Creating Technical Illustrations from SolidWorks® Data

Learn useful tips & tricks on creating technical illustrations using SolidWorks data, from a long-time user of Arbortext® IsoDraw.

Overview

Demand for Illustration Solutions in the Technical Documentation Process

Technical illustrations are essential to creating user-friendly, understandable and high-quality technical documentation. However, the illustration process can be costly and time-consuming. Very often, the launch of a new product is delayed because the documentation is not yet ready. No wonder there is a high demand for speeding up documentation processes: One solution to this problem is the reuse of 3D CAD data for documentation purposes.

By maintaining a direct link to the original 3D model, and by automatically updating illustrations and animations as designs change, PTC's Arbortext IsoDraw is enabling companies to develop documentation much faster and easier, while reducing risk and shortening time-to-market.

Arbortext IsoDraw CADprocess – 'the workbench' for all technical illustration and animation needs – has become a must-have complement, not only to PTC's Pro/ENGINEER® CAD users, but to designers using nearly every CAD toolset. This powerful application reduces the CAD designer's workload by providing illustrators with an easy-to-use tool for processing the 3D model and creating high-quality 2D and 3D technical illustrations and animations directly from CAD models.

The case study below explains how one company – FELDER KG in Austria – is using Arbortext IsoDraw with SolidWorks 3D CAD software to dramatically speed the technical illustration process, while reducing documentation file size by a 10x factor. If you're using any of the popular 3D CAD tools on the market, you, too, can see the same time and cost-savings using Arbortext IsoDraw in your technical illustration process.

Technical Illustration at FELDER KG, Austria

Ever since Austrian Johann Felder unveiled his first planing machine in 1949, ever-increasing demand has driven the continuous development of new FELDER machines. And with the construction of combined woodworking machines, the family business FELDER eventually became known all over the world. Today, FELDER KG is proud of its longstanding engineering tradition, although nowadays it also uses the very latest production methods. Continuous quality control and ongoing optimization ensure efficient products and safe application of those products.

For precisely this reason, FELDER takes great care in creating comprehensive, user-friendly product documentation. The documentation processes at FELDER have undergone a number of fundamental development stages over the last few years. Until recently, isometric views for operating instructions were drawn, scanned and reworked by hand.

But in 1994, with the acquisition of the Arbortext IsoDraw illustration software (then in Version 3), the company converted to computer-aided drawing. Since then, while updating Arbortext IsoDraw to the most current versions, the quality of the illustrations has increased steadily, from "for recognition purposes only" to true-to-scale isometric explosion drawings. Today, all spare part drawings, isometric (dimetric) views of the machines for operating instructions, assembly drawings and instructions, logos, stickers and films for operating panels are created in-house using Arbortext IsoDraw, a practice that is saving FELDER substantial time, effort and money, while dramatically improving the quality of its technical publications.

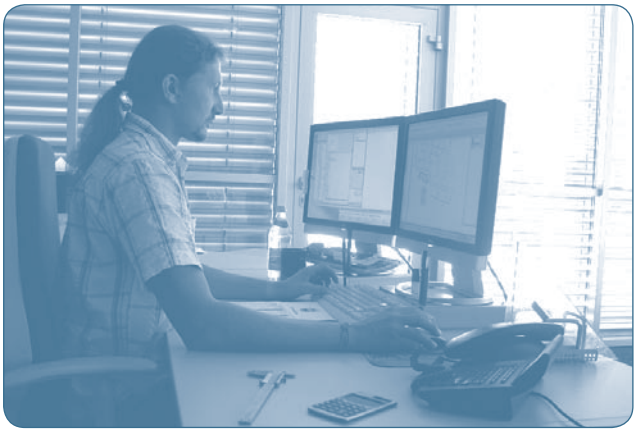
In the long term, all photos in the operating instructions will be replaced by line-art graphics, a process that has already happened to a large extent. The increased use of illustrations in the instructions eliminates the need for larger volumes of text, and therefore saves on translation and printing costs. This also has crucial advantages for the Internet in terms of presentability and transportability.

