Communicator

The Institute of Scientific and Technical Communicators

Summer 2021

Emerging trends

- Make predictions: the Globots are coming
- Create social and collaborative learning
- Read about trends in English
- Learn about the latest release: MadCap Flare 2021

Transforming traditional processes

Antonina Mitrofanova, Cortona3D, describes how RapidAuthor transforms the traditional process of technical documentation creation.

Engineer vs Software Developer

We have taken a real process of creating 3D technical documentation in an aircraft manufacturing company where the Cortona3D solution was implemented to analyse how work is really being done and how we think it should be done. The reality versus our expectations.

Our aim is not to convince you that there is a right or wrong process, but to show you how technical documentation can be created differently, in a modern way, by changing the design approach.

Einstein said, *"The significant problems we face cannot be solved at the same level of thinking we were at when we created them".* This also applies to creating technical documentation. Let's try to change the way of thinking and examine the problem starting with how 3D modelling is commonly used in industrial design.

Often when it comes to 3D technical content, the first thought that crosses people's minds is the visual and intuitive aspect. At Cortona3D, we also focus on how to optimise the cost of technical documentation production. The main idea is to reuse existing 3D models to generate 2D and 3D technical documentation instead of creating it from scratch. This change to the traditional work processes can change the production of technical documentation by making it better, faster, and cheaper.

Typically, the development of technical documentation, especially in large manufacturing companies, is a fully formed and long-held process that is changing more slowly than the production itself. However, manufacturers try to improve it and incorporate new tools into existing processes. An engineer at one aviation company told us what the real process of production of 3D content with Cortona3D RapidAuthor software looks like.

RapidAuthor is a powerful cost-effective authoring suite giving organisations the flexibility to produce all support documentation such as interactive parts catalogues, maintenance manuals, training materials, and work instructions based on existing CAD, PDM, and ERP data. The solution allows technical communicators to work with 3D scenes, text, 2D graphics in one environment and update them rapidly when engineering data changes. Created content can be published in different formats like HTML/HTML5 and PDF and viewed on any browser on various desktop and mobile devices.

Start of work

Engineer: My work starts with a list of data modules that need to be produced in 3D. I receive a textual description of the procedure including 2D illustrations. This content is created by other technical communicators who interact with designers. I review the document and if something is not clear I contact its author to understand the details. I'm responsible for the creation of 3D scenes only.

Cortona3D: We have here a situation when 3D content is created additionally, in parallel with the production of traditional 2D documentation. But if we use RapidAuthor not only to generate 3D scenes but for the production of 2D documentation as well, we will be able to reduce the work related to text and 2D illustrations preparation and save time and resources.

RapidAuthor allows users to automatically generate text that complies with ASD-STE100 (Simplified Technical English) from a 3D scene. The resulting text will require modification, but the structure of the document will be generated. Besides textual description of procedural steps is automatically synchronised with 3D animation. RapidAuthor allows authors to create documentation complied with international technical authoring standards, such as S1000D, ATA, and DITA.

Another time- and resource-saving feature of RapidAuthor is the automatic generation of 2D illustrations from 3D content. 2D graphics are updated automatically when 3D data changes.

Gathering and preparing 3D data

Engineer: In RapidAuthor, I create a special 3D data module or take an existing one and import engineering data from CAD and PLM systems to it. There are thousands of parts involved in aircraft maintenance procedures, so to gather all required data, you have to know how and where data is stored in the PLM system, how to use search, how to import objects properly, etc.

Many third-party tools are involved in the aircraft maintenance procedure but do not belong to the aircraft's bill of materials (BOM). They include jacks, stepladders, trolleys, cranes, hoists, and other auxiliary equipment. 3D models of such purchased products are additionally provided by their suppliers, but if not, I create them based on 2D drawings and then import them into my data module.

Gathering and preparing data takes a lot of time. It's one of the most time-consuming stages in the process.

Cortona3D: Unfortunately, not all industrial manufacturers have full digital product models in production. Detailed 3D models of purchased products which are manufactured by other companies, are often not available as well because at the moment of their purchase the buyer does not consider that these models will be necessary for the creation of the service documentation.

When referring more specifically to the production of technical documentation, the absence or fragmentation of 3D data complicates the development in this area. Going deeper into the subject, successful implementation of many projects depends on the accuracy and integrity of data that all involved parties — manufacturers, contractors, service providers, design bureaus, operators, service teams — share with each other.

Manufacturers who use Cortona3D software need original CAD data. Most commonly, new products launching on the market have digital models, so the Cortona3D solution can be easily implemented in these instances.

