HiCAD

UNLIMITED CAD PERFORMANCE **DEVELOPED BY ISD**

HiCAD Basics

Version 2024

Tips & Tricks

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THE WORLD OF CAD AND PDM SOLUTIONS

TOC

Tips and Tricks

With **HiCAD** you can create and process your CAD drawings easily, rapidly and flexibly - even when working with very complex models.

Start-of-the-art technologies enable you to streamline routine tasks, reduce the number of required working steps and eliminate error sources right from the start. 3-D models and 2-D drawings for catalogues or presentations can be used for catalogues and presentations at early design stages.

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Further Tips & Tricks can be found in the ISD Wiki.

Notes on Data Backup

Although HiCAD performs an AutoSave of data at regular intervals, you should create backup copies of your drawings.

Remember also to back up the following files:

- referenced parts as well as other 2-D and 3-D parts,
- detail drawings
- factory standard catalogues,
- your own background images,
- modified system settings or
- modified configurations, e.g. for BOM generation.

 If your drawing contains pixel graphics which are linked only to the drawing, back them up as well.

Re-Using of Parts

It often happens, during construction, that a part to be constructed is already part of another drawing. Speed up your construction by reusing parts that have already been constructed.

- **Referencing**
  Referenced parts are characterized by their ability to be used across projects and on an enterprise-wide basis. The 3-D body which represents this part is not closely integrated into the model, but only loaded in the current state when the model is created. The 3-D model does not therefore contain the geometry of the part, but merely a reference to the part. Referencing has the following advantages:

  - Frequently required company-specific parts can be managed and changed much more effectively from a constructive perspective if they are referenced.
  - If a drawing contains referenced parts, HiCAD checks automatically to see whether they exist in changed form. Changed parts are automatically updated. Even when a drawing is saved, only the parts that have been changed are saved again. This ensures high speed even for complex drawings.
  - During processing, referenced parts are blocked for other users. Only when the part has been released again are automatic update and other changes possible.

- **Factory Standard Catalogues**
  Any drawing objects - like 2-D, 3-D parts, assemblies, prototype beams, variants, materials and macros - can be combined in individual factory standard catalogues. These catalogue objects are fitted in HiCAD via a photo-like selection system. Factory standard catalogues can be exchanged with other users and adjusted.

Avoiding Problems During Designing

Note the following advice for avoiding potential problems during construction:

1. Wherever possible, use **Feature Technology** to model complex 3-D parts. Modelling functions like **Transform surfaces**, **Transform edges** or **Transform points** are only intended as an additional supplement for those cases in which a geometry cannot be generated via solid operations and feature technology.

2. The basic form of the 3-D parts should primarily be created using sketches, the composite edge HCM and the **Extruded solids**, **Revolved solids**, **Bores**, **Subtract** and **Add** functions based on them. The planes used in the sketch functions find the relevant reference elements with intelligent algorithms during feature recalculation, thereby also reconstructing the relevant processing correctly.

3. If a **3-D offset** fails, remove critical fillets. Fillet the internal and external side of the corners separately after the offset. Make sure that the side with the smaller radius is filleted first. If you do not, there is usually not sufficient material for the fillet.

4. If, when sketching and modelling, you transfer points or edges from an existing geometry, you must always do this by copying the geometry or measuring dimensions during sketching/modelling. Under no circumstances should you measure only the existing geometry (e.g. with 3 decimal places) and then reconstruct it by entering the measurement results. Otherwise, Boolean operations or fillets are bound to produce errors owing to the missing further decimal places.

5. Avoid using your pocket calculator to calculate the result of a mathematical formula and then typing it into HiCAD. Let HiCAD perform the calculation. HiCAD uses many more decimal places to perform calculations than a pocket calculator!

6. It is advantageous to execute modelling functions like **Transform surfaces/edges**, **Change surfaces/edge radius** as early as possible, on the simplest geometries.

7. In large drawings, you should use as few **Boolean operations** as possible, as caching the deleted body increases the file size.

Boolean Operations

If any problems occur with Boolean operations, you should bear the following in mind:

1. Example: You want to union two parts which are not in contact with each other. It then frequently makes sense to lengthen both parts so that they intersect. It is then easier for the CAD program to union the two parts. The intersection is deleted again during union.

2. In the feature log, change the sequence of processing steps that took place before the Boolean operation. Then, perform the Boolean operations again by means of a feature recalculation.

3. If you union more than two parts, first union the parts that are in contact with or intersect with each other with their entire surfaces. Union the parts only the lines of which are in contact with each other (i.e. not their surfaces) last.

4. In very rare cases, the component is drawn many millions of mm away from the absolute origin. This leads to the "consumption" of a large number of integer places during internal saving of the absolute coordinates. Fewer significant decimal places are available as a result. In this case, you should move the component nearer to the absolute origin. However, this is only necessary if a component is extremely far away from the absolute origin.

   Tip: Before using **Information, 3-D point coordinates** to determine the absolute coordinates of the part you need to delete all processing planes, as the coordinates in respect of the active processing plane will otherwise be displayed, instead of those in respect of the absolute origin of the world coordinate system.

Overview and Performance when Working with Large Drawings

HiCAD enables a rapid and convenient creation and processing even of very large CAD drawings, which can nowadays consist of several thousands of parts. For optimal orientation within such complex drawings and a fast and efficient processing of large assemblies we recommend that you read the hints and tips given below.