"The acquisition of Arbortext IsoDraw has allowed us to make substantial savings. The time saved has enabled us to invest in creating additional illustrations, and thereby improve the quality of all our documentation," says Günter Hammer, Head of Technical Documentation at FELDER.

As part of the ongoing further development, the software at FELDER has also been continuously adapted to changes in the market. In 2003, the existing license was upgraded to Arbortext IsoDraw CADprocess. This additional step made it possible to use 3D design data as a basis for the technical illustrations–and to harness new potential for optimization.

Working with SolidWorks Data

The development department at FELDER KG uses SolidWorks (current version 2007), and provides the basis for importing data with Arbortext IsoDraw CADprocess using the IGES interface. The key factor now is that the illustrator can work with the 3D data without having to access the CAD system and without the help of the designer. The illustrator also has complete artistic freedom, such that he can apply Technical



Günter Hammer, Head of Technical Documentation at FELDER KG, working on a dual screen system

Illustration style tools and techniques to the 3D data. This was not easy to do in 3D CAD, where the emphasis was on true-to-scale, design-accurate representation.

The process at FELDER now looks like this:

- The design department supplies IGES files. The aim is to import complete machines as assembly drawings. File sizes over 300 MB make considerable demands on hardware and software, but they also offer the advantage of being able to work more flexibly.
- For the most part, these assembly drawings have to be augmented, since, from a design perspective, it is not always possible to save all options, such as accessories, in one file.
- Once the machine has been imported into Arbortext IsoDraw, the multiple IGES files are combined into a complete assembly drawing and saved as a 3D Arbortext IsoDraw file. This reduces the volume of data to approximately 40% of the original IGES file.
- This assembly drawing is then divided into individual assemblies. If the individual assemblies are assigned corresponding layers, it is possible to reduce the processing time for creating the 2D drawing by hiding assemblies that are not required or not visible.
- Both dimensioned dimetric overall views (e.g., for planning the space requirement at customers' premises) and explosion drawings of individual assemblies can be created using only this one file.
- The parts on the explosion drawing are automatically allotted position numbers and object identifiers using a macro. The finished drawings and the spare parts lists exported from them (= object lists) are then entered as a chapter in the operating instructions for the relevant machine using Adobe InDesign.
- The documentation for each machine is printed in-house, bound and added to the relevant machine.

This method allows modifications and additions (particularly for spare parts) to be supplied, newly printed, to customers in minutes. Purely theory just a few years ago, this way of working has now become a reality at FELDER thanks to Arbortext IsoDraw CADprocess.

Reducing Drawing Time From Days–to Minutes

When converting the IGES file into a technical illustration, hidden lines are deleted fully automatically ("Hidden Line Removal") and the correct line thicknesses created. This time-savings is huge. For example, for a complicated cast part, it used to take several days to draw an isometric view. Arbortext IsoDraw CADprocess reduces that time to just a few minutes. The advantages are considerable, particularly if you need another view or even a cross-section of this type of part.

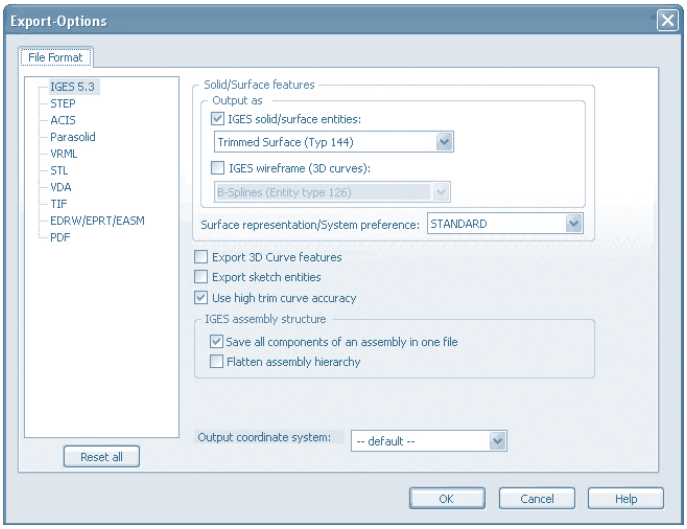
"The Arbortext IsoDraw macro language gave us a further means to increase our efficiency," explains Günter Hammer. "Being able to run repetitive processes automatically using macros considerably facilitates working with Arbortext IsoDraw. From the simplest tools–changing preferences such as changing password, tooltip on/off, grid on/off, select fills on/off, etc.–right through to complex processes, such as deleting all pens not used for a drawing, the Arbortext IsoDraw macro language makes workflows much more efficient," says Hammer.

