adjust And Delete Dimensions/Markups

Change the position, color, and size of dimensions and markups. Delete dimensions and markups that are no longer required

To adjust dimensions and markups, activate the *Measure/Markup* tool in the *Tools* group.

Move Dimensions/Markups

Movable elements of a dimension/markup will be highlighted in light blue under the cursor.
Move the following elements by dragging them while pressing the left mouse button:

- Text box of any dimension/markup
- The points of reference of distance dimensions if on an edge or a plane
- The points of reference of notes

Change Attributes Of Dimensions/Markups

Select a dimension/markup. To do so, click on the text box or use the << and >> button near *Select Annotation*.

- Change the *decimals* of dimensions by choosing a value from the drop down list.
- Change the *text height* of dimensions/markups by choosing a value from the drop down list.

Use the *Attributes* button to change further attributes:

- **Foreground color** is the color of the text.
- **Background color** is the color of the text box.
- **Line color** is the color of the carrying lines.
- **Stay on top** displays an dimension/markup always in front of the model. This prevents the dimension/markup to be hidden by the model.
- **Free move** (distance dimensions between planes only)
  Allows to move the text box and carrying lines of a distance dimensions to any position in the 3D space, as long as the measuring references are planes.
- **Show extended info** (distance dimensions between points only)
  Shows, additionally to the distance, the distances along the X,Y, and Z-axis.

Tip
Change the attributes of dimensions/markups through the context menu by right-clicking the text box of a dimension/markup.

Notes

- Color changes will not be visible until the dimension/markup has been deselected.
- The default settings of all new dimensions/markups can be designated through:
  Options tab > *Preferences* group > *Preferences* > *3D-Annotations*.

Delete Dimensions/Markups

To select a dimension/markup to be deleted, do one of the following:.
- Click on the text box of the wanted Dimension/Markup.
- Use the << and >> buttons near *Select Annotation*.

To delete the selected dimension/markup, do one of the following:
- Clicking on the *Delete* button.
- Press [Del] on the keyboard.

The *Delete all* button deletes all dimensions/markups and all background pictures and texts.

Adjust And Delete Background Images And Texts

Background pictures and texts can be moved. The text box color and text size of background texts can be changed.

To adjust background images and text, activate the *Measure/Markup* tool in the *Tools* group.

Move Background Images And Texts

Click the *Add background image or text* button.
Move background images and texts by dragging them while pressing the left mouse button.

Note
The position of background pictures and texts, measured in pixels, is in reference to the upper left corner of the display. The position of background pictures and text changes with different display resolutions, hence positioning them on the top left is favorable.

Change Attributes Of Background Texts

Click the *Add background image or text* button.
Click a background text to select it and then do one of the following:
- Change text, text color and text height by clicking *Change text*.
- Change only the *Text height* by choosing a value from the drop down list.
- Change the color of the text and the text box by clicking the Button and selecting *Foreground color* (Text) or *Background color* (Box).

Notes
- Color changes will not be visible until the background text has been deselected.
- The default settings of all new dimensions/markups can be designated through: *Options* tab > *Preferences* group > *Preferences* > *3D-Annotations*.

Delete Background Images And Texts

Click the *Add background image or text* button.

Click a background image or text to select it.

To delete the selection, do one of the following:
- Click on the *Delete* button.
- Press [Del] on the keyboard.

The *Delete all button* deletes all background images, texts, and dimensions/markups.

Explode

Use the Explode tool to manually or automatically create an exploded view of your models.

The *Explode* tool is located in the *Tools* group of the *3D-Mode* tab.

Select Parts and Assemblies

Use the options *Mouse* and *Model Tree* to specify the *Selection mode*.

Mouse

Select a part by mouse click on the model.
Move the cursor onto a part of the model in the view and move the part while pressing the left mouse button.
In this mode only single parts can be moved.

Element List

Pick models, assemblies and parts in the Model Tree.
All parts selected on the Model Tree will be displayed in red color.
Move the cursor onto one of the selected parts of the model in the view and move the parts while pressing the left mouse button.

Create Exploded View

Auto explosion

Explode all parts of the models automatically.
If there are parts that are already exploded, these parts will be repositioned.
Automatic explosions can be adjusted further manually.

Move parts

Move the selection by dragging it while pressing the left mouse button. For an easier positioning, uncheck one or two of the axes *x,y,z* under *Move direction* or enter values in the *x, y*, and *z* fields, and then click the *Move* button.

Rotate parts

Rotate the selection by dragging it while pressing the left mouse button. Choose the axis of rotation in *Rotation axis*.

- **Axis:** Rotation around one of the center axes (ax, ay, az) of the selection.
- **Screen:** Rotation around one of the screen axes (sx, sy, sz). These axes depend on the viewing angle. The sz-axis points to the viewer, the sx-axis points right, and the sy-axis points up.

The angle of rotation is displayed in the *Angle* field. For an exact rotation, enter a value and click the *Rotate* button.

Copy position from another part

Copy the movement and rotation of a part to other parts. Click the part on the model whose movement and rotation is to be copied (target). The part will appear in green. Then click on all parts that you want to move and rotate according to the target. To select a new target, click the *Pick target* button.

Reset position

Click an exploded part on the model and it will be returned to its original position. Click the *Reset all* button to return all parts to their original positions.

Tip

Double-click parts on the model to return them to their original position.

Don't move/rotate parts
Prevent the parts from being accidentally moved or rotated if you move or rotate the model in the view.

Undo
Undo the last action.

Save Exploded View as Custom View

Save the exploded views of the model as *Custom Views*. This way you can restore them as needed and use them in *Animations* and in the *Print* and *Create Picture* settings. You can save Custom Views while working with the Explode tool. Also, there is a corresponding prompt when you exit the tool.

Note
If a view contains explosion data, you can switch between exploded and assembled view through the *Show exploded* button in the *Display* group. The explosion data of a view are retained until a new Custom View is selected.

Painter

Use the Painter tool to change the color of models, parts, and faces.

The *Painter* tool is located in the *Tools* group of the *3D-Mode* tab.

Transparency / Brightness

Transp.
Use the *Transparency* slider to adjust the transparency level for all parts that are displayed transparent.

Brightn.
Use the *Brightness* slider to adjust the level of light reflection for all parts that are displayed shaded.

Note
The default settings of the transparency and brightness can be adjusted through:
Options tab > *Preferences* group > *Preferences* > *3D-Color*

Manual Color

To manually change the color of parts and surfaces take the following steps:

- **Choose selection mode**
  Triangle: Selects a triangle.
  Plane: Selects all triangles within the plane tolerance.
  Surface: Selects all triangles within the surface tolerance.
  Shell: Selects all connected triangles.
  Rectangle: Selects all triangles that are within or partially within the rectangular marquee tool.
  By color: Selects all adjacent triangles in the same color.
- **Selection on the model**
  To activate the selection, click on *Pick* or hold down [Shift].
  Click on the model or marquee select an area during the *Rectangle* mode.
  Selected details will be shown in green.
- **Change the color of the selection**
  To assign a new color to the selection, click on *Change color*

To remove a selection, select it again.
To remove the complete selection, click the *Deselect* button.

Use the *Tol.* buttons to adjust the tolerance angle of the *Plane* and the *Surface* selection mode.
Smaller angles will reduce, bigger angles will expand the selected area.

Note
The *Rectangle* selection mode will not only select the visible triangles but also all the triangles behind them.

Automatic Color

To automatically color in different colors, just click on one of the following three buttons:

- **Models:** Colors all models differently.
- **Parts:** Colors all parts differently.
- **Surfaces:** Colors all surfaces differently. Surfaces are delimitated based on the tolerance angle *Tol.* of the *surface* selection .

If there are multiple models, select the *One model* option to assign colors to the surfaces/parts of a specific model. You will be prompted to choose the model. Select the *All models* option to assign colors to the surfaces/parts of all models.

Animation (not available with the Free Viewer and in EXE files)

Use the Animation tool to create an animation of your *Custom Views*.

The *Animation* tool is located in the *Tools* group of the *3D-Mode* tab.

Basic Approach

An animation consists of multiple *Custom Views* that are used as key frames.
To do so, take the following steps:

- Generate different Custom Views of the model.
- Activate the *Animation* tool.
- Create a *New Animation*.
- Add Custom Views as key frames to the animation.
- Put the key frames in the wanted order and adjust their time of transition.

Example 1
Key frame 1 shows the front of the model.
Key frame 2 shows the left side of the model.
When the animation is run, the model will turn from the front to the left.

Example 2
Key frame 1 shows a regular view of the model.
Key frame 2 shows an exploded view of the model.
When the animation is run, parts of the model will move from their original position to their positions after the model has been exploded.

Create Animation

Animation
Choose an animation from the drop down list. If no animations were created, the list is empty.

New animation
Create a new animation.

Copy selected animation to new animation
Copy the current animation and create a new animation.

Rename animation
Change the name of the current animation.

Delete animation
Delete the current animation.

Key frames Time - Name
The lists of the key frames in the current animation and their transition times in seconds.
The list will be empty when a new animation has been created.

To change the transition time of a key frame, double-click the transition time and enter the new time.

Custom Views
List of the available Custom Views.

Use the *Filter* if there are orthogonal and perspective Custom Views. The transition between the two cannot be animated and, thus, would be discontinues. So combining the two modes of display is useless. Choose a display mode from the drop down list.

Preview
The thumbnail on the upper right side is a preview of currently selected Custom View or key frame. This makes it easier to select key frames or Custom Views.

Add selected Custom View to key frames
Add the views selected in the list of Custom Views as key frames to the animation. New key frames will be added to the end of the animation.

Remove selected key frame
Remove the selected key frame from the animation.

Move selected key frame up
Move the selected key frame up by one position on the list.

Move selected key frame down
Move the selected key frame down by one position on the list.

Change transition times
Change the transition time of a key frame by double-clicking the time and entering a new time (in seconds).

Start preview
Show a preview of the current animation.

Play Animation

Click *OK* to exit the *Animation* tool. Now the animation can be played using the *Play Animation* button in the *Presentation* group.

Animations will also appear at the end of the Custom Views list and can be started from there.

Export AVI

An animation can be exported as AVI video.
To do so, take the following steps:

- Click the *Resolution* button until the wanted resolution is displayed..
- Click on *Export AVI.*
- Select where you want to save the video, and enter the name of the video.
- Select the *Compressor* (video codec) to be used. Depending on the compressor, it may be possible to make further adjustments through the K*ey Frame* and *Data Rate* option and through the *Configure* button.
- Click *OK* to start generating the video.

Depending on the compressor, the length of the animation, the resolution, and the capacity of the computer this process may take some time.

Note
A resolution lower than 800x600 pixels will not show fine lines, small details, and smaller text of, for example, annotations and dimensions.

Videocodecs
The AVI format is a container for various video codecs. All AVI files will have a *avi ending no matter what compressor was used. The codec has to be available so the video can be played.

The following codecs have been tried; however, this is not an exhaustive list and only a short overview.

