Technical Illustrations: Bridging the Gap Between 3D CAD and Product Documentation

The reuse of engineering data for technical documentation offers a tremendous productivity boost to manufacturers. Learn what companies need to consider if they want to restructure their processes and bring 3D CAD-based illustrations directly into their customer documentation.

The age-old adage "A picture is worth a thousand words" appears in just about every article on the subject of technical Illustration. And rightly so; the value of illustrations in technical documentation cannot be overestimated. However, for companies having to create technical manuals for their products, the creation of technical illustrations, up to now, has very often been connected to a series of business decisions that can seem a bit daunting.

Yes, technical illustration is becoming very important, but managers still have a great number of questions surrounding the process of bringing 3D illustrations into their technical manuals, including: how many illustrations do I need in my manuals? Isn't it a time-consuming and expensive process to create illustrations? Can I really replace descriptions of processes with illustrations? Can this method be used to save translation costs? What tools do I need for creating graphics?

This article sheds light on the most important questions that professionals are now asking about the illustration process, and discusses an effective approach that is working today.
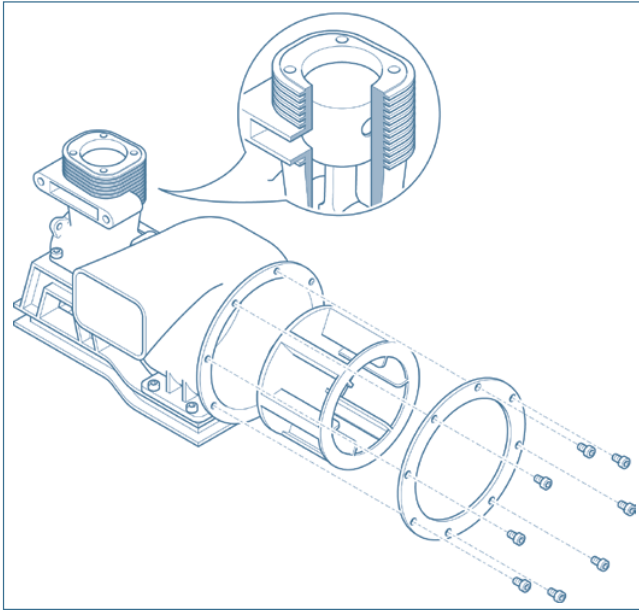
Why use technical illustrations?

Technical illustration offers numerous stylistic characteristics and forms of presentation that make it possible to illustrate a multitude of contexts, making them more easily understandable by the viewer. By focusing on just the essential elements of a graphic, the observer is directed to those characteristics that are most important for comprehension. This ensures, for instance, that a customer can assemble a piece of furniture quickly and without mistakes, after reading the assembly instructions, or that Customer Service personnel can easily identify and order the correct part after viewing the replacement parts catalog. Clearly, illustrations make documentation more user-friendly, and thus increase the end user's satisfaction with the product.
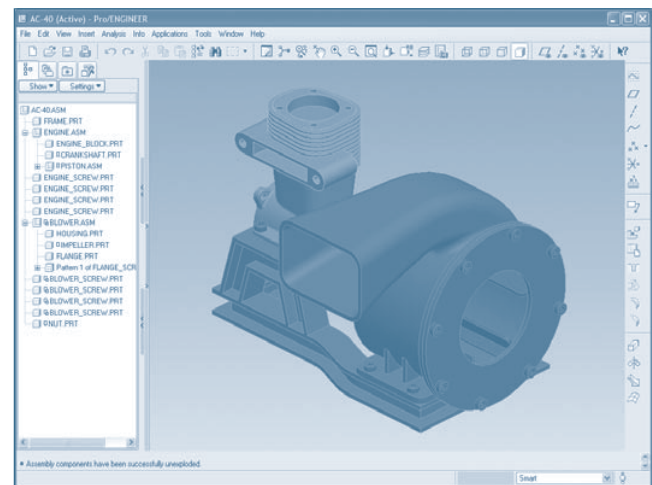
A 3D CAD model created in PTC's Pro/ENGINEER software.

This clarity of meaning is an especially important aspect for companies that manufacture goods for export. Many of these companies translate their documentation into 10 or more languages – creating a cost factor that should not be underestimated. Since mistakes in translation are inevitable, the larger the quantity of text, the greater the risk of error and associated cost.

Therefore, a balanced combination of text and illustrations is recommended. In some cases, such as short assembly instructions, it is now possible to work entirely with illustrations alone. One company from the agricultural sector recently reported that all assembly instructions for their seeding equipment are being converted to illustrations-only, resulting in a 90% reduction in translation costs. Only the safety information is still translated into all relevant languages. This approach is increasingly being considered by global companies due to the drastic rise in translation costs over the past few years.