The Future: More Workstations with Arbortext IsoDraw

"It's possible we may equip more workstations with Arbortext IsoDraw in future. However, at the moment we are managing very well with our existing setup, thanks in no small part to the efficiency and high performance of Arbortext IsoDraw CADprocess," says Hammer. "What is certain, however, is that we will maintain our service contract with PTC, so that we can keep our installation up to date in the future. After all, every software update so far, however small, has meant huge improvements to our workflows!"

Recommended Export Settings for IGES Export

FELDER currently uses SolidWorks Version 2007, and they use the following settings when exporting to IGES:



Your options page may differ, depending on your version of SolidWorks

In order to keep the file size as small as possible, the 3D Curve features are not exported. These are not needed for the technical illustration.

Using Illustrations Instead of Photos

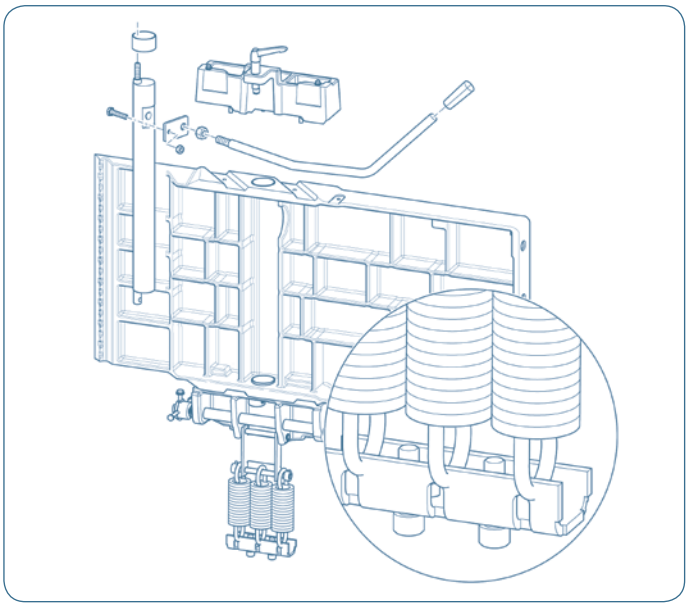
Photos are commonly used for technical documentation in operating manuals. However, they are less suitable for complicated descriptions, such as assembly or repair instructions. In such documents, it is especially important, for reasons of liability, that even the smallest details can be recognized in an illustration. With photos, this is possible only to a limited extent. Due to the many gradations of color, the eye has to work harder to recognize details. Viewing this type of depiction is more strenuous and prone to errors in interpretation. Technical illustrations, on the other hand, offer clear advantages due to the diverse presentation possibilities and techniques.

- Reduction to the essential: only the information that is important for the viewer is depicted, and superfluous information can be omitted.
- Numerous possibilities for emphasis: enlarged depiction of important elements (overdrawing) for better portrayal.
- Insertion of detail magnifiers for separate depiction of details.
- Use of phantom depictions to allow the viewer to "look inside" a device.
- Clarification through the use of lines with varying thicknesses.
- Exploded views for replacement parts catalogs or assembly instructions enable the visualization of installation positions and sequences.

An essential advantage of the use of vector graphics instead of photos is the smaller file size, according to the FELDER Company, which offers documentation for download from the Internet.

An 86-page operating manual with photos used to be about 35 MB in size. A comparable manual with vector-based illustrations has a file size of only about 3 MB!