- **Full frames (uncompressed)**
  (Limited Suitability) Offers the best quality without lost data but creates a large file. It can be useful, if the video will be edited with a video editing software or further converted. Caution: Only files of up to 2 GB are supported.
- **Cinepak by Radius**
  (Suitable) Delivers good results and small files. The display is sharp and the color gradients will be displayed accuratly.
- **Intel Indeo R3.2**
  (Not Suitable) Creates small files but an unfocused display with jagged color gradients.
- **Microsoft Video 1**
  (Limited Suitability) Very sharp display but poor color gradients and relatively large files.
- **Microsoft Video 9**
  (Suitable) Small files and decent quality; however, color gradients may be inaccurate.
- **DivX**
  (Very Suitable) The display is focused and color gradients are smooth. Even with high resolutions, small files are created. But, depending on the DivX version, there may be problems when exporting videos with high resolution.
- **MPEG-4**
  (Very Suitable) The display is focused and the transitions are smooth. Even with high resolutions, small files are created. Best results.

Tooling Analysis

Use the tooling Analysis to display drafts and their angles and to calculate the projected area of the model.

The *Tooling Analysis* is located in the *Tools* group of the *3D-Mode* tab.

Draft

To choose the *Reference plane,* do one of the following:

- From the drop down list select one of the standard planes XY, YZ, YZ
- Click the button or hold down [Shift] and click any plane on the model. While this selection mode, the model cannot be moved. Press [Esc], or let go of [Shift], to cancel the selection.

When the reference plane is selected, the drafts are displayed in different colors.
By default: *green* - top, *red* - no draft, *blue* - bottom.

Tolerance (*Default 0.2*)
Enter a tolerance angle for surface allocation. The tolerance angle is necessary because triangulated models are not 100% exact. Increasing the angle can harmonize the results of the analysis if the inaccuracy produces too many artifacts.

Surfaces without draft (*Default: Red color*)
Select the display of surfaces without draft from the drop down list:
- **Red color:** Surfaces without draft angle are red.
- **Top side:** Surfaces without draft angle will be assigned to the top/green section.
- **Neutral:** Surfaces without draft angles are gray.
- **Bottom side:** Surfaces without draft angles will be assigned to the bottom/blue section.

Angle

To choose the *Reference plane*, do one of the following:
- From the drop down list select one of the standard planes XY, YZ, YZ
- Click the button or hold down [Shift]. Click any plane on the model. While this selection mode, the model cannot be moved. Press [Esc], or let go of [Shift], to cancel the selection.

When the reference plane is selected, the draft angles are displayed in different colors.

Angle (*Default: 3.0*)
Enter the maximum angle for the display of draft angles.

Direction (*Default: Up*)
Click the *Direction* button to designate whether draft angles opened up, down, or in both directions are shown.

Projected Area

This function calculates the surface area of all models that is projected onto one of the three standard planes. This, for example, is needed to calculate locking forces when making molds.

Choose on of the standard planes XY, XZ, YZ as *Reference plane* (Projection plane).

When the reference plane is selected, the projected area is displayed in square units. For example, if the units of a model are millimeters in square millimeters.

The result will be shown in square units in accordance with the units of the model.

Tip
Use the *Placement* tool to align the model in the coordinate system.

Information

Use the Information tool to display the volume, surface area, and dimensions of models and parts.

The *Information* tool is located in the *Tools* group of the *3D-Mode* tab.

The following information is displayed:
- The volume
- The surface area
- The number of bad edges
- The number of triangles
- The dimensions in X, Y and Z.

On start-up of the tool the information refers to the whole model. If multiple models are present to all models in the scene, you can also display information on single parts of a model or single models of the scene.

Select model

The buttons to select a model are located above the information display.
To select a model, do one of the following:

- Click the << or >> button until the wanted model is displayed.
- Click the button, and click the wanted model in the view.

Select part

The buttons to select a part are located beneath the information display
To select a part, do one of the following:

- Click the << or >> button until the wanted part is displayed.
- Click the button, and click a part on the model.

Note

The information about the volume is only reliable for closed parts and models. Bad (open) edges and twisted planes will distort the volume calculation and could cause wrong results. "Twisted planes" means that the back faces of planes are turned outside and is most likely to happen when importing IGES files.

Placement (not available with the Free Viewer and in EXE files)

Use the Placement tool to place and align your models.

The *Placement* tool is located in *More tools* in the *Tools* group of the *3D-Mode* tab.

Place Models Freely

Select model

The active, red colored model will always be positioned.
To select a model, do one of the following:

- Click the << or >> button until the wanted model is selected.
- Click the button, and click a model in the view.

To freely place models, the following functions are available.
See the 3D Tools section of this help for more usage details.

Drag'n Trans

Tool to move and rotate the model with the mouse.

Move

Tool to move the model by entering x,y, and z-values.

Rotate

Tool to rotate the model by choosing a rotation axis and entering an angle.

Place Models to Each Other or to the Coordinate System

Select model

The active, red colored model will always be positioned.
To select a model, do one of the following:

- Click the << or >> button until the wanted model is selected.
- Click the button, and click a model in the view.

From / To

From the two drop down lists *From* and *To* choose the type of references to be used for aligning/placing the model. *From* defines the reference for the active model. *To* defines the reference on another model or in the coordinate system.

Choose *Auto Pick* to select points, centers of circles, or planes as references on the models. Move the cursor across the models, and possible references are highlighted in blue. Click to select a reference.

When *From* and *To* are defined, you may align and/or translate the active model.

Align

The *Align* button is active if the From and To references are planes. Use the *Same* or *Opposite* option to align the faces of the planes in the same or in opposite direction. Click *Align* to align the active model.

Translate

The *Translate* button is active for points/centers of circles and parallel planes. Use the All, x, y, and z options to specify the coordinates affected by the translation. Click *Align* to translate the active model.

Note

When translating a model to a plane, the model is translated only along a line perpendicular to the plane.

Tip

First align models, and then translate them.

Wall Thickness Analysis

Use the Wall Thickness Analysis to show the wall thicknesses of a model in different colors.

The *Wall Thickness Analysis* is located in *More tools* in the *Tools* group of the *3D-Mode* tab.

Tip

To cancel a running calculation, press [Esc], for example to adjust the calculation settings for a shorter calculation time.

Calculation

Click the *Calculation* tab to adjust and start the calculation.

Calculation time

Calculating the wall thickness requires extensive calculations because the triangles of the model are further broken down into smaller triangles. Calculating the wall thickness of a model with numerous triangles, using fine calculation settings, can take up to a few days. An estimate of the time needed to perform the calculation will be displayed after starting the analysis.

Select model
The Wall Thickness Analysis can only display and analyze one model at a time. If there are multiple models, click the << or >> button until the wanted model is displayed.

Remesh iterations *(Default: 5)*
Enter how many times edges of triangles that are longer than the *Maximum edge length* are sectioned. A larger value will enhance the result but increase the time needed for the calculation. If "0" is entered, the edges of triangles will not be broken down further.

Max. edge length *(Default: 5.0 mm / 0.2 inch)*
Enter the maximum edge length a triangle may have until it is broken down into smaller triangles. A smaller value will enhance the result but increase the time needed for the calculation.

Wall angle *(Default: 25)*
Enter the maximum angle of walls, e.g. for drafts.

Min. distance *(Default: 0.50 mm / 0.02 inch)*
Enter the distance below which wall thicknesses will be ignored.

Shells/Parts separate *(Default: active)*
Select the *Shells/Parts separate* option to calculate the wall thicknesses for each shell/part separately.

Quick calc
Click the *Quick calc* button to start a calculation based on the center of the generated triangles.

Normal calc
Click the Normal calc button to start a calculation based on all edge points of the generated triangles.

At point
See the wall thickness at certain points on the model. This function is available without calculating the wall thicknesses.

Click the *At point* button and move the cursor across the model. The wall thickness at the position of the cursor will be displayed.

Display

Click the *Display* tab to adjust the color display of the calculation. Adjusting the color does not require a new calculation.

2 Colors / **Spectrum**
Choose the *2 colors option* to display the different wall thicknesses as a gradient from yellow to green.
Choose the *Spectrum* option to display the different wall thicknesses as a color spectrum.

Min. / **Max.**
Enter the minimum and maximum wall thickness for the color display.

Custom View Editor (not available with the Free Viewer and in EXE files)

Use the Custom View Editor to change the order and names of *Custom Views*.

The *Custom View Editor* is located in *More tools* in the *Tools* group of the *3D-Mode* tab.

Filter

From the drop down list, choose the type of Custom Views to be displayed in the list of Custom Views:

- All views
- 3D views
- Orthogonal views
- Perspective views
- 2D views
- Views used in certain animations

List of Custom Views

Click a Custom view in the list to select it. The thumbnail, on the upper right side, shows a preview of the selected Custom View.

View is used in animation

If the selected Custom View is used in an animation, the name of the animation will be shown here. Deletion of the view will also delete the animation. Changing the names and order of Custom Views has no effect on animations.

Rename Custom View

Enter a new name (op to 50 characters) for the selected Custom View.

Delete Custom View

Delete the selected Custom View. If the Custom View is included in an animation, a warning will appear. Deleting the Custom View will also delete the animation.

Move selected Custom View up

Move the selected Custom View up by one spot on the list.

Move selected Custom View down

Move the selected Custom View down by one spot on the list.

OK

Apply all changes and exit the Editor.

Cancel

Discard all changes and exit the Editor.

Property Editor (not available with the Free Viewer and in EXE files)

Use the Property Editor to change the name, color, and transparency of parts. Save your changes for models with the same parts.

The *Property Editor* is located in *More tools* in the *Tools* group of the *3D-Mode* tab.

Edit Properties

The property table

The property table has 4 columns:

- **Original name**
  The original names of assemblies and parts. Click an element to select it.
- **New name**
  Enter a new name for the selected element.
- **Color**
  Click the colored square to change the color of the selected element. Assemblies and multi-colored parts (multi-colored square) will be completely inked in the new color.
- **Transp.**
  Click on the little blue square to turn ON / OFF the transparency of the selected element.
  This function is only available with parts.

Notes

- Changes will not be applied until you click *Apply changes*.
- Elements without new names keep their original names.

Copy original name to new name

Copy the name of the selected element to the *New name* column.

All - Copy all original names to new names

Copy all original names to the to the *New name* column. Existing entries will be overwritten.

Highlight selected parts/assemblies *(Default: Active)*

Display selected parts and assemblies on the model in red. If inactive, double-click parts and assemblies to highlight them.

Apply changes

Click on *Apply changes* to apply the changes you have made.

Close

Leave the Property Editor.

Save And Load Properties

Save your changes for new versions of the model or models with the same part names. That way, you can load the changes to reapply them.

Save
Save the property table to a property file (*.pf).

Load
Load a property file (*.pf). Choose the properties (New name, Color, Transparency) to be resumed. Every element of the table whose original name matches a name in the property file will receive the properties stored in the file. You can continue to work on the table. Click on *Apply changes* to apply the changes you have made.

Notes

- If the property file contains more than one entry of the same original name, all elements with this name will be assigned the properties of the first entry, and all other entries will be ignored.
- For assemblies only the names will be transferred. However, all properties will be transferred for the parts of an assembly.

Characteristics of the property file (for experienced users)
The property file is a TAB separated text file that can be opened and edited with a text editor. Each entry starts with the original name of the element of which the properties are to be changed. The original name is followed, separated by a Tab, by the new name, color, transparency in the following syntax:

OriginalName $N:*NewName* **$C:$***Color* **$T:***- or +*

- *Color* stands for hexadecimal BGR color information in the form BBGGRR with a maximum of 6 characters.
- **$T:** Minus - means transparency off, Plus + means transparency on.

Examples
611_Stator $N:Stator $C:$0000FF $T:+
Changes the name of the element *611_Stator* to *Stator*, colors the element red and shows it transparent.