Preparing reference structure

Engineer: Reference structure is the secondary information

and is designed to show the access and context of the primary object. The primary object is the one on which the operation is carried out. If it's a chassis installation or removal, the primary object will be the chassis and it has to be shown in detail in 3D. The section of the aircraft where the landing gear is retracted is the 'surrounding' information and can look less detailed. Another sample is the aircraft in its entirety that helps us to show where any unit is located before it can be removed. If I use a detailed 3D model of the aircraft, it'll take 10-20 minutes to load the object. That's not good, so I prepare a reference structure so that I can work more efficiently. It can take a few days to create such objects, but I can reuse them many times in different procedures.

Cortona3D: We support this approach and recommend using reference structures for 3D scenes. To create a reference structure, an existing 3D model can be optimised with RapidAuthor or created with other modelling tools and then imported into RapidAuthor.

Creating 3D animated procedures

Engineer: When all required 3D objects are prepared, I can start to create 3D procedures. During the preparation phase I briefly go through the procedure. Now I study it thoroughly, step by step, to understand how every assembly works.

For example, if a jack is involved in a procedure, I contact the department that deals with ground support equipment to find out how it should be used. One of the reasons 3D scenes are created is that nuances are not explained in the text and on 2D illustrations but they can be visualised in 3D. As the 3D creator, I have a lot of responsibility because I add information that was not originally available in the procedure.

Cortona3D: Interactive 3D technical content allows complex procedures to be clearly explained. Users can rotate, zoom, explode, and drill down into 3D models, but this is not the key value. The real value is in integration. Cortona3D software can be integrated with CAD and PLM systems, bridging engineering data and after-sales support. Cortona3D integrated solution allows companies to keep technical documentation accurate and synchronised with up-to-date engineering data, despite frequent design changes, shortened production cycles, or production of a wide range of product modifications.

Engineer: The big advantage of 3D documentation is that during the production of 3D scenes I find errors in maintenance and repair documents, sometimes 3-4 per procedure. I inform the author of the document about the errors, they review the document, and, if the error is confirmed, they correct it. Until the error is corrected, I work on the next steps of the procedure and return to the missed step after correction.

Sometimes I find out that some operations cannot be performed, although in the 2D illustration everything 'works' perfectly. For example, it's written: 'remove the nut', but when I start to animate it in 3D I see that the nut is covered by other items and the torque wrench just won't fit there physically. This is of course not the most common mistake. More often, it turns out that a described operation cannot be performed with the recommended equipment. Such errors can be identified during the production of 3D animations or already on-site during preproduction tests.

Cortona3D: We can avoid errors in documentation and inconsistencies between the text and actual procedures if we produce text and 2D illustrations based on validated CAD data. How it works: we gather and import required engineering data into RapidAuthor and create a 3D scene step-by-step (for example, assemblies, explosions, views that the user will see). The resulting animation confirms that all operations can be performed on the real equipment and we can start to automatically generate text complied with ASD-STE100 and 2D illustrations based on 3D views. Instead of two parallel processes of production of 2D and 3D technical documentation, we have one process that helps us to reduce errors and save time and costs by reuse of existing engineering assets.

Exchange of information between the staff

Engineer: If 3D documentation helps technicians in the field to make fewer mistakes of the type that may result in consequential financial or other losses, it's regarded as a big advantage. When I'm consulted extensively and animate procedures correctly, I do a good job. We can make mistakes in any documentation, including 3D. It's very important in my work to interact with the authors who prepare a textual technical description of the procedure to create an accurate 3D animation and not misinterpret some steps. And the authors