- **Large assemblies**
  The question whether an assembly can be called "large" does not only depend on the number of parts of which the assembly consists, but on a combination of the following factors: The number of parts, the complexity of the individual parts and the number of solids / surface parts. In addition, assemblies are not infrequently imported via various interfaces. These imported models often have even more surfaces than necessary.

- **Part structure**
  The part-oriented HiCAD data structure enables you to create drawings the logical structure of which matches the part structure of real products. Before you start your drawing, it is therefore advisable to consider the product structure and create the part structure accordingly.

- **Referenced 3-D parts**
  References part are parts can be used for different projects and throughout the entire company. From an engineer's point of view, they can be managed and modified in a very convenient way. Therefore, save your sub-assemblies as referenced parts. When you work on a sub-assembly, just open the referenced assembly in a separate drawing and edit it there. Your main assembly will be updated automatically.

- **Opening of drawings in "reduced" mode**
  For a faster assembling of models, HiCAD offers the option to open CAD drawings with reduced data. In the process, referenced 3-D parts and assemblies will be represented as "reduced" elements, i.e. HiCAD will display them as polygon models, thus reducing the amount of data significantly. As a result, less memory will be required, and the general performance will be increased. The reduced representation can take place immediately when opening a drawing file is opened, or subsequently for individual parts and assemblies.

- **Exact and simplified representation of standard parts**
  Beams, profiles, standard parts, standard processings and boltings can either be displayed in an exact or simplified mode. Especially in large drawings containing many profiles, boltings etc. it can be useful to select the simplified representation.

- **Layers**
  Using layers allows the drawing to be split into different information components, which can then be processed individually, as required. For example, objects can be assigned, even temporarily, to the invisible layer 0.

- **Views**

  - 3-D parts can be hidden in certain views, either directly in the ICN or by defining so-called list views.
  - If you use the "real" Hidden Line representation, you have the option to hide parts that are overlapped by other parts. All parts which are not visible in the current view anyway, will then no longer be considered for further processings or recalculations of the view. Especially in the case of complex drawings, this will speed up the processing times significantly.
  - Besides the possibility of hiding views you can also "freeze" views. In contrast to hidden views, "frozen" views will remain visible on the screen, but cannot be processed. This option is useful if you have several views on one sheet, but work in only one view.
  - Instead of complex and time-consuming HiddenLine calculations, views can also be displayed in Quick-View mode.

- **Visualisation settings**
  You can use the Visualisation Settings to hide parts with certain attributes as well as certain element types.

- **Active part**
  All parts except for the active part can be hidden in one step.

- **Part search**
  Use the Search function for a rapid detection of parts with particular properties.

- **Part selection filter**
  Resrtict 3-D part selection by setting appropriate filters.

- **Multiple selection**
  Define Part lists to process several parts in one step.

- **Shading mode**
  - Hidden Line calculation can be rather time-consuming for very large CAD drawings. For a faster hand-ling, you can use the Quick Hidden Line or Quick Hidden Grey representation instead, which are optic-ally very similar to the real Hidden Line representation.
  - The surface approximation determines the quality of the screen representation of filleted surfaces. The higher the value for the surface approximation, the "cleaner" and more precise will the shading look. Please note however that the file size will also increase. If the chosen value is too high, this may result in a loss of performance, especially for large drawings. We recommend the setting **Via distance tol-erance, with maximum/minimum number** to obtain a good representation combined with a high per-formance.
  - With the function **Shaded, without highlighted edges**, the parts of the active view are shaded and all visible edges are displayed with the exception of highlighted edges. Highlighted edges are theoretical edges that appear where there is no clearly recognizable edge due to a fillet. This type of rep-resentation can be useful to improve performance when working in the model view of large drawings.

- **Snapshots in long feature logs**
  If you have very long feature logs, insert so-called "snapshots" into the feature log to speed up recal-culation. Recalculations will then only be performed starting from the last snapshot above the changed fea-ture step. In this way, a time-consuming recalculation of the entire feature log can be avoided.

- **Threshold value for simplified OpenGL**
  The setting for threshold values enables the automatic simplification of parts starting from a particular size:
  - Parts that are smaller that 1 pixel are automatically hidden on the screen.
  - Parts that are smaller than 10 pixels are represented as cuboids on the screen.

  This setting can be adjusted to the individual requirements of the user. You can change the pixel size for this dynamic switch of display individually in the **Configuration Editor**, at **System settings > Visualisation > Views**. You use the parameters
  - **Threshold value for simplified OpenGL representation (Bounding box)** and
  - **Threshold value for simplified OpenGL representation (Omit)**

  for this purpose.

- **Temporary suppression of graphical preview**
  When you call certain functions (e.g. part insertion or part transformation, part insertion in the preview mode or Standard Part insertion) a shaded preview image will be attached to the cursor for a placing of objects in your model drawing. This preview image can be temporarily switched off by pressing and hold-ing down of the SHIFT key, which can, for instance, make sense for performance reasons when working with very large models. When you release the key, the preview image will be displayed again.

- **Insert /exchange large assemblies**
  If parts are inserted into the model drawing where the specification of a fitting point on the part is required for the placement of the part in the drawing, HiCAD displays an enlarged preview of this part to determine

this point. This is the case, for example, with most of the functions of the **Insert Part** function group on the **Drawing** tab. The display type for the preview (insertion view) is the setting from the Configuration Editor at **System settings > Visualisation > Views > Insertion view**. When inserting large assemblies, it may be useful for performance reasons to select the display type Shaded with edges. This avoids time-consuming HiddenLine calculations.