Properties that are not to be changed can be omitted:
611_Stator $C:$0099FF
Changes only the color for element *611_Stator*.

Repair (not available with the Free Viewer and in EXE files)

Use the Repair tool to delete faces, fix inverted faces and open edges, create triangles, and move edge points.

The *Repair* tool is located in *More tools* in the *Tools* group of the *3D-Mode* tab.

Basics

Select model

The *Repair* tool can only display and repair one model at a time. If there are multiple models, click the << or >> button until the wanted model is displayed.

Display

The *Repair* tool will show open edges in yellow and backs of triangles in red. This makes it easier to locate irregularities.

Tip

In the *Display* group activate the shade mode *Shaded/Triangles.* This makes the selection easier.

Delete

To delete faces, take the following steps:

- **Choose selection mode**
  - **Triangle:** Selects a triangle.
  - **Plane:** Selects all triangles within the plane tolerance.
  - **Surface:** Selects all triangles within the surface tolerance.
  - **Shell:** Selects all connected triangles.
  - **Rectangle:** Selects all triangles that are within or partially within the rectangular marquee tool.
  - **By color:** Selects all adjacent triangles in the same color.
- **Selection on the model**
  To activate the selection, click on *Pick* or hold down [Shift].
  Click on the model or marquee select an area during the *Rectangle* mode.
  Selected details will be shown in green.
- **Delete the selection**
  To delete the selection, click on *Delete selection.*

To remove a selection, select it again.
To remove the complete selection, click the *Deselect* button.

Use the *Tol.* buttons to adjust the tolerance angle of the *Plane* and the *Surface* selection mode. Smaller angles will reduce, bigger angles will expand the selected area.

Note

The *Rectangle* selection mode will not only select the visible triangles but also all triangles behind them.

Normals

To invert faces, take the following steps:

- **Choose selection mode**
  - **Triangle:** Selects a triangle.
  - **Plane:** Selects all triangles within the plane tolerance.
  - **Surface:** Selects all triangles within the surface tolerance.
  - **Shell:** Selects all connected triangles.
  - **Rectangle:** Selects all triangles that are within or partially within the rectangular marquee tool.
  - **By color:** Selects all adjacent triangles in the same color.
- **Selection on the model**
  To activate the selection, click on *Pick* or hold down [Shift].
  Click on the model or marquee select an area during the *Rectangle* mode.
  Selected details will be shown in green.
- **Invert the selection**
  To invert the selection, click on *Invert selection.*

To remove a selection, select it again.
To remove the complete selection, click the *Deselect* button.

The *Invert all* button will invert all faces of the model.

Use the *Tol.* buttons to adjust the tolerance angle of the *Plane* and the *Surface* selection mode.
Smaller angles will reduce, bigger angles will expand the selected area.

Note
The *Rectangle* selection mode will not only select the visible triangles but also all triangles behind them.

Move pt (Move points)

Click the *Move pt* tab to move edge points.

Move two edge points on top of each other, e.g. to close open edges. To make the selection easier, the edge points of the triangles are displayed.

Click the edge point to be moved. Then click the edge point in target position.
Click the *Start again* button to reset a false selection.

Click the *Confirm* button to move the point.

Note
Moving points will delete triangles if two point of a triangle are on top of each other or all points are on one line.

New (create new triangles)

Click the *New* tab to create new triangles.

Create a new triangle by picking three edge points. To make the selection easier, the edge points of the triangles are displayed.

Click three edges points to select them.
Click the *Start again* button to reset an erroneous selection.

When the three points are selected, the new triangle will be created. Its orientation is calculated based on the adjacent triangles.

Auto (automatic repair)

Click the Auto tab to automatically repair inverted faces and open edges.

The automatic repair tries to close open edges and turn inverted triangles.

Tolerance *(Default 0.05mm / 0.002 inch)*
Enter the distance value to be used for the automatic connection of open edges in the Tolerance field.
The automatic repair tries to close all open edges based on the tolerance distance.
Increasing the tolerance may close more open edges.

Connect edges
Click the *Connect edges* button to automatically close open edges.

Decide if you want to keep the current part assignment.
- Select *Yes* to keep the assignments and names.
- Select *No* to put the parts, based on the newly connected edges, in to a new arrangement.
  This may be useful if the parts consist of multiple shells, but the names of the parts may be lost.

Auto orientation
Click the *Auto orientation* button to automatically turn inverted triangles. The automatic orientation tries to assign the same orientation to all connected triangles.

RP-Layout (not available with the Free Viewer and in EXE files)

Use the RP-Layout tool to place models on a platform for Rapid Prototyping Systems.

The *RP-Layout* tool is located in *More tools* in the *Tools* group of the *3D-Mode* tab.

Select model
Except for *Auto-Position* always the active, red colored model will be positioned.
To select a model, do one of the following:
- Click the << or >> button until the wanted model is selected.
- Click the button, and click a model in the view.

RP-System
Select the RP-system from the drop down list. Only the *Standard* system is available first, but you can create a new systems by using the *Setup* button.

Setup
Create a new RP-system.

Drag'n Trans
Tool to move and rotate the model with the mouse.

Move
Tool to move the model by entering x,y, and z-values.
To move a copy of the model, activate the *Create copy* option.

Rotate
Tool to rotate the model or a copy by choosing a rotation axis and entering an angle.
To rotate a copy of the model, activate the *Create copy* option.

Scale
Tool to scale the model.

Mirror
Tool to mirror the model or a copy by choosing a mirror plane.
To mirror a copy of the model, activate the *Create copy* option.

Auto position
Position the models according to the specifications of the RP-system automatically.

Align faces
Choose the direction óf the alignment from the drop down list.
Click the *Plane* button, and click a plane on the model.

Snap Z-min to
To move models to the minimal Z-position as specified in the according input field, do one of the following:
- To move the active (red) model, click the *Model* button.
- Click the *All* button to move all models to Z-min.

Undo
Undo the last action.

Move

Use the Move tool to move models, assemblies, and parts.

The *Move* tool is located in *More tools* in the *Tools* group of the *3D-Mode* tab.

Model Tree Selection
Select a model, an assembly, or a part in the Model Tree.

x, y, z
Enter the value of the movement in the x, y, and z input field.

Create copy
Create a copy of the selection, and move it.

Move
Execute the movement.

Undo
Undo the last movement.

Note
If you change the coordinates of parts (move, rotate, scale, mirror), it will affect your *Custom Views*.

Rotate

Use the Rotate tool to rotate models, assemblies, and parts.

The *Rotate* tool is located in *More tools* in the *Tools* group of the *3D-Mode* tab.

Model Tree Selection
Select a model, an assembly, or a part in the Model Tree.

Rotation axis
From the drop down list, choose the rotation axis.
- **X-Axis**
- **Y-Axis**
- **Z-Axis**

Center
From the drop down list, choose the position of the rotation axis.
- **Center:** The common center of the selected elements.
- **Origin:** The origin (0,0,0) of the coordinate system.
- **Minimum:** The common minimum (MinX,MinY,MinZ) of the selected elements.
- **Maximum:** The common maximum (MaxX,MaxY, MaxZ) of the selected elements.

Angle
Enter the number of degrees by which you want to rotate the element.

Create copy
Create a copy of the selection, and rotate it.

Rotate
Execute the rotation.

Undo
Undo the last rotation.

Note
If you change the coordinates of parts (move, rotate, scale, mirror), it will affect your *Custom Views*.

Scale

Use the Scale tool to change the size of models, assemblies, and parts.

The *Move* tool is located in *More tools* in the *Tools* group of the *3D-Mode* tab.

Model Tree Selection
Select a model, an assembly, or a part in the Model Tree.

Scale
From the drop down list, choose the scale:
- **mm => inch:** Millimeter to Inch.
- **inch => mm:** Inch to Millimeter.
- **Custom:** Enter a custom scale factor.

Scale center
From the drop down list, choose the center of the scale:
- **Center:** The common center of the selected elements.
- **Origin:** The origin (0,0,0) of the coordinate system.
- **Minimum:** The common minimum (MinX,MinY,MinZ) of the selected elements.
- **Maximum:** The common maximum (MaxX,MaxY, MaxZ) of the selected elements.

Uniform in all directions
Scale uniform in x, y and z. Deactivate this option during the *Custom* scale to enter different values for x, y, and z .

Scale
Execute the scaling.

Undo
Undo the last scaling.

Note
If you change the coordinates of parts (move, rotate, scale, mirror), it will affect your *Custom Views*.

Mirror

Use the Mirror tool to mirror models, assemblies, and parts.

The *Mirror* tool is located in *More tools* in the *Tools* group of the *3D-Mode* tab.

Model Tree Selection
Select a model, an assembly, or a part in the Model Tree.

Mirror plane
From the drop down list choose the plane of reflection.
- **XY-plane**
- **XZ-plane**
- **YZ-plane**

Mirror center

From the drop down list, choose the position of the mirror plane.

- **Center:** The common center of the selected elements.
- **Origin:** The origin (0,0,0) of the coordinate system.
- **Minimum:** The common minimum (MinX,MinY,MinZ) of the selected elements.
- **Maximum:** The common maximum (MaxX,MaxY, MaxZ) of the selected elements.

Create copy

Create a copy of the selection, and reflect it.

Mirror

Execute the reflection.

Undo

Undo the last reflection.

Note

If you change the coordinates of parts (move, rotate, scale, mirror), it will affect your *Custom Views*.

Drag'n Trans

Use this tool within the *RP Layout* and the *Placement* tool to easily move and rotate models with the mouse.

Move parts

Left-click on the selected model and hold down the mouse button to move the model.

The x,y, and z-values of the translation and the position of the model center are shown while the model is moved.

To make the movement easier, uncheck one or two of the axes *x,y,z* under *Move on axis*.

Rotate part

Choose the *x, y, z*, or virtual axis of the *screen* as rotation axis.
Left-click on the model and hold down the mouse button to rotate the model.

The angle of rotation is displayed while the model is rotated.

Don't move/rotate parts

Prevent the parts from being accidentally moved or rotated if you move or rotate the model in the view.

Undo

Undo the last movement/rotation.

Note

If you change the coordinates of parts (move, rotate, scale, mirror), it will affect your *Custom Views*.

11. 2D Mode

This section informs you about the 2D mode of 3D-Tool. The 2D mode features dimensions, markups, and tools to edit the elements of a drawing

To view 2D drawings, click the *2D-Mode* tab or the *2D Mode* button in the *Mode* group.

Zoom and Fit Drawings

Beside the mouse wheel or the middle mouse button, you can use the following functions to zoom in on and out of, and fit 2D-drawings.

The functions to zoom and fit the drawings are located in the *Zoom* group of the *2D-Mode* tab.

Fit View
Fit the drawing in the display.

This function is also assigned to the function key [F4].

Zoom In
Zoom into an area. Click into the display, hold down the mouse button, and move the marquee across the area to be zoomed.

This function is also assigned to the function key [F2].

Zoom Out
Zoom out of the view. You may also zoom in and out using the mouse wheel.

This function is also assigned to the function key [F3].

Previous Zoom
Undo the last zoom, move, or rotation of the view.

This function is also assigned to the function key [F5].

Change the Background Color (2D)

Use a black, white, or colored background for your drawings.

In *2D Mode* change the color of the background in the right info panel.

Black
Select the *Black* option to use a black background.

White
Select the *White* option to use a white background.

Custom color
Select the *Custom color* option to choose any color for the background.
To choose a color, click the square button behind the option.