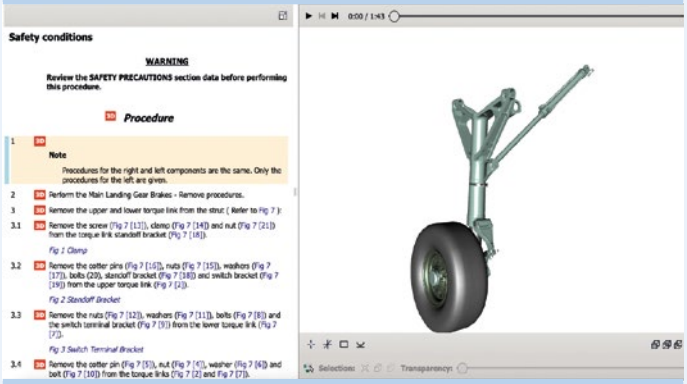

Figure 1. Landing gear

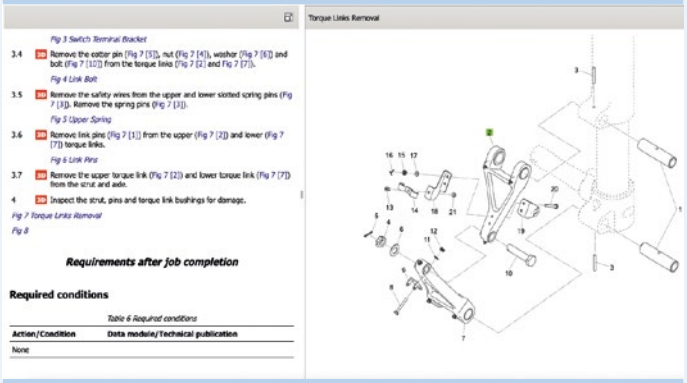

Figure 2. Torque links

in their turn communicate with designers, study drawings, take part in preproduction test, visit the construction site, etc.

In general, authors who create traditional documentation do not have to care much about 3D. They have their tasks and workflows. Despite it, everyone understands the importance of communication. The authors are always ready to help, explain, and advise. If we don't communicate with each other, we don't get good results, no matter whether the product is simple or complex.

Cortona3D: This is the traditional work process that manufacturers (and technical publication teams) are accustomed to when producing technical documentation. Separate teams create textual technical descriptions and 3D scenes describing the same procedures and both teams lose time while exchanging information.

RapidAuthor is a positive change to the traditional workflow: one person can create technical documentation, no matter if it's 2D or 3D, based on existing CAD data. Instead of two parallel work processes — one, where all users can work in one environment to create text, animations, or 2D graphics.

It reminds us of the situation, 20-30 years ago when design bureaus started to widely use computer-aided design (CAD) software instead of drawing boards. The world's first CAD software was developed in the 1950s. Its migration from research to commercial use started in the 1970s followed by a long period of expanding potential markets. The real revolution happened in the 2000s. It took 50 years to become the 'sustaining' technology! During those times, it appeared to be impossible that one person could effectively design using CAD software as if it was done using drawing boards. There were attempts to combine the staff with different skills. Two engineers were sitting together: one designing with a drawing board and another one reproducing created drawings with a CAD tool. How did the story end? Designers everywhere in the world now use CAD tools. It has become common practice.

The situation with technology for the development of technical documentation is quite similar. It seems to be very

Glossary

ASD-STE100. ASD-STE100 (STE) is a controlled language developed in the early Eighties (as AECMA Simplified English) to help the users of English-language maintenance documentation understand what they read.
Source: www.asd-ste100.org/about.html (accessed 20 May 2021).

ATA. The ATA iSpec2200 is a standard used worldwide in the commercial aviation industry, developed and published by Airline for America (A4A) - formerly Air Transport Association (ATA). This standard regulates the content, structure and electronic exchange of aircraft, maintenance and flight operations information.
Source: www.asn-gmbh.com/en/leistungen/glossar (accessed 20 May 2021).

Augmented Reality (AR). A technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view.
Source: www.lexico.com/definition/augmented_reality (accessed 17 April 2020).

BOM. A bill of materials (BOM) is an extensive list of raw materials, components, and instructions required to construct, manufacture, or repair a product or service.
Source: www.investopedia.com/terms/b/bill-of-materials.asp (accessed 20 May 2021).

CAD. Computer-aided design (CAD) is the use of computers (or workstations) to aid in the creation, modification, analysis, or optimisation of a design.
Source: https://en.wikipedia.org/wiki/Computer-aided_design (accessed 20 May 2021).

DITA. The Darwin Information Typing Architecture (DITA) specification defines a set of document types for authoring and organising topic-oriented information, as well as a set of mechanisms for combining, extending, and constraining document types. It is an open standard that is defined and maintained by the OASIS DITA Technical Committee.
Source: https://en.wikipedia.org/wiki/Darwin_Information_Typing_Architecture (accessed 20 May 2021).

ERP. Enterprise risk management (ERM) is the process of planning, organising, leading, and controlling the activities of an organisation in order to minimise the effects of risk on an organisation's capital and earnings.
Source: https://searchcio.techtarget.com/definition/enterprise-risk-management (accessed 20 May 2021).

HTML. The HyperText Markup Language is the standard markup language for documents designed to be displayed in a web browser.
Source: https://en.wikipedia.org/wiki/HTML (accessed 20 May 2021).