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The above illustration, based on the 3D CAD model, was finished up with Arbortext IsoDraw and includes stylistic features (e.g., the magnifier) that are typical of technical illustrations.

Illustration as a cost factor

Many documentation professionals might ask: Is increasing the number of illustrations, in order to lower translation costs, merely the same as replacing one expensive process with another? Actually, it's not. And here's why.

If you have to draw an illustration from scratch, that process requires a certain amount of time, depending on the complexity of the illustration. Here, we are not talking about two or three new illustrations each week, but much larger quantities. When a manufacturer introduces a machine that may consist of 2000 individual parts or more, that means piecework for the illustrators–not to mention the many revisions of existing illustrations. It is no wonder, then, that the introduction of a new product is often delayed because the documentation is not ready on time.

The reuse of 3D CAD data for technical documentation purposes offers a solution to these problems, and will be discussed in more detail in the following paragraphs.

The solution: 3D CAD data?

Many companies today have access to 3D data from design systems, such as Pro/ENGINEER®, CATIA®, Unigraphics®, SolidWorks®, etc, that can be used for illustrations. Use of this data certainly presents the greatest savings potential in the creation of illustrations. In practice, however, 3D data is hardly ever used optimally, due to the high expenditure for the design department.

Today, the documentation department seldom has direct access to the CAD system. Therefore, an employee from the design department is responsible for preparation of the data, that is, finding the required component or assembly, then rotating it to the required position, exploding it, deleting hidden lines, etc. Enormous coordination is required between both the design and documentation departments. After all, the information to be conveyed by the illustration has a very specific purpose. This information first has to be communicated to the colleague in the design department, usually in the form of drafts. This collaboration generally causes extra work: if the illustrator needs the same part again in a different position or in an exploded view, the designer must begin the process all over again.

It should also be noted that the conversion of 3D data to a 2D illustration is only the first step. The illustration then has to be revised in accordance with the requirements of the documentation (line widths, colors, deletion of details, preparation for electronic delivery, etc.). The CAD system may offer different line weight options, but not in the style required in Technical Illustration ("thick-thin technique"), which forces subsequent editing in a graphics program. Due to increasing product piracy, many companies today place high value on the simplification of technical product illustrations, and accept the resulting costs. Such revisions entail several hours of work for each illustration. Also, correctly illustrating threaded parts, or drawing tools and hands that must be shown in the illustration, cannot be done with the CAD system.

In short, 3D CAD systems may offer extensive capabilities for preparing data for documentation, but the work required of the designer is enormous. A solution should be strived for that reduces the load on the design department and enables the documentation department to adapt the models without the need for an additional CAD workplace. And, this adaptation should be possible without the illustrator having extensive knowledge of CAD systems. It is also important to reduce the subsequent revision work, and be able to prepare the illustration for electronic delivery at little additional expense.

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How to deal with changes

In an ideal world, the documentation department should start its work at a very early stage of product development. This concurrent design/documentation increases the probability that the documentation will be ready for delivery upon completion of the product. However, because the CAD model is typically modified several times during the development phase, any illustrations based on the model also have to be updated accordingly. Yet, by linking the illustration to the source data, changes to the product's illustrations can be made automatically, which reduces the time and expense required for changes immensely, while shortening the time-to-market drastically.

A state-of-the-art solution

The above scenario is by no means a futuristic vision, but a reality occurring for many forward-thinking companies today. Software programs, such as Arbortext® IsoDraw CADprocess, enable direct adaptation of 3D CAD models for Technical Documentation. An important economical aspect for companies in this respect is the central implementation of the entire process, from 3D CAD to delivery of the illustrations on a wide variety of media. Instead of a separate tool for preparing and converting the CAD data for adapting the illustration and for preparing the electronic delivery (e.g., by adding "hotspots" to the illustration), a single tool is used for a continuous process chain that includes all of these steps.

Moreover, these state-of-the-art tools are so advanced that you can use the 3D models to create 2D and 3D animations, which can also be automatically updated by linking to the original data. For small and mid-sized companies especially, the need for an animated installation manual is no longer utopian; it can be achieved by the documentation department at no additional financial cost. As a special feature, illustrators can even include 2D and 3D animations in the same application.

In closing, the reuse of 3D CAD data for technical documentation purposes offers a tremendous savings potential for companies–if they use the right tools and have a process established to support the same. If you want to dive deeper into the topic, download an informative Flash demo at **www.ptc.com/go/isodraw_flash**, which describes the process in more detail.

For more information about how IsoDraw can help your company create and deliver high-quality product information, please visit our website at:

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