Change the Display of Lines (2D)

Display all lines of the drawing in black/white or as thin lines.

In *2D Mode,* change the display of the lines in the *Display* group

Black/White Lines
Display all lines of the drawing in black or white, depending on the background color.

Thin Lines
Display all lines of the drawing with a width of 1pt. This may make it easier to see details in drawings with thick lines.

View: The Layer List (2D)

Use the *View* mode to view only a 2D drawing and to show/hide the layers of the drawing.

Click the *View* button in the right info panel to display the layer list.

Dimensions
This layer contains the dimensions added with 3D-Tool. To hide the layer, click the icon.
To show the layer, click the icon.

Redlining
This layer contains the redline markups, annotations, and pictures added with 3D-Tool. To hide the layer, click the icon. To show the layer, click the icon.

Layers of the drawing
Depending on the loaded drawing, the layer list contains one or multiple layers of the drawing.
To hide a layer, click the icon. To show a layer, click the icon.

Show/Hide
Show/Hide the layer currently selected in the layer list.

Show all layers
Show all layers of the drawing. This will not show the layers *Dimensions* and *Redlining* if they are hidden.

Hide all layers
Hide all layers of the drawing. This will not hide the layers *Dimensions* and *Redlining*.

Annotate: Dimensions and Markups (2D)

Use the *Annotate* mode to add dimensions, redline-markups, annotations, and pictures.

Click the *Annotate* button in the right info panel to add dimensions and markups.

Add Dimensions (2D)

Measure distances, angle, radii and the length of lines.

To add dimensions, click the *Annotate* button in the right info panel.
Click the *Distance/Angle* button to measure distances and angles or click the little black arrow in the button to select another measure function.

Distance / Angle

Automatically measure the distance or the angle between two references.

Move the cursor across the drawing. Elements of the drawing that can be references for measuring will be highlighted in blue, but you can also choose any point.
Select two references by clicking.
Move the new dimension into the wanted position, and click to fix it.
In the following dialog, adjust the **properties** of the dimension, and click OK.

The type and position of the references determines whether the angle or position is measured.

- Between two non-parallel lines, the angle is measured.
- Between two parallel lines, the distance is measured.
- Between two points, the distance is measured.
- Between a point and a line, the distance is measured.

Note
Press [Esc] to cancel the operation.

Distance

Measure the distances between two references.

Move the cursor across the drawing. Elements of the drawing that can be references for measuring will be highlighted in blue, but you can also choose any point.
Select two references by clicking.
Move the new dimension into the wanted position, and click to fix it.
In the following dialog adjust the **properties** of the dimension and click OK.

The distance can be measured:

- Between two point.
- Between a point and a line.
- Between two parallel lines.

Note
Press [Esc] to cancel the operation.

Distance In X- And Y-Direction

Measure the distances between two references in the direction of x or y.

Move the cursor across the drawing. Elements of the drawing that can be references for measuring will be highlighted in blue, but you can also choose any point.
Select two references by clicking.
Move the new dimension into the wanted position, and click to fix it.
In the following dialog adjust the **properties** of the dimension, and click OK.

The distance can be measured:

- Between two points.
- Between a point and a line.
- Between two parallel lines.

Note
Press [Esc] to cancel the operation.

Line Length

Measure the length of a line.

Move the cursor across the drawing. Lines that can be references for measuring will be highlighted in blue.
Select a line by clicking.
Move the new dimension into the wanted position, and click to fix it.
In the following dialog adjust the **properties** of the dimension, and click OK.

Note
Press [Esc] to cancel the operation.

Radius

Measure radii of circles.

Move the cursor across the drawing. Circles that can be references for measuring will be highlighted in blue.
Select a circle by clickng.
Move the new dimension into the wanted position, and click to fix it.
In the following dialog adjust the **properties** of the dimension, and click OK.

Notes

- Press [Esc] to cancel the operation.
- If a circle cannot be selected, use *Radius by 3 points*.

Diameter

Measure diameters of circles.

Move the cursor across the drawing. Circles that can be references for measuring will be highlighted in blue.
Select a cricle by clicking.
Move the new dimension into the wanted position, and click to fix it.
In the following dialog adjust the **properties** of the dimension, and click OK.

Notes

- Press [Esc] to cancel the operation.
- If a circle cannot be selected, use *Radius by 3 points*.

Radius by 3 Points

Measure the radius of a circle defined by three points.

Move the cursor across the drawing. Points of the drawing that can be references for measuring will be highlighted in blue, but you can also choose any points.
Select three points by clicking.
Move the new dimension into the wanted position, and click to fix it.
In the following dialog adjust the **properties** of the dimension, and click OK.

Note
Press [Esc] to cancel the operation.

Angle Between Two Lines

Measure the angle between two lines.

Move the cursor across the drawing. Lines that can be references for measuring will be highlighted in blue.
Select two lines by clicking.
Move the new dimension into the wanted position, and click to fix it.
In the following dialog adjust the **properties** of the dimension, and click OK.

Notes
Press [Esc] to cancel the operation.

Angle By 3 Points

Measure an angle defined by three points.

Move the cursor across the drawing. Points of the drawing that can be references for measuring will be highlighted in blue, but you can also choose any point.
Select three points by clicking, of which the second point defines the angular point.
Move the new dimension into the wanted position, and click to fix it.
In the following dialog adjust the **properties** of the dimension, and click OK.

Note
Press [Esc] to cancel the operation.

Angle By 4 Points

Measure an angle defined by four points.

Move the cursor across the drawing. Points of the drawing that can be references for measuring will be highlighted in blue, but you can also choose any point.
Select four points by mouse click, of which point 1 and 2 define the first arm and point 3 and 4 the second arm of the angle.
Move the new dimension into the wanted position, and click to fix it.
In the following dialog adjust the **properties** of the dimension, and click OK.

Note
Press [Esc] to cancel the operation.

Adjust And Delete Dimensions

Move dimensions

Click the text of a dimension, hold down the mouse button and move the dimension into the wanted position. Angle dimensions can be placed in any quadrant of the angle.

Change the properties of dimensions

Double-click the text of a dimension.

- **Scale:** Choose the scale of the drawing to adjust the measured value.
- **Text field:** Shows the text/value of the dimension. You can enter a custom text, but this will prevent the value from being scaled.
- **Text:** Change the text height and color.
- **Line:** Change the thickness and color of the lines.
- **Arrow:** Select an arrow head and change its length.
- **Tolerance:** Enter tolerance values for the dimension.

Note
If common text heights appear extremely small or large, the units of the drawing do not correspond to the 3D-Tool default units.
Options tab > *Preferences* group > *Preferences* > *Common.*

Delete dimensions

To delete a dimension, do one of the following:

- Right-click the text of a dimension, and select *Delete*.
- Click the *Delete* button in the right info panel, and then click the text of a dimension.
- Move the cursor onto the text of a dimension, and press [Del] on the keyboard.
- To delete all 2D dimensions and/or all 2D markups (Redline Markups, texts, pictures), click the *Delete all* button in the right info panel.

Add Markups, Text and Pictures (2D)

Activate Annotate to make 2D markups. Use the second button to create various Redline Markups and insert pictures and texts.

To add markups, text, and pictures, click the *Annotate* button in the right info panel.
Click the *Arrow* button to add an arrow markup, or click the little black arrow in the button to select another function.

Arrow

Add an arrow. Click to select the starting point, hold down the mouse button, and move the arrow to the end point.

Sketch

Add a sketch. Click into the drawing, hold down the mouse button, and draw with the cursor.

Circle

Add a circle. Click into the drawing, hold down the mouse button, and drag the circle to the wanted size.

Note
Actually, an ellipse is created, and the circle only constitutes the ideal case of uniformly dragging the ellipse in the x- and y-direction.

Rectangle

Add a rectangle. Click into the drawing, hold down the mouse button, and drag the rectangle to the wanted size.

Oval

Add an oval. Click into the drawing, hold down the mouse button, and drag the oval to the wanted size.

Cloud

Add a cloud. Click into the drawing, hold down the mouse button, and drag the cloud to the wanted size.

Text

Add a text. Click into the drawing. Choose the text height and color, enter the text, and click OK.

Add Picture

Add a JPG or BMP picture. Click into the drawing, hold down the mouse button, and drag the rectangle to the wanted size. Release the mouse button, and load an image.

Adjust and Delete Markups, Text and Pictures

Move markups, text and pictures.
Click a markup, text, or edge of a picture, hold down the mouse button, and move the object into the wanted position. For arrow markups, you can also move the starting and end point.

Scale markups and pictures
Move the cursor onto the line of a markup or the edge of a picture. Press and hold [Ctrl] and the left mouse button. Move the mouse to scale the object.

Change the lines of markups
Double-click a markup. Change the thickness and color of the line. For arrow markups, you can also change the length of the arrow head.

Change text
Double-click a text. Change text height and color or enter new text.

Replace pictures
Double-click the edge of a picture, and select a new picture to be loaded.

Delete markups, text and pictures
- Right click a markup, a text or the edge of a picture. Select *Delete*.
- Move the cursor on a markup, text or edge of a picture. Press [Del] on the keyboard.
- Click the *Delete* button in the right info panel, and then click a markup, text or the edge of a picture.
- To delete all 2D dimensions and/or all 2D markups (redline markups, texts, pictures), click the *Delete All* button in the right info panel.

Note
If common text heights appear extremely small or large, the units of the drawing do not correspond to the 3D-Tool default units. '
Options tab > *Preferences* group > *Preferences* > *Common.*

2D-Tools

Use the 2D-Tools mode to edit the elements of the drawing and the markups, texts and pictures added with 3D-Tool.

To use the 2D-Tools, click the *2D-Tools* button in the right info panel.

Create a Selection

Selection by mouse click
- Click on an element of the drawing (line or text). The element is selected and highlighted in red.
- Click on a redline-markup, an added text, or the edge of an added picture. The object is selected and highlighted in light blue.

Marquee select
Click on the drawing, hold down the mouse button, and move the marquee rectangle across the drawing. Release the mouse button. All elements of the drawing and all 3D-Tool objects that are totally or partially covered by the marquee rectangle are selected and highlighted in red or in light blue.

Each new selection will be added to the existing selection.
To remove a selection, click *Deselect*.

Delete Selection

Delete the selected elements.

Change Color Of Selection

Choose a new color for the selected elements.

If nothing is selected, but there is a layer of the drawing selected in the layer list, you will be asked if you want to change the color of the complete layer.

Move Selection

Move the selected elements.

Click on the drawing, hold down the mouse button, and move the selection to the wanted position.

If nothing is selected, you will be asked if you want to move the origin of the drawing to the coordinates (0,0).

Scale Selection

Scale the selected elements.

Select the scale to be used:

- inch **=>** mm.
- mm **=>** inch.
- Custom: Enter a scale.

If nothing is selected, you will be asked whether you want to scale the whole drawing or not.

Change Text Element

Edit a text element of the drawing.

Click on a text element of the drawing.
In the right info panel enter the new text, and click *OK*.
Click *Cancel* to leave the text as it is.

12. Converter

This section shows you how to use the 3D-NativeCAD Converter to convert 3D-CAD files to different 3D file formats.

3D-NativeCAD Converter (only available with 3D-Tool Premium)

Convert CATIA V4/V5, Pro/E, Inventor, SolidWorks, UG, STEP, IGS, VDA, SAT, and Parasolid files to CATIA V4/5, STEP, IGS, VDA, SAT, SAB, ASAT, and STL files.