HTML5. Hypertext Markup Language revision 5 is markup language for the structure and presentation of World Wide Web contents. HTML5 supports the traditional HTML and XHTML-style syntax and other new features in its markup, New APIs, XHTML and error handling.
Source: https://www.techopedia.com/definition/1891/html5 (accessed 20 May 2021).

IETM. Interactive Electronic Technical Manuals (IETM) or Interactive Electronic Technical Publications (IETP) are technical manuals (for example, maintenance, user, training, operations, etc) published in electronic format, interactive, convenience and ease to use. IETM replace traditional paper based manuals and can be viewed on various devices like computers, laptops and tablets.
Source: www.linkedin.com/pulse/20141007151648-4505860-a-brief-introduction-to-interactive-electronic-technical-manuals-ietm (accessed 20 May 2021).

PDM. Product data management (PDM) is the process of capturing and managing the electronic information related to a product so it can be reused in business processes such as design, production, distribution and marketing.
Source: https://searcherp.techtarget.com/definition/product-data-management-PDM (accessed 20 May 2021).

PLM. PLM is a software solution to manage products from cradle to grave by integrating data, workflows, and systems across a value chain to fuel collaboration and drop the cost of new product development by making processes fast, efficient, and simple.
Source: www.upchain.com/blog/what-is-plm (accessed 20 May 2021).

S1000D. S1000D is an international specification for technical publications using a common source database.
Source: https://s1000d.org (accessed 20 May 2021).

SCORM. Shareable Content Object Reference Model (SCORM) is a set of technical standards for eLearning software products. SCORM tells programmers how to write their code so that it can 'play well' with other eLearning software. It is the de facto industry standard for eLearning interoperability.
Source: https://scorm.com/scorm-explained/one-minute-scorm-overview (accessed 20 May 2021).

challenging to switch from the traditional methods, often largely isolated to integrated solutions, where technical communicators use engineering source data to produce 2D or 3D documents and benefit from the shared environment. We hope that manufacturers will evaluate new methods from a business value perspective. An important aspect is realising the advantages of new technology: it is faster, cheaper, and provides documentation of better quality.

Conclusion

As we can see, the real process of the production of technical documentation differs from our ideal vision. We are in a 'transition' period and the global changes that are happening in some areas will help to develop things that are still moving slowly. Digitalisation, additive manufacturing, 5G, augmented reality, etc. will prompt the changing of traditional approaches to the technical documentation authoring process.

When we started our business 20 years ago, only the industry leaders were interested in the research and development of new technologies for the production of 3D documentation, but nowadays more and more different manufacturers are starting to implement our authoring solution. After-sales services have become a long-term profitable business and equipment manufacturers require high-quality and user-friendly technical documentation such as spare parts catalogues, maintenance and repair manuals, and assembly work instructions.

Cortona3D RapidAuthor provides in this context a lot of opportunities: production of technical documentation based on existing engineering data, even not in ideal conditions, enables companies to significantly reduce the cost and time for authoring and updating technical documentation, improve documentation quality and efficiency, and speed time-to-market. Manufacturers get the competitive advantage by offering their customers greater value by delivering products with rich and interactive service documentation allowing customers to solve their problems faster and more effectively than before.

Did you manage to look at the process of creating technical documentation from a different, new perspective?

About Cortona3D

Cortona3D (www.cortona3d.com) provides effective solutions for transforming engineering data into highly interactive 3D/2D parts catalogs, work instructions, and product maintenance materials. Visually intuitive and lightweight documentation can be easily accessed by technicians on-site or in the field, strengthening service and customer satisfaction. Customers include Boeing, Airbus, European Space Agency, Rolls-Royce, Siemens Mobility, KAMAZ, etc. Cortona3D is a technology partner of Siemens Digital Industry Software.

RapidAuthor — authoring suite to develop a wide range of manufacturing and after-sales documentation complied with international standards S1000D, ATA, DITA, SCORM. ■

References

Cortona3D www.cortona3d.com

RapidAuthor www.cortona3d.com/en/rapidauthor

The images in this article are examples from Cortona3D's demo content.

Originally published in Russian. CAD/CAM/CAE Observer # 3(143)/2021 www.cadcamcae.lv

Antonina Mitrofanova

Antonina is a marketing & PR specialist at Cortona3D. She has worked in the IT industry for over 10 years. Her experience includes digital marketing, public relations, customer training, and business analysis.
Email mitrofanova@cortona3d.com
Tweet Cortona3D @Cortona3D
Follow Cortona on LinkedIn @cortona3d
Connect on LinkedIn @antoninam