A further advantage of illustrations, as compared with photos, is that they can easily be "retouched". If illustrations are always depicted in the same viewing angle (e.g. isometric or dimetric), variants of the same machine (e.g. other models or options, etc.) can be generated quite easily. Instead of creating all the illustrations again, only an "update" is necessary, e.g. by exchanging the model designation or supplementing and erasing handwheels.



Example of an Arbortext IsoDraw illustration with a magnifier detail.

How to Create a Magnifier in 10 Seconds with Arbortext IsoDraw

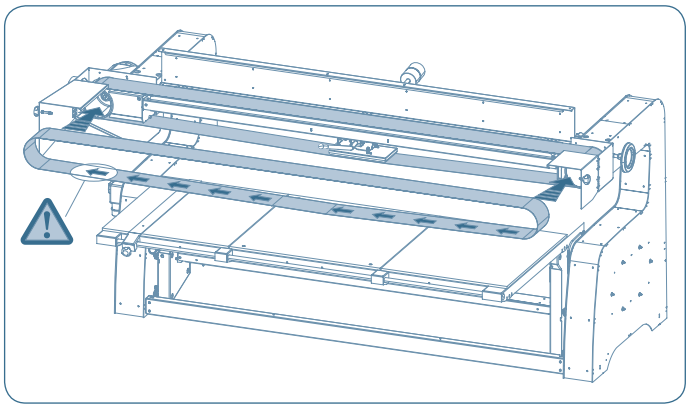
At FELDER KG in Hall (Tyrol), documentation specialist Günter Hammer has been using Arbortext IsoDraw intensively for many years. He compiled this tip for the fast creation of a detail magnifier. The detail magnifier shows an enlarged duplicate of a cutout. In addition, the magnifier is created on a separate layer.

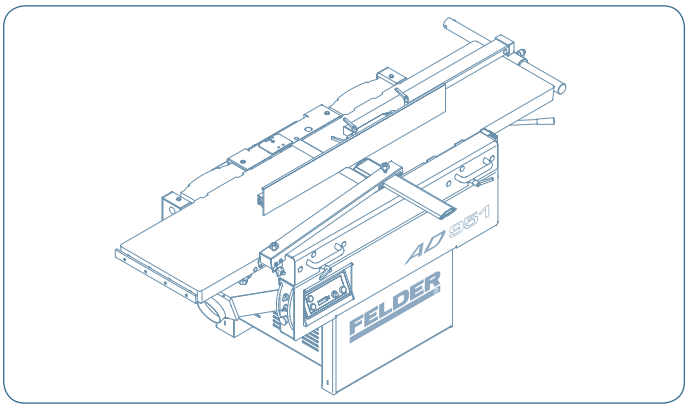
- Create a new layer. Rename the layer as "Magnifier", for example, and set this layer as the active layer. Activate the "Plane view" grid, since the magnifier should be drawn without perspective.
- To isolate the desired cutout, now select the Plus cursor. Hold down the Alt key and start marking the desired area with the lasso.
- As soon as the lasso appears, switch from the Alt key to the Ctrl key. Keep the Ctrl and the mouse button pressed and mark the desired area.
- Use the scaling tool (shortcut "s"), scale the selection, e.g. to 400 %. After clicking the "Copy" button, an enlarged copy of your selection is available. Arbortext IsoDraw also places the copy on the "Magnifier" layer, which is still active.
- Now you can hide all layers; the "Magnifier" layer remains active.
- Now draw a circle around the desired area of your elements.
- Select all elements of the "Magnifier" layer and then deselect the circle that you drew before.
- Now mask the selected elements with the circle using the command "Element/Mask"
- Fill the circle with the color "white" in order to hide the other elements. The use of a shadow for the magnifier makes this possible.
- Now show all layers again.