To start the 3D-NativeCAD Converter, click *Converter* in the *Mode* group of the *3D Mode* tab or directly start the converter by clicking its icon on your desktop.

Open CAD File and Adjust Conversion

File to convert

Click on *Choose a file to convert* to select the 3D-CAD file you want to convert.

More about the supported file formats can be seen in the *Data Import* section.

Output file

The complete path to the output file. By default the file that was converted will be saved in the same folder and under the same name as the original file. The file extension will be adjusted according to the output format. The path can be edited. Non-existent directories will be created

Format

From the dropdown list choose one of the supported output formats.

- **CATIA V5**: 3D-CAD model in the Catia V5 format. By default *CATproduct* will be displayed as file extension of the output file. If the file that is to be converted is not an assembly, a *CATPart* file will be created automatically.
- **CATIA V4**: 3D-CAD model in the Catia V4 format.
- **STEP**: 3D-CAD model in the STEP format.
- **ACIS SAT**: 3D-CAD model in the SAT format (ASIC-text).
- **ACIS SAB**: 3D-CAD model in the SAB format (ASIC-binary).
- **ACIS ASAT**: 3D-CAD model in the ASAT format (ASIC-text with assemblies). If the file to be converted is not an assembly, the conversion into ASAT is not possible, and a SAB file will be created. ASAT files can be imported into 3D-Tool.
- **XML-E-BOM**: 3D-CAD model in the XML E-BOM format (XML assembly structure and SAB parts). When converting assemblies, there may be unwanted parts or parts that cause problems. In these cases, first convert to the XML E-BOM format, and then, in a second step, to the desired output format. If the direct conversion of an assembly fails because of defective parts, this approach will often lead to success.
- **STL**: Triangulated 3D model in the STL format.

Version

From the dropdown list choose the file version when converting to CATIA V5, SAT and SAB. Possible values are: For CATIA V5: V5R6 to V5R22, for SAT: V2 to V22 and for SAB: V18 to V22.

Options

- **Output units** *(Default: according to the 3D-Tool standard units)*
  Set the units of the output file. If the units of the output file differ from the units of the native file, the model will be scaled. The default setting depends on the Windows settings for the measurement system.
- **Convert curves** *(Default: Active)*
  Convert curves too. If inactive, curves and lines will not be converted.
- **Convert points** *(Default: Active)*
  Convert point too. If inactive, the points will not be converted.
- **Healing** *(Default: Active)*
  Resolve problems that are caused by specific attributes of the various file formats or inaccuracies that occur during the conversion.
- **Create Log file** (Default: Active)
  Create Log files (*.log) in the directory of the output file during the conversion. The name of the Log files is the same as the file that is converted. During *2-Step conversion* two log files will be created. The files contain information about the conversion process, and can be opened with a text editor.
- **2-Step conversion** (Default: Active)
  Convert the file in two steps via a temporary file. This puts less strain on the computers memory. The 2-Step conversion is not available during all conversions. However, if this option is available it should be used.
- **Convert hidden entities** *(Default: Inactive)*
  Activate the conversion of elements that are hidden in the file that will be converted.
- **Tessellation-Chord height** *(Default: -1)*
  Enter the chord height used for triangulation when converting to STL. A chord height of -1 will automatically calculate the chord height as 1/500 of the diagonal of the boundary box of the model that is converted. Absolute values can be entered, e.g. 0.05. Smaller values increase the quality of the display but also increase the file size.
- **Tessellation-Angle control** *(Default: 20.00)*
  Enter the tolerance angle used for triangulation when converting to STL. Smaller values increase the quality of the display but also increase the file size.

Note
The default values of *Chord height* and *Angle control* can be set in the 3D-Tool preferences:
Options tap > Preferences group > Preferences > 3D-Import

Convert Complete

Click the *Convert Complete* button to convert all parts and assemblies of the file that is converted.

The converter starts in a new window which displays information on the conversion progress.
Do not close this window before the conversion is complete. The window will automatically close when the conversion is completed.

Choose Parts and Assemblies

Click the *Choose Parts and Assemblies* button to choose the parts and assemblies to be converted.

The assembly structure of the file to be converted will be read. For complex assemblies this may take some time. When the assembly structure is completely read, the Model Tree is displayed to Select *the parts which should be converted*.

Select the parts which should be converted
To expand and collapse an assembly, click the arrow symbol in front of the assembly.
To enable a part, click its *symbol.* To enable an assembly, click its *symbol.*

Convert Selected
Convert all enabled parts and assemblies. Disabled parts and assemblies will not be converted. For conversion at least one part must be enabled.

Expand all assemblies in the Model Tree
Expand all assemblies in the Model Tree. All parts and assemblies of the model can be seen in the Model Tree.

Collapse all assemblies in the Model Tree
Collapse all assemblies in the Model Tree. Only the model can be seen in the Model Tree.

Enable all parts and assemblies
Enable all parts and assemblies for conversion.

Disable all parts and assemblies
Disable all parts and assemblies for conversion.

Batch Mode

Convert complete models via command line. This enables you to create your own batch files for conversion.

Show Batch Content

For help when creating your own batch files, start the *3D-NativeCAD Converter* directly from your desktop or through Windows start menu > Programs > 3D-Tool V10. Then, open a file to convert and setup the conversion.

In the *Options* menu, click *Show Batch Content*. The field *Batch content for the converter* shows the command line to call up the converter with the current conversion settings. You can copy the content of the field and use it with your batch file.

Call of the converter

"InstallationPath\converter.exe" -i "CADfile" **-o** "OutputFile"
[**-oformat CATIAV5**][**-ounit** [units]] [**-healing** [1/0]] [**-hidden** [1/0]] [**-curves** [1/0]]
[**-points** [1/0]] [**-chord** [Number]] [**-angle** [0 - 90]] [**-2steps**] [**-log** [Path\LogFile]] [**-w**]

"CADfile" > Path and file name of the file that is to be converted.

"OutputFile" > Path and file name of the converted file.

Except for Catia V5 the file format of the output file is specified by its file extension:

- ***.model** for Catia V4
- ***.stp** for STEP
- ***.igs** for IGES
- ***.vda** for VDA
- ***.sat** for ASIC SAT (ASIC text)
- ***.sab** for ASIC SAB (ASIC binäry)
- ***.asat** for ASIC ASAT
  If the file to be converted is not an assembly, the conversion into ASAT is not possible, and a SAB file will be created automatically.
- ***.xml** for XML E-BOM
- ***.stl** for STL

Catia V5
To create Catia V5 files, the parameter *-oFormat CATIAV5* must be used. When creating Catia V5 files, the file format of the output file depends on whether the file that is to be converted is an assembly (= CATProduct) or just a part (= CATPart). Therefore the file extension cannot be specified in advance.

Notes

- Directories cannot be created in the batch mode. If the directory that has been assigned to an output file does not exist, the file cannot be saved.
- In batch mode, only complete models can be converted. It is not possible to choose parts and assemblies.

Optional parameters

The following parameters are optional. For parameters that have not been set, the default values will be used.

-oformat CATIAV5 > Catia V5 output *(Default: file extension of the output file)*
This parameter is only needed for Catia V5 output. All other output formats will be specified by the file extension of the output file.

-oversion [Version name] > Version of the output file *(Default: Latest Version)*
When converting to CATIA V5, SAT and SAB a file version can be specified for the output file. Possible version names are: For CATIA V5: V5R6 to V5R22, for SAT: V2 to V22 and for SAB: V18 to V22.

-ounit [units] > Units of the output file *(Default: units of the input file)*
Units: Nanometer (nm), Micrometer (micr), Millimeter (mm), Centimeter (cm), Decimeter (deci), Meter (m), Inch (in), Foot (ft), Mile, Kilometer (km), Milliinch, Microinch.

-healing [1/0] > Healing *(Default: 1 = enabled)*
-hidden [1/0] > Convert hidden entities *(Default: 0 = disabled)*
-curves [1/0] > Convert curves *(Default: 1 = enabled)*
-points [[1/0] > Convert points *(Default: 1 = enabled)*
-chord [Number] > Chord height for STL output *(Default: -1 = auto)*
A chord height of -1 will automatically calculate the chord height as 1/500 of the diagonal of the boundary box of the model that is converted. Absolute values can be entered e.g. 0.05.

-angle [0 - 90] > Angle control for STL output *(Default: 15.00)*

-2steps > 2-Step conversion *(Default: disabled)*
Convert the file in two steps via a temporary file. This puts less strain on the computers memory. We recommend,to always use this parameter even if the 2-Step conversion is not available during all conversions.

-log [Path\LogFile] > Log file *(Default: No Log file)*
-w > Wait *(Default: disabled)*
By default the *convert.exe* starts the conversion an then immediately is terminated. This parameter forces the *convert.exe* to wait for the end of the conversion.

13. Options

This section informs you about the 3D-Tool settings that let you adjust 3D-Tool to your personal needs.

The Options Tab

Use the Options tab to adjust 3D-Tool to your needs, to activate 3D-Tool licenses, and to get information on the program version and available updates.

Licensing

License Terms
Show the 3D-Tool End User License Agreement..

Licensing (not available in the Free Viewer)
Show the licensing dialog to request and enter 3D-Tool License and Demo Keys.

3D-Display Options

Change Background
Change the color and the gradient of the 3D background.

- **Gradient background**
  Display the background in a gradient that begins with the selected base color.
- **Top color intensity**
  The slider adjusts the color intensity of the top color. Move it up for a brighter and down for a darker color.
- **Set as default**
  Designates the current background as default.
- **Change color**
  Set a base color for the background.
- **Update screen**
  Applies all changes to the background. This way you can preview your settings without exiting the background dialog.

Change Wire Frame Angle *(Default: 20)*
Change the wire frame angle used for the display modes*: Shaded/Edges, Wire Frame and Hidden Line*. A line will be displayed at the edge between two triangles if their angle is greater than the wire frame angle. A small angle will create more lines than a large angle. The *Set as default* button designates the current wire frame angle as default.

Adjust Smoothing
Recalculate the smoothing for all models. To do so, enter an angle larger than "0".
The transitions among the triangles will be smoothed if the angle between the triangles is smaller than the smooth angle. The larger an angle, the more the models will be smoothed. To prevent the models from being smoothed, reduce the angle to "0".

Note:
The recalculation of the smooth vector overwrites the current smooth vectors and cannot be undone.

Preferences

The functions to change the language, to activate hardware acceleration, and to change the 3D-Tool preferences are located in the *Preferences* group of the *Options* tab.

Change Language
Change the language of 3D-Tool. Choose one of the available languages from the drop down list. The language will change immediately.

Preferences
Change the 3D-Tool preferences to your needs. A detailed description on all preferences can be found in the *Preferences* section of this manual.

Hardware Acceleration
Activate hardware acceleration for the current session. This will speed up the display.

All changes in 3D-Tool and other open programs should be saved before activating the hardware acceleration for the first time.

If there are strange effects after activating the hardware acceleration, it cannot be used.
- The model is not or is only partly shown.
- Parts of the user interface are not shown or not shown correctly.
- The program crashes.
- The program cannot be started.

In this case switch off the hardware acceleration or restart 3D-Tool. This is not a software bug but the result of an incompatible implementation of the OpenGL interface in the driver of the graphics card.

If there are no problems, the hardware acceleration can be set permanently through:
Options tab > *Preferences* group > *Preferences* button > *Hardware*.