 Please note:

- Tips on performance optimisation can also be found in the **ISD Wiki**, at **Product know-how > Whitepaper > HiCAD - Performance Optimisation**.

- If you want to simplify very large and complex CAD models before passing them on to a third party you can use the functions of the **Simplify** tab. This can be useful for very large drawings the processing of which would take too much time, or if you want to provide a partner or customer only with the absolutely essential information about the model.

Part Structure: Advantages and Planning

What is the purpose of a Part structure?

For large and complex drawings a logical structuring of the data is absolutely essential. In HiCAD such structuring will be enabled through the subdivision of the model drawing into Main assembly, Assemblies, Main parts and Sub-parts. This part-oriented data structure allows the creation of model drawings the logical structure of which corresponds to that of real products - consisting of one main assembly, sub-assemblies and individual parts.

The HiCAD part structure is a tree structure - similar to the directory structure on the hard disk of your computer.

The advantages:

- Orientation within the model drawing is facilitated.
- Design-relevant data and BOM-information can be attached to the designed part.
- The part structure allows the creation of structure BOMs and quantity BOMs.
- Part where-used lists enhance the reuse rate of parts.
- Company-specific assemblies can be visualized via the parameterisation of parts.
- Parts can be transferred from a draft to a single part production drawing.
- A consistent modification of a reused part throughout all related drawings is possible.
- Designing in 2-D requires a calculation of overlaps in assembly drawings, realized via overlap levels of parts.
- The associativity of hatchings is ensured via the part.
- Part scales irrespective of the drawing scale enable optimised representations.
- Processing functions mostly refer to parts.
- 3-D parts which are structured into Assemblies, Main parts and Sub-parts can be highlighted in different colours.
- The **Usage** attribute can be assigned to parts and assemblies. In this way you can, for instance, define parts as columns, girders, mullions, transoms etc. for design tasks in civil engineering. This classification of parts according to types of use allows the creation of usage-dependent workshop drawings or bills of materials.

> If a clear and logical part structure is used, this will normally also result in a more precise and clearer construction of the individual parts. In this way, error sources can be minimised as well.

During designing, an overview of the current 2-D and 3-D part structure of your drawing will be shown in the Information + Communication Navigator (ICN).

The part structure affects the following actions:

- Transformations
  If you move or rotate a part, its sub-parts will be automatically rotated as well.

- Overlaps
  You can determine for complete 2-D parts that they are located in front of or behind a different part, i.e. you do not need to specify this for each single line of the part (in 3-D, HiCAD automatically knows the depths of the parts).

- Hatchings
  Part hatchings will never require any rework. Sub-parts (e.g. bores, cut-outs, bolts...) will be automatically excluded from hatching. If you create assembly drawings, contours frequently change due to overlapping workpieces. Here, too, no rework will be necessary, as part hatchings are based upon the part structure and not on line contours.

- Reuse
  If you reuse a part in a different drawing, all data contained in this part (hatching, overlap level, master data for the BOM, part attributes...) will be copied as well. The automatic copying of the master data, for instance, ensures that no part will be missing in the new drawing.

- BOMs
  BOMs can be created "at the push of a button", as the names of the parts and the corresponding master data have already been defined in the drawing.

- Workshop drawings / Derived drawings
  Here, a well thought out part structure is an advantage, too. You can, for instance, specify which views are to be shown in the drawing - separately for assemblies, general parts, beams, plates and sheets. In addition, the views can be managed in so-called "view groups". During definition of these groups you distinguish between assembly main parts, main parts and sub-parts. Another advantage is that you can assign to assemblies a usage that will be considered during workshop drawing creation, e.g. for the dimensioning.