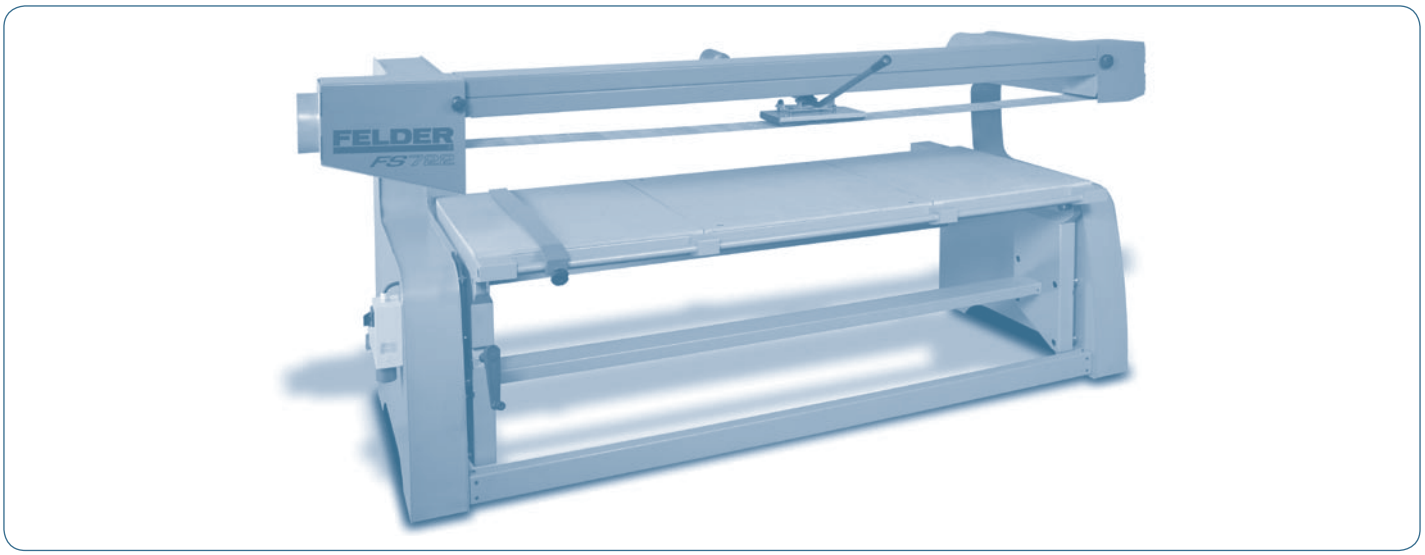
Overview of Arbortext IsoDraw Capabilities and Benefits

- Create high-quality 2D and 3D technical illustrations directly from CAD, and eliminate the need to create illustrations from scratch
- Quickly create either 2D, 3D, or a mix of 2D/3D animation with a simple user interface; Import and leverage existing 2D and 3D data animations to create high-quality animations
- Manipulate 3D data with a highly intuitive user interface: explode graphics along any axes, cutaways, rotations, reflections, copying, scaling, etc.
- Newly trained illustrators can be fully productive within just a few days
- Empower illustrators to manipulate 3D CAD data for the purpose of the illustration rather than relying on the CAD designer for all 3D data manipulation
- Delete hidden lines, set line thickness as required, and optimize the elements of the CAD model to both reduce file size (required for electronic delivery) and make elements more compact and easier to edit; reduce further editing and cleanup of illustrations; automate hotspot creation for electronic delivery
- Enables concurrent development of technical publications and engineering designs; link technical illustrations to engineering designs and automatically re-create illustrations when CAD files change (through direct integration with Pro/ENGINEER® or link to 3rd-party CAD tools through IGES, DWG, VRML, STEP, VDA, SAT, OBJ, and Parasolid)
- Automatically prepares illustrations for publishing in multiple formats and for delivery in both print and electronic media
- Automatically updates illustrations and animations as designs change
- Contains the full set of Arbortext IsoDraw Foundation capabilities for creating and editing high-quality technical illustrations, including specialized tools for drawing in perspective, automatic thick/thin line technique application, standard parts library, and high-quality filters for all major graphic formats, among others

Showcase: Technical Illustrations Created From SolidWorks Data







Credits

FELDER KG Maschinenbau
Heiligkreuzerfeld 18
A-6060 Hall i.T.
Tel. +43 5223 5850-0
Fax +43 5223 5850-66300

FELDER-GROUP USA
2 Lukens Drive, Suite 300
DE 19720 NEW CASTLE
Toll free 866-792-5288
www.felderusa.com