If there are unexpected problems after this permanent activation and if you cannot switch off the acceleration, e.g. because 3D-Tool refuses to start then turn off the Hardware acceleration through:
Windows Start > Programs > 3D-Tool V10 > Tools > OpenGl-Accelaration_Off.

Note
With 3D-Tool EXE-files, the hardware acceleration can be activated in the starting dialog of the EXE file or after start-up in the *Options* tab by clicking *Hardware acceleration*.

Tip
Updating the driver of the graphics card will often eliminate problems during the hardware acceleration.

Info

About 3D-Tool
See information about 3D-Tool, such as the program version, the serial number, and license type.

Tip of the Day
Show the Tip of the Day.

Check for Updates
Check online for a newer program version. This requires an internet connection.

Preferences

This section informs you about the default settings of the 3D-Tool tools and functions.

The *Preferences* are located in the *Preferences* group of the *Options* tab.

Common
- **3D - Display**
- **3D - Modell Tree**
- **3D - Color**
- **3D - Section**
- **3D - Annotations**
- **3D - Import Basic**
- **3D - Import Advanced / Premium**
- **3D - Publish / Export**
- **3D - NativeCAD Converter**

- **2D - Display**
- **2D - Annotations**

Print / Picture / Capture
Hardware
File Associations

Common

Common default settings such as the program language and the default units.

Options tab > *Preferences* group > *Preferences* > *Common*.

Program language *(Default: System language)*
Select one of the available languages for program start-up. Choosing *System language* will start 3D-Tool in the system language of Windows, if available, otherwise in English.

Use Ribbon Menu *(Default: Active)*
Use the Ribbon Menu instead of drop down menues. From the drop down list, select a color style for the Ribbon Menu.

Use Aero Glass Effect *(Default: Active)*
Activate the transparency effects of the Windows Aero interface.

Automatic updates *(Default: Active)*
During the program start-up, check if there is a new program version. You will receive an according message. Download and install new versions from **www.3D-Tool.de**.

Save window size at end of program *(Default: Active)*
When closing 3D-Tool, save the window size and position for the next program start-up.

Default units *(Default depends on Windows settings: mm for metric, inch for US system units)*
Set the default units of measurement (*mm* or *inch*).

The units of the following files will be converted to the 3D-Tool default units during import:
- STEP, IGES, VDA, SAT, and PARASOLID.
- Native files from CATIA, Pro/Engineer, Inventor, Solidworks, and UG.

With facetted 3D files (STL, SLP, VRML, etc.) and 2D files, the 3D-Tool default units will be used without conversion. If the units of a file deviate, the following functions can lead to unwanted results:
- *Max. edge length* and *Min. distance* for the wall thickness analysis.
- *Text height* of 2D dimensions and 2D texts.
- The displayed volume and surface in the Information tool.

In this case, change the 3D-Tool default units to the units of the file.

Animation time *(Default: 1.00)*
Set the time in seconds for:
- The animation of the 3D-view, e.g. when Custom Views or standard views are selected. If a 0 is entered, there will be no animation.
- The transition time of new key frames in the *Animation* tool.

Custom Views: Show undefined parts *(Default: Inactive)*
Show newly loaded or created parts in existing Custom Views.

Reset hidden dialogs
Reset all dialogs hidden by *Don't show this message again*.
.

3D - Display

Default settings of the 3D Display such as the display of back faces and bad edges.

Options tab > *Preferences* group > *Preferences* > *3D - Display*.

Shade mode *(Default: Shaded)*
Select the shade mode of the models at program start-up
- **Shaded**
  Display the models shaded.
- **Shaded with edges**
  Display the models shaded with black edges

Fast move *(Default: Auto)*
Select the display of parts being moved with the mouse.
- **On**
  Display parts being moved as wire frame to speed up the display.
- **Off**
  Display parts being moved in the current render mode during movement. When slow computers are used, large and complex models may not move smoothly.
- **Auto**
  Display parts being moved automatically as wire frame if the number of frames displayed per second drops below the *FPS treshold*.

Back faces *(Default: None)*
Select the display of back faces at program start-up
- **Same**
  Display shaded faces with same colored back faces.
- **Red**
  Display shaded faces with red back faces.
- **None**
  Display shaded faces without back faces. This speeds up the display.

Set global shade mode resets local part settings *(Default: Active)*
Reset all parts to the render mode of the display when changed.
If this option is not active, only the display mode of such parts is changed that do not have an individual render mode assigned.

Display bad edges *(Default: Inactive)*
Display bad edges at program start-up.

Display coordinate system *(Default: Inactive)*
Display the coordinate system at program start-up.

Display orientation *(Default: Active)*
Display the orientation (x,y,z) at program start-up

Rotate around screen center *(Default: Active)*
Use the center of the screen as the center of rotation when models are rotated with the mouse.
Otherwise the center of all models will be used.

Note
Rotate around screen center does not work with the *perspective view*.

Perspective view *(Default: Inactive)*
Display the models in perspective view at program start-up.

Note
Rotate around screen center does not work with the *perspective view*.

3D - Model Tree

Default settings of the Model Tree.

Options tab > *Preferences* group > *Preferences* > *3D - Model Tree*.

Size *(Default: Normal size)*
Select the size of the Model Tree at program start-up
- **Normal size**
  Display the Model Tree in normal width.
- **Double size**
  Display the Model Tree in double width.

Sort shells while loading STL or SLP files *(Default: Active)*
Sort the shells of the models while loading STL and SLP files.
Select the type and direction of sorting.

- By number of facets.
- By volume.
- By volume of bounds *(Default).*
- By number of bad edges.
- Up / Down

Highlight while moving mouse over parts *(Default: Active)*
Highlight parts and assemblies when moving the mouse over their names in Model Tree.

3D - Color

Default settings of transparency, brightness, and light postion.

Options tab > *Preferences* group > *Preferences* > *3D - Color*.

Transparency/Brightness
Set the values of transparency and brightness at the program start-up.

- **Transparent ... Solid** *(Default: 70%)*
  Opacity of parts that are displayed transparent.
- **Dull ... Shiny** *(Default: 50%)*
  Brightness of parts that are displayed shaded.

Light *(Default: Light at 4/4)*
Drag the yellow light spot to set the default light position.

3D - Section

Default settings for 3D cross sections.

Options tab > *Preferences* group > *Preferences* > *3D - Section*.

Section line color *(Default: Red)*
Choose a color for the section line.

Draw section controls in front of geometries *(Default: Inactive)*
Always display the section controls in front of the model, even if they are located behind the model.

Draw section line while move section *(Default: Inactive)*
Do not hide the section line while moving the cross section.

3D - Annotations

Default settings of dimensions and annotations.

Options tab > *Preferences* group > *Preferences* > *3D - Annotations*.

Foreground color *(Default: Black)*
Choose the text color of new dimensions/annotations.

Background color *(Default: Light yellow)*
Choose the color of the text box of new dimensions/annotations.

Line color *(Default: Red)*
Choose the color of the lines of new dimensions/annotations.

Text height *(Default: 14)*
Choose the text height of new dimensions/annotations.

Distance: Decimal format *(Default: 0.12 - 2 places for mm, 0.123 - 3 places for inch)*
Choose the number of decimal places used with newly measured distances.

Angle: Decimal format *(Default: 0.12 - 2 places)*
Choose the number of decimal places used with newly measured angles.

Annotations stay on top *(Default: Inactive)*
Always display new dimensions/annotations in front of the model, even if they are located behind the model.

Use leading text description *(Default: Inactive)*
Display a leading text description for the dimension type.

3D - Import Basic

Default settings used with the Basic 3D Import.

Options tab > *Preferences* group > *Preferences* > *3D - Import Basic*.

Calculate smooth vectors for files with flat triangles *(Default: Inactive)*
Calculate smooth vectors while loading files that do not contain smooth vectors. To do so, set *Smooth angle*. Angles between 20 and 35 degrees deliver the best results.

Load *_s.stl files in one shell (*Default: Active)*
Load STL-Support files (*_s.stl) as one shell.

Load colored STL files as colored *(Default: Active)*
Load the colors from STL files that contain color data.

Assign color to non-colored STL files *(Default: Active)*
Automatically assign a new color to every STL file that does not contain color data.

Select a color for all non-colored STL files *(Default: Inactive)*
Assign the selected color to all STL files that do not contain color data. Click the square button to select the color.

3D - Import Advanced/Premium

Default settings used with the advanced and premium 3D import.

Options tab > *Preferences* group > *Preferences* > *3D - Import Adv/Prem*.

Show import settings dialog *(Default: Active)*
Show the import settings when loading files.

Import settings
Set the default import settings.

- **Chord height** *(Default: 0,05 mm / 0.002 inch)*
  Enter a value for the chord height.
- **Angle control** (*Default: 20)*
  Enter a value for the angle control.
- **Read hidden entities** *(Default: Inactive).*
  Read elements that are hidden in the files.

Advanced-Importer

- **Create B-Reps for IGS files** *(Default: Inactive)*
  Create B-Reps during the import of IGS files. This will increase the quality of the display but needs more memory during import.
- **Create B-Reps for STEP files** *(Default: Inactive)*
  Create B-Reps during the import of STEP files. This will increase the quality of the display but needs more memory during import.

Premium-Importer (3D-Tool Premium only)

- **Use Premium-Importer for STEP, IGS, VDA, SAT and Parasolid** *(Default: Active)*
  Use the Premium Importer with STEP, IGS, VDA, SAT, and Parasolid files.
  Otherwise the Advanced Importer will be used with these files.
- **Show extended settings (Edge length, Aspect ratio)** (Default: Inactive)
  Extend the import settings by the input of the Max. Edge length and the Aspect ratio.
- **Show import warnings and errors** *(Default: Active)*
  After loading, show import errors and warnings, e.g. missing parts and information on non-supported formats.

3D - Publish / Export

Default settings for publishing and saving data.

Options tab > *Preferences* group > *Preferences* > *3D - Publish/Export*.

Default file as short message for publish EXE/DDD *(Default: Empty)*
Enter the path of a text file (*.txt) that you want to use as a short message every time an EXE/DDD file is published. The text is limited to 2000 characters and can be edited before the file is published.

Save STL files with color information *(Default: Active)*
Save the colors of the model with STL files. The files can be used with any other program.
But since there is no standard of STL colors, the colors may not be displayed correctly.

Include smooth groups in 3DS files (*Default: Inactive)*
When 3DS files are saved, create smooth groups based on the angle set in *Angle to create smooth groups. (Default 45)*

3D - NativeCAD Converter

Default settings of the 3D - NativeCAD Converter.

Options tab > *Preferences* group > *Preferences* > *3D -NativeCAD Converter*.

Healing *(Default: Active)*
Use healing during conversion.

Convert hidden entities *(Default: Inactive)*
Convert elements that are hidden in the file that is to be converted.

Convert curves *(Default: Active)*
Convert the curves present in the file that is to be converted.

Convert points *(Default: Active)*
Convert the points present in the file that is to be converted.

Tesselation settings (for conversion to STL)

- **Chord height** *(Default: -1.0000)*
  Enter the default value for the chord height of triangulation. A chord height of -1 will automatically calculate the chord height as 1/500 of the diagonal of the boundary box of the model that is converted. Absolute values can be entered, e.g. 0.05.
- **Angle control** *(Default: 15.00)*
  Enter the default value for the angle control of the triangulation.

Create log file *(Default: Active)*
Create a Log file (*.log) in the directory of the output file during the conversion.