Example: Turnbuckle:
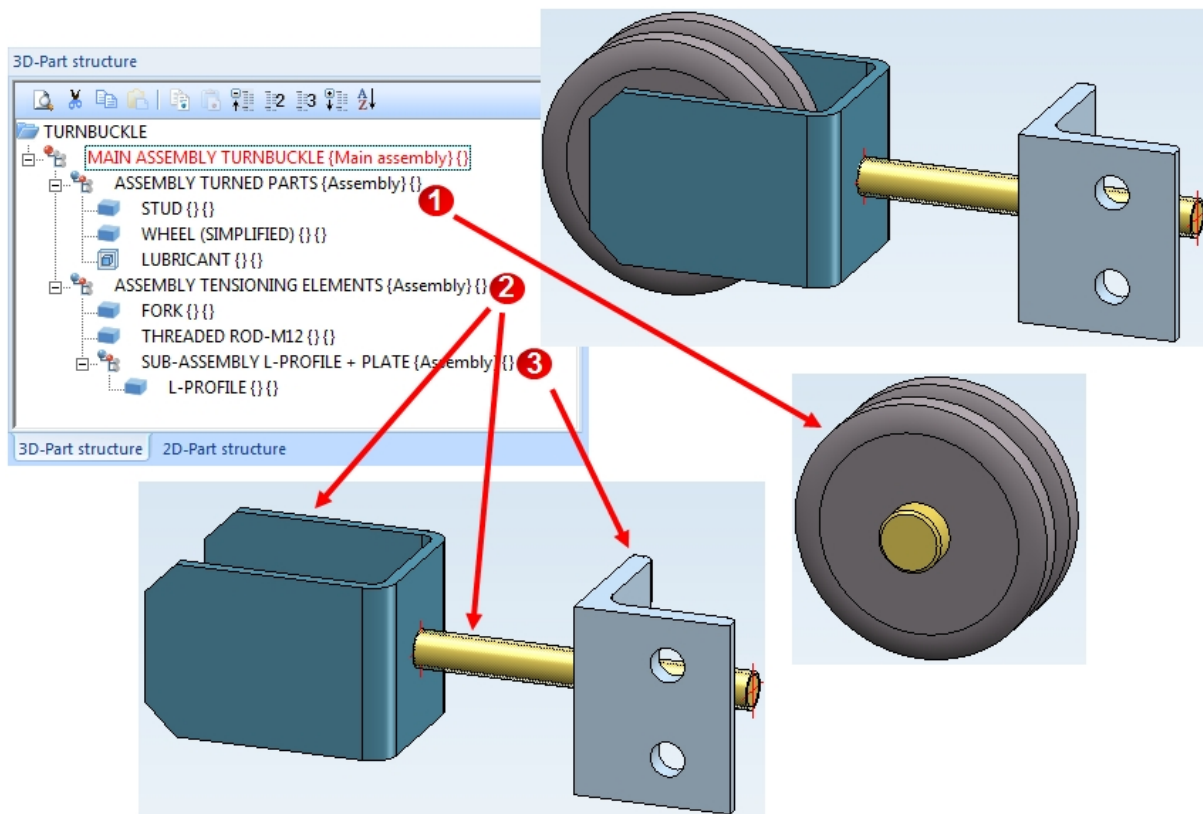
Assumptions:

Stus and Wheel are mounted to each other, i.e. they belong to an assembly - here: the Assembly Turned Parts (1). Via this assembly you can move, rotate copy, delete etc. these parts together.

Fork, L-profile and Threaded rod are also mounted together. They are linked together in the Assembly Tensioning Elements (2).

Altogether these assemblies constitute the product Turnbuckle, which is represented by the same-named Main assembly Turnbuckle. All parts of this model drawing belong to this main assembly. This means that if you move the main assembly, all subordinated assemblies and the parts contain therein will also be moved (or also be deleted, copied etc.).

If you noticed that the Threaded rod is not connected to the Fork or the L-profile, but belongs to the Turned parts, you would move it below the Assembly Turned Parts, accordingly.

Following the same principle, the Assembly Tensioning Elements has a further sub-assembly containing the L-profile (3).

Planning of the part structure

> Before you start creating your model, you should appropriately preconceive its product structure, and then create the assemblies, main parts and sub-parts of your model drawing (i.e. the part structure) accordingly.

- If desired, specify the settings for assemblies in the Configuration Editor.
- Chose the assembly drawing when you create new drawings. This ensures that a main assembly will be automatically created, to which all subsequently created assemblies and parts will be assigned. Especially for referencing, itemisation, BOM creation and for a combined working with the PDM system HELiOS, this procedure provides significantly more efficiency.
- Make use of the possibility to create assemblies. This enables you to determine the part structure of your product right from the start. Specify appropriate assembly points, allowing you to directly identify the assemblies in your drawing.
- Please ensure that an assembly main part is defined in the assemblies. This assembly man part often needs to be specified manually.
- Observe the part rules while creating main parts and sub-parts.
- Choose meaningful names for the parts and assemblies you create, as this facilitates their retrieval during the design process.
- Specify the attributes for assemblies and parts. In particular, do not forget to fill in the **Article number** field.

Visualisation Settings

The functions of the **Visualisation** menu enable you to show/hide objects with particular attributes or objects of a particular type.

Via element type

Shows/hides certain element types like hatchings, texts, splines, point designations, isolated points, symbols, dimensionings and pixel graphics. Inactive symbols identify the hidden element types.
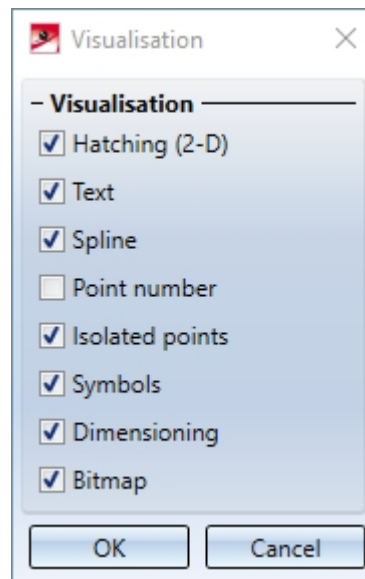
Assembly points On/Off

Shows/hides isolated points for identifying assemblies (Layer 47).

Dimensioning On/Off

Shows/hides dimensioning Layer 49.

Layer 0 On/Off

Shows/hides the normally invisible Layer 0.

All attributes visible

Displays all objects of Layers 1-999, with layer 0 remaining invisible.

Via line attributes

Shows/hides all objects that comply with certain attribute settings in respect of colour, line type or layer, e.g. all blue elements in layer 7. Attributes marked with a check are regarded as current attributes. The element type in question determines which of the active attributes are taken into account with an element:

- In the case of lines, circles and conic sections, all attributes are taken into account; in the case of texts, the line type is not taken into account.
- Isolated points have attributes layer and colour as well as constant line type 0.
- In the case of symbols, only the layer number is taken into account. Graphic elements of symbol geometry lying in layer 0 are generally regarded as invisible even if layer 0 is activated.
- In the case of dimensionings and hatchings, only the layer number is taken into account.
- In the case of curves and symbol lines smoothed with spline methods, the attributes of the first element of the support polyline of the spline or the polyline which you want to be displayed as a symbol line are taken into account.

Load visualisation

The current visualisation settings are saved together with the drawing. If the drawing is re-loaded, the HiCAD standard settings are active. If you want to use the saved settings, activate this function.

Designation

Assigns designations to the various layers of a drawing.

Furthermore, the menu contains functions for displaying hidden 2-D edges and for showing/hiding 2-D main parts and sub-parts.

Please note:

- If the visibility of point numbers is activated, then the text size of the point designations can be set.

- The visualisation settings are also taken into account in the **Show all parts** and **Show active parts** functions as well as for subsequently drawn elements.

- The settings for the element type are also taken into account for printing and exports.

- The settings in the **Show /Hide, Via element type** menu can be saved with the drawing. Whether the information will be saved with the drawing depends on the settings in the Configuration Editor (ISDConfigEditor.exe), at **... > System settings > Load/Save**.

With the functions of the **Visualisation** toolbar you can switch the visibility of coordinate systems, isolated points, dimensions, HCM constraints etc. on and off with a single click. In certain situations - especially when working with large model drawings - this can make editing easier. For example, you can hide all dimensions of a model drawing, without having to call a function in the context menu or Ribbon first.
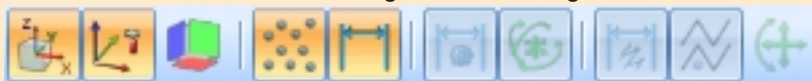
Using Layers

Every 2-D and 3-D element, every text, every hatching, every symbol and every dimenisoning in a drawing can be assigned to a fixed layer - also called level. This enables you to decompose the drawing into different information components, which you can then process and output individually or on top of one another. This can be useful for complex drawings, in particular, as all objects located on a layer can be hidden and shown again in one step at the press of a button.
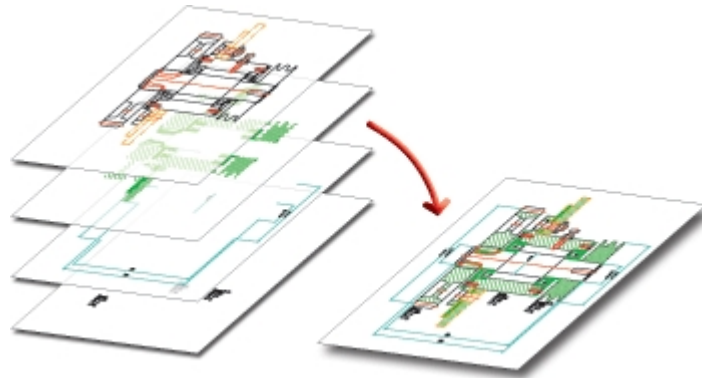
Every layer is addressed via a unique number between 0 and 999. The layer number is independent of the structure of the parts and the other attributes. This enables elements of the same part to belong to different layers. Conversely, elements with a particular layer number can belong to any parts.

The following layer numbers have a special meaning:

Layer	Module	Meaning
0	general	Elements of this layer are regarded as invisible and are not displayed, e.g. text on 2-D Steel Engineering Standard Part.
1	general	
2	P+ID	Attached p+ID symbols
2	Sheet Metal	2-D blank, bend line
2	Sheet Metal	2-D blank, texts on bend line
3	P+ID	Gauge symbols
3	P+ID	Signal connections
3	P+ID	Measuring point
3	Sheet Metal	2-D blank, texts on stamping tool
4	P+ID	Attached gauge symbols
4	Sheet Metal	3-D development
5	P+ID	KKS text box, frame lines
5	P+ID	KKS text box, texts
10	P+ID	Text for attached P+ID symbols
10	Sheet Metal	Flange

Layer	Module	Meaning
20	Sheet Metal	Bend zone
40	3-D	Parts on this layer are regarded as transparent.
49	2-D	Dimensioning
49	3-D	Dimensioning
0-999		for DXF import

Assign layer

- To assign **2-D lines** to a particular layer, choose **2-D Geometry > Draw > Param...** .

- To assign **3-D edges** to a particular layer, right-click the edge in the **Element snap** mode and choose one of the functions in the **Properties** sub-menu.

- To assign **3-Dparts** to a particular layer, right-click the part in the **Object snap** mode, choose **Properties > Layer** and select the layer number.

Layer designation

Drawing > Properties > Visual. ▾ > Layers, Designation

In addition to the layer number, you can assign individual names to the layers:

1. Select **Drawing > Properties > Visual.** ▾ **> Layers, Designation** . This will also show you which layers are visible (status: on).

2. In the **Name** column, enter the desired layer names.

3. Click **OK** to exit the window.

Show/Hide layers

Drawing > Properties > Visual. ▾ >Hide/Show

To hide layers, select **Drawing > Properties >Visual.** ▾ **> ...** then select the required function from the pull-down menu.

Dimensioning On/Off

Hides/shows the Dimensioning layer 49.

Layer 0 On/Off

Hides/shows the - normally invisible - Layer 0.

All attributes visible

All objects of layers 1-999 will be displayed, with Layer 0 remaining invisible.

Via line attributes

All objects that comply with certain attribute settings in respect of colour, line type or layer will be shown/hidden.