2D - Display

Default settings of the 2D display when the program is started.

Options tab > *Preferences* group > *Preferences* > *2D - Display*.

Resolution for curves and circles *(Default: 32)*
Set the value of the arc resolution. A large value will result in a better display of arcs but reduce the speed of the display.

Background *(Default: Black)'*
Choose the color for the background at program start-up

- **Black**
  Use a black background.
- **White**
  Use a white background.
- **Custom color**
  Choose any color for the background. Click the square button to choose the color.

Use antialiased lines *(Default: Inactive)*
Smooth the display of lines in the drawing.

Use thin lines *(Default: Inactive)*
At program start-up, show all lines of the drawing with a width of 1 point.

Import text as curves *(Default: Inactive)*
On import, convert the text within a drawing into curves.

2D - Annotations

Default settings of new 2D Annotations and Dimensions.

Options tab > *Preferences* group > *Preferences* > *2D - Annotations*.

Text height *(Default: 14)*
Choose the text height of new Dimensions.
- **Color** *(Default: Red)*
  Choose the text color of new Dimensions.

Line thickness *(Default: 1)*
Choose the width of lines of new Dimensions.
- **Color** *(Default: Red)*
  Choose the color of lines of new Dimensions.

Arrow *(Default: inner triangle)*
Choose the arrow head of new Dimension.
- **Length** *(Default: 3)*
  Choose the length of an arrow head of new Annotations and Dimensions.

Distance: Decimal format *(Default: 0.12 - 2 places for mm, 0.123 - 3 places for inch)*
Choose the number of decimal places used with newly measured distances.

Angle: Decimal format *(Default: 0.12 - 2 places)*
Choose the number of decimal places used with newly measured angles.

Redline markups
- **Line thickness** *(Default: 3)*
  Choose the width of new Redline-Markups.
- **Color** *(Default: Red)*
  Choose the color of a new Redline-Markups.

Print / Picture / Capture

Default settings for print-outs, pictures and captures.

Options tab > *Preferences* group > *Preferences* > *Print/Picture/Capture*.

Print /Picture
Change the default settings for print-outs and pictures.
- **Improve quality (Antialias)** *(Default: Active)*
  Use antialias when printing or creating a picture.
- **Preferred print format** *(Default: Landscape)*
  Choose the preferred format for printing: *Landscape* or *Portrait*
- **Jpeg quality** *(Default: 90)*
  Set the quality of JPG pictures that were created with 3D-Tool. Possible values are between 30 and 100. Larger values will result in better quality but also in a larger file.

Capture to Clipboard
Settings for capturing sections of the screen to the Clipboard.
- **Use white background** *(Default: Active)*
  Draw a black frame around the captured screenshot.
- **Use antialias** *(Default: Active)*
  Use antialias on captured screenshot.
- **Include frame** *(Default: Inactive)*
  Draw a black frame around the captured screenshot.

Hardware

Activate the hardware acceleration and adjust the zoom speed of the mouse wheel.

Options tab > *Preferences* group > *Preferences* > *Hardware*.

Enable Hardware Acceleration *(Default: Inactive)*
Activate the OpenGL hardware acceleration of the graphics card at program start-up. In a few cases, problems may occur after the hardware acceleration is activated. In this case, please refer to the section ***Display Speed Optimization*** of this help.

Mouse wheel zoom
Set the speed of the zoom when using the mouse wheel.

File Associations

The file extensions associated with 3D-Tool.

Options tab > *Preferences* group > *Preferences* > *File Associations*.

Check all file formats you want to associate with 3D-Tool, and click the *Apply* button.

The list contains all file formats that are supported by 3D-Tool. Non-selectable (gray colored) file formats are not available with your 3D-Tool Version/License.

Notes

- Once a file association is set, it will be activated until it is overwritten by another program.
- To set a file connection, you have to have administrative rights. Starting with Windows Vista, you will be asked to confirm and possibly to re-enter the administrative password by the User Account Control (UAC).

14. How To ... ?

Here you will find many useful tips that make it easier to work with 3D-Tool.

How To Publish CAD Models

Publish you CAD models to make them available to anyone, even if the person does not have a CAD program.

Load CAD Models

You can load any number of models, in different formats, into one 3D-Tool scene.

The quality of the imported file can be adjusted in the Advanced and Premium Version of 3D-Tool. Usually, the default values will produce good results; however, very large and complex models may slow down the display of the models on older computers.

Tip
Increase the *Chord height* (e.g. to 0.5) in the import settings to decrease the number of triangles that will be created and put less strain on the computer.

Change Colors

If a model does not have the wanted color, changing the color of parts and assemblies can make it easier to distinguish the parts. To change the color of parts and assemblies do one of the following:

- Right-click a part on the model or an assembly in the Model Tree, and select *New color*.
- Use the *Painter* tool to color surfaces or parts.
- Use the *Property Editor* to change colors more comfortable. It will also save changes so they can be used with later versions of the same model. This way the model can be seen with the same properties repeatedly.

Highlight Details

3D annotations and dimensions

Use the *Measure/Markup* tool to measure distances, angles, radii, wall thickness, and add text messages. During measurement, keep the following in mind:

- Add dimensions only where you want to point out important details to the viewer. If the EXE and DDD files are shared, the recipient can perform all measurements.
- Use *Create notes* to add small 3D notes to parts of the model.

3D background images and text

In the *Measure/Markup* tool you will find the operation *Add background image or text*.
Use this operation to:

- Insert a picture to the background.
- Insert a text to the background, e.g. a date or a model name.

Note
The alignment of background pictures and texts is measured in pixels and in relation to the upper left corner of the display. The position of the background picture or text can vary with different resolutions. Therefore, the best place for them is the upper left corner.

Create Custom Views

Any 3D and 2D view can be saved as Custom View. The Custom Views contain the following information:

- The orientation, position, and size of a model in the display.
- The graphical settings of the elements (transparent, shaded, shaded with edges, etc.)
- The shown and hidden parts and assemblies.
- The exploded position of parts.
- The settings of the cross sections, including the parts excluded from the cross section.
- All display settings, e.g. the *Perspective View*, *Show Dimensions and Markups*, and Show *Exploded*.
- The color settings of the background.
- The position of the light.
- In the 2D mode, the position and the size of a drawing, the color of the background, the display settings, and if the *Dimensions* and *Redlining* layers are shown.

You can save any number of Custom Views. An EXE or DDD file contains all Custom Views. If the file is shared, the Custom Views will be available to the recipient.

Publish EXE/DDD Files

Publish your 3D-models and 2D-drawings including all Annotations, Dimensions and Custom Views as 3D-Tool EXE or DDD file:

- **EXE files** contain the 3D-Tool Viewer and can be rund directly on any Windows system.
- **DDD files** contain everything that EXE files contain except the Viewer. If the files are shared, the recipient has to download the 3D-Tool Viewer from our website **www.3D-Tool.de**.
  Share your model as a DDD file if EXE files are blocked by a firewall.

The recipient will always take advantage of the full 3D-Tool functionality. He can measure, create cross sections, and explode assemblies.

Tip
When you publish an EXE or DDD file, enter a short message in the *Publish File* dialog. This message will appear when the EXE/DDD file is opened.

Publish 3D-PDF File

3D-PDF files are an alternative to EXE and DDD files, particularly if the EXE files cannot be received or executed. The Adobe Acrobat Reader (Version 7.0.7 or higher) is required.

- A 3D-PDF file offers fewer operations than the 3D-Tool Viewer.
- The Annotations, Dimensions, Custom Views, and Animations are not included.
- 2D drawings cannot be published.

Add 2D Drawing

3D-Tool can load and publish 2D drawings in the DWG, DXF, and HPGL format, separately or together with 3D models.

2D drawings will be loaded in the *2D Mode*. In 2D Mode, you can arrange multiple drawings on top of each other or side by side.

2D Dimensions and Markups

For 2D drawings, the *Annotate* mode allows you to insert the following:

- Redline Markups: Arrows, Circles, Clouds, etc.
- Dimensions: Distance, angle, radius, etc.
- Pictures and texts.

How To Make Presentations

Prepare your models for a presentation and use the full screen during the presentation.

Prepare The Models

Change colors

Use rich, high contrast colors to the element if you want to use a beamer. Not all beamers make small color differences distinguishable. To change the color of parts and assemblies do one of the following:

- Right-click a part on the model or an assembly in the Model Tree, and select *New color*.
- Use the *Painter* tool to color surfaces or parts.
- Use the *Property Editor* to change colors more comfortable. It will also save changes so they can be used with later versions of the same model. This way the model can be seen with the same properties repeatedly.

Custom Views

Prepare views of the major details of a model and save these as Custom Views. This keeps you from having to continuously adjust what parts are shown or hidden during a presentation.

- Use the *Custom View Editor* to arrange the Custom Views into an optimal sequence.
  Use distinct names for the Custom Views to find them more easily later.

Publish models

Publish EXE file is useful with presentations. You can save the EXE file on a data carrier, e.g. an USB stick, and use it later on another computer without any installation.

Important Presentation Functions

Hardware acceleration

Try if the EXE file will open and activate the hardware acceleration in the starting dialog before the presentations. The hardware acceleration will increase the display speed of the models; however it may cause graphical problems on some computers.

Hide parts and assemblies

To hide parts and assemblies, do one of the following:

- Right-click a part on the model, and select *Hide*.
- In the Model Tree, click the icons of parts and assemblies.
- Select parts and assemblies from the Model Tree, and above the Model Tree click *Hide selection*.

Show parts and assemblies

To show parts and assemblies, do one of the following::

- Right-click into the background of the model. In the context menu you can show single or all currently hidden parts.
- In the Model Tree, click the icons of hidden parts and assemblies.
- Select parts and assemblies from the Model Tree, and click *Show selection*.
- above the Model Tree

More important presentation functions

The following important functions are located in the Ribbon menu:

- ***Orientation* group**
  Use the default views *Left* *Right* *Front*, etc. to fit the model to the display and rotate it accordingly. Use *Align view* to align the three axes x,y,z of the coordinate system horizontally, vertically, and to the viewing direction.
- ***Zoom* group**
  Use *Zoom in*, *Zoom out* and *Fit to screen* to increase or decrease the size of the model.
- ***Display* group**
  Use *Show dimensions and markup* to show and hide all dimensions and markups. If the current view contains explosion data, use *Show exploded* to switch between the exploded and assembled state of the model.
- ***Tools* group**
  Use *Cross section* to shows a cross section of the model.

Measure

Within the 3D-Tool EXE files the *Measure/Markup* tool is available. The automatic selection of planes, edges, points, and circles by moving the cursor across a model makes quick and precise measurements possible, even during a presentation.

Full screen mode

To use the whole display for your presentation, click on *Full screen* in the *Presentation* group. You can easily open Custom Views, show cross sections, and hide parts during the full screen mode with the context menu that will appear when you right-click in the display.

Press [ESC] to leave the full screen mode.

Note

The hardware acceleration is not available during the full screen mode. Moving, rotating, and zooming the model will, therefore, be slower than usual.

How to Decrease File Sizes of EXE/DDD Files and Speed Up the Display

Because large files are more difficult to e-mail and may slow down the computer of the recipient, keep the file size in mind if you publish CAD models and share them with others.

Reduce The Number Of Triangles

3D-CAD files are triangulated during their import in 3D-Tool. This means they are split in numerous triangles. The number of triangles that make up a model is displayed in the lower left corner of 3D-Tool.