Presenting of 3-D Models

Images of 3-D models are frequently required for presentations at trade fairs, for product catalogues, on web-sites etc. HiCAD provides various options here:

- Shading and lighting; if required, textures and environments,

- Simulations,

- Creating VRML files, e.g. for the Internet, directly from HiCAD and

- Exporting the 3-D model as TGF file, and further processing through to animation with the **Gamma Ray** rendering program.
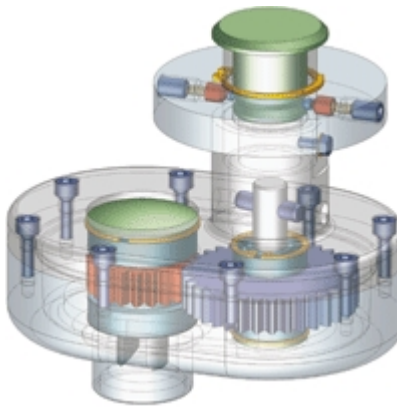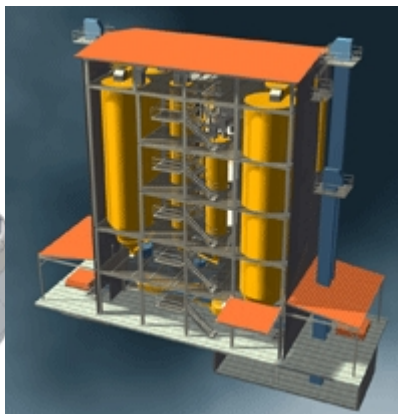
Shaded model   Rendered model

Shaded model with panorama and environment mirroring

Shading and Lighting

- Add floor and side walls to your 3-D model, if required. They can reflect the light. You can subsequently choose a screen display that prevents these objects from being visible.

- Assign suitable colours to your model. Use the HiCAD **Colour/Material Editor** to define your own colours and materials. Or assign individual textures to your model.

- Use layer 40. Objects located on this layer are transparent.

- Shade your drawing with or without edges.

- Use the settings for subsequent **Surface approximation** and for the **Mesh fineness** of freeform surfaces to make the shading appear even cleaner. You can find these functions in the context menu for drawings.

- Use the **Graphics window** function under ▨ ▾ **Settings > Colour settings**. You can use wallpaper or colour gradients as the drawing background here and also optimally illuminate the 3-D model temporarily with very few slider movements.

- Choose a **3-D view** and place the spatial centre in the middle of the screen. Even now, by shading your drawing, you will be able to determine whether the lighting settings and the selected view are relevant and meaningful.

- Use the key combination CTRL+C to save the drawing as a high-resolution BMP or JPG file.

- If required, you can also simulate environments by assigning panoramas to your model. The environments are then mirrored on the surface of the model.
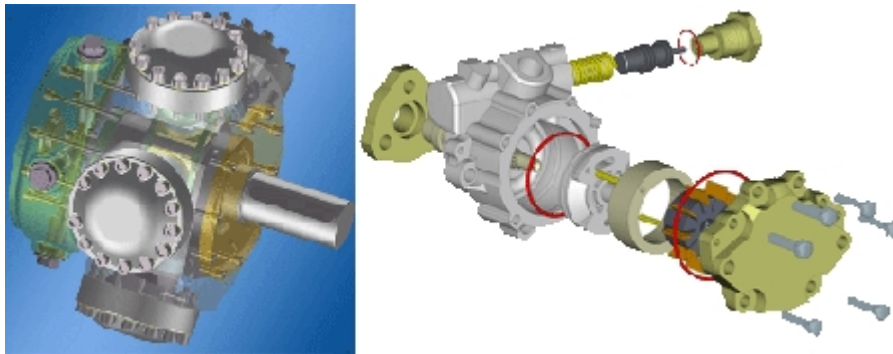
ⓘ Programs like *DirectConvert* and others can also convert the HiCAD drawing into other formats such as TIF.

Render and Animate

In addition to shading your 3-D models, you can also render and animate them. Various options are available to enable you to do this.

- **Saving motion simulations and physical simulations in AVI format**
  HiCAD allows you to use the 3-D model to check and assess a product's assembly, transport and move-ment processes. This enables you to identify and remove any errors at an early stage. You can also make optimum use of these simulations in product presentations as you can derive films in AVI format directly from them.

  Exploded layouts, too, can be saved as videos.

- 3-D models can be exported as 3D-PDF files. This interactive representation allows a viewing and eval-uation of 3-D models from all sides, even without HiCAD. The models can be moved, rotated, zoomed etc. The file formats U3D and JT are also supported.

  ⬇ Example of a 3D-PDF file
  Please note:
  If the linked PDF file will not be shown in your browser, save the PDF file and open it locally afterwards.

- **Processing with Gamma Ray**
  HiCAD models can be directly converted into TGF files via an interface. They can then be processed fur-ther with the rendering program **Gamma Ray**. The Gamma Ray allows a rendering of 3-D CAD models in real time, with real surface materials, mirroring, transparency, lighting and shadow effects. This enables you to derive images of photographic quality from your models, making the actual production of prototypes superfluous. Furthermore, you can create videos of your models, complete with tracking shots, animated movements and sound effects. **The Gamma Ray program is neither part of HiCAD, nor is it sold by the ISD Group**.

Internet Presentation

Export your 3-D model to VRML format. This enables it to be received directly by Internet users and viewed in various views.

The HiCAD VRML interface creates a WRL file, which can be viewed directly in Internet Explorer if a corresponding plug-in has been installed. Examples include the Cosmo-Player, Blaxxun or Cortona. If a player has been installed, it will be automatically started when the WRL file is opened with Internet Explorer.

There are various other plug-ins, in addition to these. The Internet will inform you which ones exist and which are available as freeware.

The plug-ins are not a HiCAD component and are not supplied by ISD.

Images for Catalogues, Manuals etc.

Not only shaded or rendered models are required for presentation purposes or similar. Documentation or other company-internal materials also frequently require 2-D or 3-D drawings as a vector graphic.

The various HiCAD interfaces such as DXF or EMF are available for this. DXF and EMF files can usually be further processed by any of the common graphics programs.

Furthermore, you can also use the functions under **HPGL Print** in the **Extras** menu to create files in HPGL format (file name extension .PLO). These files can be further processed, for example, in CorelDraw®.

You can also create PDF (Portable Document Format) files. You require a corresponding PDF creation program for this. These programs are not delivered with HiCAD.

Create Pixel Graphic

To use the 3-D model for presentations, catalogues, manuals etc., you frequently need to save the shaded model as a pixel graphic. HiCAD provides various options to enable you to do this:

Shortcut	Description
CTRL+C	**High-Resolution Pixel Graphic** You use this key combination to copy the contents of the drawing surface or an area to the clipboard. You can choose the resolution as required.
CTRL+ALT+W, CTRL+W	**Pixel Graphic in Screen Resolution** You use this key combination to copy any area of the graphics screen to a file or to the clipboard. The screen resolution is used.
PRINT	This copies the entire screen contents to the Windows clipboard.

 Using CTRL+C is recommended for high-resolution graphics.

High-resolution pixel graphic

CTRL+C

If you want to obtain high-resolution graphics, use the key combination CTRL+C. This enables you to copy the contents of the drawing surface or an area to the clipboard.
Proceed as follows:

1. Press CTRL+C.

2. In the **Copy to clipboard** window, activate the desired options.
   Format
   You can either copy the selected area as an **Enhanced Metafile (EMF)** or as a **Bitmap** to the clipboard.
   Size
   This setting specifies the maximum size of the file. The higher the value you choose for the width/height of the graphic, the cleaner the result will look and the better the resolution can be increased in image processing programs. However, the file size also increases!

3. Click **OK**.

4. Specify the screen area to be saved by dragging a rectangle.

5. Specify the background as follows:

   - If you want to use the current HiCAD background (Settings > Colour settings > Graphics window) , i.e. with a colour gradient or a wallpaper - click the **HiCAD background** button.
   - If you want to select a background colour from the HiCAD special colours (Colour Editor) , click the **Background colour** button.
   - If you want to a different background colour, select the desired colour from the System colours /Drawing colours list.

 Please note:

- The graphic is copied to the Windows clipboard. The following options are available for saving this file:

  - Activating an image processing program and creating a new file. You then insert the contents of the clipboard and save the image file.
  - Temporarily saving the clipboard file. To do this, you need to activate the Windows clipboard (Clipbrd.exe) and save the contents as a CLP file. You can re-open CLP files at any time via the clipboard

and hence use them in other programs.

■ Shaded models cannot be saved as an EMF file!

Pixel graphics in screen resolution

You use the key combination CTRL+ALT+W or CTRL+W to copy any area of the graphics screen as a file or to the clipboard, with the screen resolution being used.

1. Press CTRL+ALT+W or CTRL+W. Instead of the normal HiCAD cursor, a white cross is shown .

2. By typing once, first specify the top left corner of the desired area and then, similarly, the bottom right corner of the area.

3. In the **Bitmap** window, activate the desired options.

   - **Save to hard disk:** The selected area is saved as a BMP or JPG file.
   - **Copy to clipboard:** The selected area is copied to the clipboard and can then be inserted into other files.
   - **Process with "Paint Brush":** The selected area is loaded in **Microsoft Paint**.
   - **Send:** The selected area can be sent as an e-mail attachment in BMP format.
   - **Process with program:** You can edit the selected area with another program. To do this, enter the title of the program, under **Process with,** and the complete path and name of the corresponding EXE file, under **Program**.

4. Click **OK.**

Create Enhanced Metafile

You can save individual parts or entire drawings as EMF (Enhanced Meta Files). However, the parts must not be shaded.

To save a part as an **EMF** file, proceed as follows:

1. On the **Drawing** tab, select **Save/Print > SaveAs** ⏷ .

2. Select **Conversion** .

3. Select **Create Enhanced Metafile (EMF)** .

4. Identify the object that you want to save as an EMF file or use the right mouse button to activate the **Extended Selection** function and specify the object there.

5. Finally, define the storage location and the name of the file.

To save the drawing as an **EMF** file, use the key combination CTRL+C.

The HiCAD Viewer

The **HiCAD Viewer** is a tool enabling a quick and easy viewing and evaluation of HiCAD 2-D and 3-D drawings - even for non-HiCAD users.

Numerous functions, from dynamic rotation and zooming, various viewing and visualisation options to measuring functions for 2-D elements and 3-D distances are available to the user. Use the multiple windows technology to drag drawing elements, parts and assemblies from the Viewer into other applications, e.g.Office applications or HiCAD. This working technique enables you to arrange assemblies in HiCAD conveniently with a few mouse-clicks. In addition, you can display other file formats such as TIFF, JPG, BMP, PNG, GIF or EMF with the Viewer.