A large number of triangles ensures a high quality and accuracy of the display of a model. But as the number of triangles increases the display speed of the models decreases and the published EXE/DDD files will become bigger. Keep this in mind if you plan to send your models by e-mail.

In the Advanced and Premium Version of 3D-Tool it is possible to adjust the import quality of the most common file formats and, in turn, have an influence on the number of triangles. Increase the *Chord Height* in the import settings (e.g. to 0.5) to create a smaller number of triangles and decrease the size of the file. Also, this will reduce the time it will take to display the models.

For all other interchange formats, the quality of the triangulation has to be set before you export the file from the CAD program. See the manual of your CAD software for further instructions.

Use Hardware Acceleration

The OpenGL Hardware Acceleration will speed up the display of the models.

3D-Tool and 3D-Tool Free Viewer

Activate the Hardware Acceleration in the *Options* tab by clicking *Hardware acceleration.*

3D-Tool EXE files

Activate the hardware acceleration in the starting dialog of the EXE file or after start-up in the *Options* tab by clicking *Hardware acceleration.*

Note

In a few cases, the Hardware Acceleration may cause difficulties with the display of models. An update of the OpenGL driver may eliminate this problem.

How To Measure On Inaccessible Places

Create cross sections and show/hide parts to measure on places that are difficult of impossible to access.

Measure In Cross Sections

Use cross sections to quickly and easily select hard to reach references.

Start the *Measure/Markup* tool
Start the *Cross Section* tool.
Move and rotate the cross section so the wanted reference for measuring is accessible.

With dimensions that need two references (distances, angles), you should make sure that both references are available in the cross section. However, you can also change the cross section, after the first reference is selected, to reach the second reference.

Tip

The section line and its edge points can also be used as references for measuring.

Hide Distracting Parts

Hide distracting parts

Right-click a part on the model. Select *Hide* in the context menu.

Show hidden parts

Right-click on the background. If there are any hidden parts, the context menu will contain a list of the hidden elements. Select single or all parts to be shown again.

How To Compare Two Models

Use cross sections and different colors and render modes to compare two variants of a model.

Load Both Models

Load the two models that you want to compare. If the models have the same name, the name of the second model that is loaded will automatically be changed.

After both models are loaded, you will find them behind each other on the Model Tree and the second model will superimpose the first model in the display.

Note
Models that were triangulated differently may show small deviations that do not exist.

Comparison By Color

To make difference in the models more obvious, color the two models differently.

Right-click the first model in the Model Tree and select *New color* in the context menu.
Select a distinct, rich color e.g. magenta.
Color the second model in a color that is distinct from the color of the first model.
In all places where the color of the first model in the Model Tree is visible the models deviate.

Now change the order of the two models in the Model Tree to find more deviations.
Select the second model in the Model Tree.
In the *Model Tree* group click the *More* button and choose *Move up*.
In all places where the color of the first model in the Model Tree is visible the models deviate.

Con

This way of comparing two models only shows deviations in visible places. Deviations inside the models cannot be seen.

Comparison By Wire Frame

This comparison uses the wire frame display to investigate the models.

Load both models.
Color the models differently.
From the *Display* group select *Wire Frame Display.*

Where the models overlap exactly, you will only see the wire lines in the color of the second model. In places where the position of the models deviates, you can additionally see the wire lines of the first model.

Pro

It is easy to see all deviations, even small ones, in the inside of the models.

Con

Since the wire lines are shown for the edges of a model only, deviations of curved surfaces e.g. a cone or a sphere, may remain undetected. You can adjust the *Wire frame angle* in the *Options* tab. Reducing the size of the angle will increase the number of edges.

Comparison By Different Display Modes

Here one model is shown as a wire frame and the other model is shaded.

Load both models.
Color the models differently.
Select the first model in the Model Tree.
Top of the Model Tree click *Display selection as wire frame*.
Select the second model in the Model Tree.
Top of the Model Tree click *Display selection shaded*.

Deviations are detectable on the edges of the wire frame of the first model that are at a distance to the shaded surfaces of the second model.
To investigate parts inside of the models, activate the *Cross section* tool and move the cross section through the models.

Swap the shade modes of the models to detect more deviations.
Select the first model in the Model Tree.
Top of the Model Tree click *Display selection shaded* .
Select the second model in the Model Tree.
Top of the Model Tree click *Display selection as wire frame* .

Pro

This type of comparison represents deviations more clearly than other types of comparisons.

Con

- To find all deviations, you might have to switch the shade modes of the models more than once.
- Since the wire frame models shows only the edges, deviations of curved surfaces e.g. cylinders or spheres might remain undetected. You can adjust the *Wire frame angle* in the *Options* tab. Reducing the size of the angle will increase the number of edges.

Comparison By Cross Sections

Here the shaded models are compared with help of a cross section.

Load both models
Color the models differently.
In the *Display* group, click *Shaded Display*.
For the back faces of the model, in the Display group activate *Back faces like front faces.*
In the *Tools* group, activate the *Cross Section* tool.
Unmark *Section line* and *Fill section* in the cross section controls.
Move the cross section through the model.

Where the models overlap exactly, you will only see the surfaces in the color of the second model. In places where the positions of the models deviate, you can additionally see surfaces in the color of the first model.

Pro

Deviations of curved surfaces can be detected.

Con

To detect small deviations, the cross section has to be moved in small increments.

How To Check For Collisions

Use cross sections to see collisions of parts.

To distinguish the parts more easily, you should color the parts differently.
You can color only certain parts or all parts differently:

- To only color certain parts differently, right-click parts on the model or in the Model Tree and select *New color* from the context menu.
- Use the *Painter* tool to automatically assign different colors to all parts of the model.

Activate the *Cross section* tool.
Check *Section line* and *Fill section* in the cross section controls.
Move the cross section through the model.

You will notice places where parts interfuse by an unequal coloring of the cutting plane and by the run of the section line.

To check distances, use the functions to measure *Distances* or *Clearances* in the *Measure/Markup* tool.

Tip
Distances can also be measured by using the edges and edge points of the section line.

How To Create Animations

Create animations out of Custom Views, e.g. to show the mounting of an assembly.

Create an Animation

Before you can create an animation, you have to create Custom Views.
Custom Views save the complete state of the view including all display settings.
Later the Custom Views will be used as key frames in the animation. When the animation is played, the changes of the view between the key frames will be animated.

To combine Custom Views to an animation, use the *Animation* tool.

Set up a new animation

Use *New animation* to create a new animation and enter the name of the new animation.

Add key frames

Select one or more Custom Views out of the list and click on to add them as a new key frames.
New key frames are added at the end of an animation and can be repositioned with the up and down arrow.

Use the *Filter* to designate whether all Custom Views, or only the ones with perspective or orthogonal view will be shown. This prevents the mixing of the orthogonal and perspective view, because this transition cannot be animated.

Adjust animation time

The time that is displayed in front of a key frame is the time needed for the transition between that and the next key frame. The time needed for the transition is set to a default value for each new key frame. You can change the value with a double click. If you enter a value larger than the default value, the transition will become slower. If you enter a value smaller than the default value, the transition will become faster.

If you want the animation to pause, use the same Custom View twice as key frame. Set the animation time for the first key frame and the pausing time for the second key frame.

Preview of the animation

The button will play an preview of the current animation in the preview window. You can stop the preview by pressing [Esc].

Save and play the animation

When you are satisfied with your animation, close the Animation tool by clicking *OK*.
You can start the animation by choosing *Start animation* or *Start full screen animation* in the *Presentation* group.
Animations are also added at the end of the list of Custom Views and can be started from there.

Note

When playing animations within 3D-Tool the transition times assigned to the key frames are only an approximation, because they depend on the computers performance. However, if you export the animation as an AVI-video the designated times will be exact.

What Can Be Animated?

Animated settings

The following changes of the model and the view will be animated between two key frames:

- Changes in the orientation, position, and size of the view.
- Changes in the exploded position of parts.
- Changes in the position of a cross section.
- Changes in the position of the lighting.
- Changes in the base color of the background.

Not animated settings

The following changes of the model and the view will be only set but not animated.
They should be avoided, if you want to get a smooth animation.

- Changes in the mode of display of the parts (transparent, shaded, shaded with edges).
- Shown/Hidden parts.
- Activation of cross sections.
- The switch between perspective and orthogonal view.
- The switch between uniform background and a background with a color gradient.

How is animated?

The following applies to the transition between key frames:

- First, all settings that cannot be animated will be set. Then, the transition of the settings that can be animated takes place.
- The position and orientation of the objects will be animated by using the shortest distance between two positions.

Tip

Because a switch between the orthogonal and the perspective view cannot be animated and the transition would be abrupt all key frames of an animation should be in the same view.

Animation of the View

The simplest way of animation is an animated movement, rotation, or zoom of the view:

Move, rotate and zoom the model to the wanted position or use the buttons on the *Orientation* group.
Click *Save Custom View* in the bottom of the right info panel.
Create all needed Custom Views this way.
Start the *Animation* tool.
Add the Custom Views in the wanted order to the animation.

If you play the animation, the model will move and rotate from one view to the next..

Tip
A rotation will be always animated in the shortest distance. To rotate the view of a model by 180° or more, disperse the rotation equally over two or more key frames (each less than 180 degrees).

Animation of Parts (Explosion)

Use the *Explode* tool to animate single parts and assemblies. By this you can, for example, animate the mounting of an assembly.

Activate the *Explode* tool
Use the operations *Move parts* and *Rotate parts* to place the parts in the wanted position.
Save the exploded view as a Custom View.
If the animation is to occur gradually e.g. a step-by-step assembly, you should save each step as a separate Custom View.
Start the *Animation* tool.
Add the Custom Views in the wanted order to the animation.

If you play the animation, the parts will move and rotate from one view to the next..

Tip
A rotation will be always animated in the shortest distance. To rotate the view of a model by 180° or more, disperse the rotation equally over two or more key frames (each less than 180 degrees).

Note
Movements of parts will be animated by using the shortest distance and separate for each part.
If you select multiple parts and rotate them together, the animated rotation will not be performed together. Each part will move linear, independent of the other parts, into the position and orientation designated by the key frame.

Animation of Cross Sections

Let cross sections run animated through the model.

You need at least two key frames to animate a cross section.
Key frame 1 will activate the cross section in a particular location. Key frame 2 will move the cross section to another location.

Activate the  *Cross section* tool.
Select a *Section plane*.
Move/turn the cross section to the starting position within or outside of the model.
Save the view as Custom View.
Move/turn the cross section to the end position.
Save the view as Custom View.

If the Custom Views are added to an animation in sequence, the cross section moves from the starting to the end position.

Tip
Place the starting position of the cross section outside of the model so the whole model is visible. This way the cross section does not suddenly appear in the animation but move into the model.

15. Additional Help

Use the following additional help when working with 3D-Tool.

3D-Tool Quick Reference

The 3D-Tool Quick Reference Card gives a quick overview of the user interface of 3D-Tool:
Windows Start > Programs > 3D-Tool V10 > Quick Reference.

3D-Tool tool tips

When the cursor is moved onto a button (e.g. on the Ribbon Menu) and remains there a moment, the a short description of the function is displayed.

3D-Tool website

Go to our website **www.3D-Tool.de** to find the newest information about 3D-Tool.

16. Credits

3D-Tool thanks the following persons and companies.

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bsalsa productions

"Embedded Web Browser" - **http://www.bsalsa.com**

Others

ComponentAce; base2 technologie; Fabio Dell' Aria