You **start** the HiCAD Viewer as follows:

- click "Start" on the Windows taskbar and select the **Programs > ISD ...**, folder, then select the Viewer symbol

  or

- click the Viewer icon on the Desktop

  or

- open the HiCADVIEWER2024 file (e.g. in the HiCAD EXE directory)

Frequently Asked Questions

Experience has shown that some questions arise particularly frequently:

- What are the functions of the mouse buttons?
- How do I select a point option?
- Which point options do I select if I require a reference point?
- What types of re-use are available?
- How do I draw an uninterrupted contour in a 3-D sketch?
- How do I move objects by a particular value, using a displacement vector?
- How can I modify the grids in sketching functions?
- How do I convert a HiCAD drawing into a graphic?
- How do I load the automatic "10-Minute Save" option?

> Further questions and answers can be found here.

What are the functions of the mouse buttons?

Left mouse button (LMB)
Select function / confirm entry (e.g. a radius)

Middle mouse button (LMB) / Mouse wheel
Exit function / Cancel

Right mouse button (RMB)
Context menu (you can right-click on an icon, a part, the drawing area, a dimensioning, a text and numerous other objects).

How do I select a point option?

When HiCAD prompts you to specify a point, you have the following options to do this:

- All point options represented by one letter (R, A, D, W, P, N) can be selected via the corresponding keyboard button.
- Press the RETURN key to activate the **Point options** menu.
- A (quick) double left-click also activates the **Point options** menu.

Which point options do I select if I require a reference point?

Select **Relative-Return** (REL RET). Press the "R" key for the point option "Relative", then press the RETURN key.

Firstly, select the reference point and then enter the coordinate values separated by spaces, e.g.
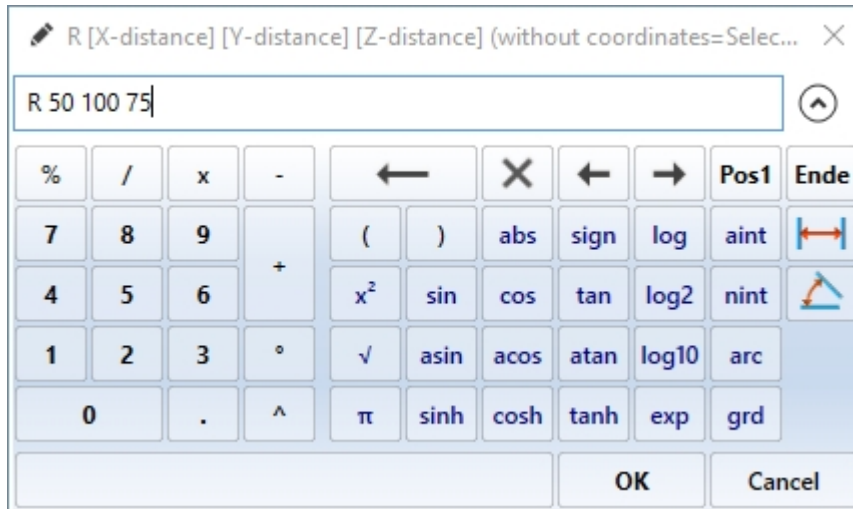
What types of re-use are available?

- the **HiCAD Clipboard**
- **Insert Part > Insert part, via Explorer** or **...via DB article master** or **...via DB document master**
- **Insert Part > Insert main part, via Standard Part catalogue**
- **User Library / New part library**

How do I draw an uninterrupted contour in a 3-D sketch?

1. **Sketch** tab **> Others > Sort GE in active sketch**

2. **Information** tab **> 3-D, Further > Information 3-D-Sketch 1**
   (Check whether sketch contains self-intersections)

3. **Information** tab **> 3-D, Further > Information 3-D Sketch**
   (Check, whether the sketch is closed.)

4. After any further changes, select **Sort GE in active sketch** again.

How do I move objects by a particular value, using a displacement vector?

1. Specify the start point of the vector by selecting an arbitrary point in the drawing area.
2. Specify the end point with the point option **Relative (R)**.

How can I modify the grids in sketching functions?

The sketch grid can be changed by entering values directly in the respective dialogue window. In addition, the grid can also be changed during sketching via the keyboard:

- **Minus (-)key**: Refine grid,
- **Plus (+) key**: Coarsen grid,

How do I convert a HiCAD drawing into a graphic?

- **CTRL+C** > Select format and size > Select detail > Select background colour
  The graphic is copied to the Windows clipboard
- **CTRL+W** > Select detail
  Depending on the selected option, the graphic is copied to a file or to the clipboard.
- **Print** key
  The current screen content is copied to the clipboard.

For high-definition graphics the shortcut CTRL+C should be used.

How do I load the automatic "10-Minute Save" option?

To use one of the automatic 10-Minute Save" options HiCAD_NN, load the file HiCAD_NN.SZN in the HiCAD TEMP directory and save this file, with different name, as SZA file.

1. **Drawing** tab **> New/Open > Load drawing**
2. Select the HiCAD subdirectory TEMP.
3. Switch file type to extension SZN.
4. Select the file HICAD_N1. N is the number of the drawing in the **Switch drawing** tab of the ICN.

*The **Switch drawing** tab of the ICN*

Legal notes