BETA Technologies: Delivering FAA Compliance and Collaboration with Anark 3D TDPs

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The Mission: High quality engineering data packages for FAA Type Certification

BETA Technologies is an innovative aerospace company developing new electric aircraft, motors, batteries, and charge technology from the ground up that will launch electric flight into the mainstream. As part of developing a new class of aircraft in the U.S., FAA type certification is a major milestone in the company's path to commercialization. The FAA requires manufacturers like BETA to generate and deliver the aircraft type design to specific requirements and regulations.

Figure 1: BETA Technologies' N916LF production aircraft flies a leg of its coast-to-coast U.S. journey in 2024.

The type design must be easily accessible for the FAA. To succeed in their mission, aircraft manufacturers can't put an undue burden on the FAA, or their supply base. This means they can't require third parties to procure certain CAD licenses or deploy specific data management systems to interpret engineering data sets. In the case of a catastrophic event which renders the manufacturer unable to support the airworthiness of their deployed aircraft, the FAA owns the type design and has the obligation to monitor and maintain the airworthiness of the aircraft in the field. So, it's a critical program requirement to provide detailed engineering data specifications which the FAA can interpret, maintain and use.

"A central part of our R&D team's mission is to deliver a robust design and engineering definition package that meets the FAA type certification aerospace regulatory requirements, and which can be leveraged by our supply chain," Jesse Cannon, Configuration Management Engineer, BETA

The Problem: Accurate 3D TDP publishing is easier said than done

BETA needed an easy to adopt, visual solution that everyone can accept and interpret accurately. While they chose STEP AP242 to transfer CAD geometry between CAD systems, this didn't meet their broader collaboration requirements with the FAA and their extended supply chain. This led them to search for a 3D PDF software solution that could translate technical data specs from 3DEXPERIENCE CATIA data into a visual rendition which is accurate, robust and CAD software neutral.

This turned out to be a bigger challenge than expected. There were three technical requirements that came together to pose a significant threat to success:

1. Translate 3DEXPERIENCE CATIA V6 Data: BETA uses 3DEXPERIENCE and CATIA V6, but not everyone in their ecosystem does. To meet FAA requirements and share cert-ready data, Jesse's team needed a way to translate and publish 3DEXPERIENCE CATIA V6 data into 3D PDF Technical Data Packages (TDP). Unlike earlier generations, CATIA V6 and the 3DEXPERIENCE platform are not widely supported for this kind of translation and publishing. Jesse explained the reality of the situation, "This became a major stumbling block for us. No one has really figured out how to robustly and easily translate CATIA V6 or 3DEXPERIENCE datasets. CATIA V5 to 3D PDF? No problem. CATIA V6? That's a problem."

2. Preserve high quality 3D FTA (MBD) design intent: BETA's engineering team uses CATIA's 3D Functional Tolerancing and Annotation (FTA) capabilities. FTA, often referred to as model-based definition (MBD), allows CAD Engineers to define and manage GD&T and PMI directly within the 3D model, eliminating the need for 2D drawings. Jesse elaborated, "For the last 20 years, industries like aerospace and automotive have been shifting to 3D MBD—where dimensions, tolerances, and notes live right in the model. This is much easier to interpret and leverage. Translating and publishing complete and accurate versions of these 3D designs was the second core requirement for a solution. We found out the hard way that not everyone does this well."

3. Support advanced composites design: To develop innovative next-generation aircraft, BETA uses a number of modern engineering design practices, including the use of composites. However, composites present another layer of complexity when translating complete and accurate representations. Jesse noted, "To make things even more challenging, we are using composites design functionalities, and composites CAD definitions are much more complex to translate into neutral formats than standard mechanical CAD models."

As BETA searched for an effective 3D PDF publishing solution, their aircraft certification program continued to advance. With pre-production designs finalized and the first pre-production aircraft underway, they were already preparing to build cert-intent, conforming aircraft. Producing 3D Technical Data Packages (TDPs) became a critical milestone on the path to certification. Jesse stressed the importance of a reliable 3D TDP solution, "If we can't produce the TDPs, then we cannot conform those aircraft. It doesn't matter how well the parts are made, or how good the aircraft design is. If we don't have an acceptable TDP for conformity, we're going to be dead in the water."

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The Solution: Anark 3D TDPs that meet FAA requirements and more

Jesse and the team contacted Anark because their configuration management leader had worked with Anark before and knew about Anark's strengths in translating 3D CAD into 3D PDFs. And that has proven to be true. The BETA team talked to several software vendors, including Anark, about a solution to publish TDPs directly from 3DEXPERIENCE. Jesse noted, "They all said they can produce a complete TDP from 3DX, but when you start digging into the use cases, you quickly realize, no, it's all a work in progress." Technical data (TDP) exchange and collaboration from 3DEXPERIENCE has always been a challenge for manufacturers, but the team at BETA found the right combination of technology and expertise to solve the problem. Jesse continued, "We have been working very hard with Anark and Dassault to get an accurate export from 3DExperience translated into an accurate, repeatable, and automated 3D PDF + STEP Data Package Format."

While there were many difficult challenges to overcome, the right people came together with the right technology to deliver a successful solution. With Anark's 3D PDF publishing solution, the team was able to overcome the three major technical challenges that had been blocking a workable solution. The result is a complete 3D TDP from 3DEXPERIENCE Catia data which meets all the requirements, format wise and function wise, of the FAA and the supply chain. Jesse added, "For a long time, it felt like the light at the end of the tunnel was moving further away from us. But once we were able to dig deep with Anark and Dassault, that started to change. And as of the end of last year, I'm happy to say the light at the end of the tunnel has been steadily moving closer."

Today, BETA has the TDP publishing solution they need to meet FAA type certification requirements and has begun to add automation that will further enhance the value. Jesse concluded that he wants this to be "a solution that is effective, efficient and bulletproof. We now have the right people and technology to do it. We just have to keep building on this momentum."

The Value: The power to move at the pace of a startup

Efficiencies in engineering, production and quality: Faced with the choice between traditional 2D drawings and model-based 3D data, BETA chose to move forward—not backward. By leveraging Anark's 3D PDF publishing solution, the team avoided the inefficiencies of creating detailed 2D drawings and embraced a faster, more scalable path to FAA certification and supplier collaboration.

"We're setting a higher bar with 3D TDPs from Anark," said Rick Florence, Configuration Manager – Aircraft Certification at BETA, "One that moves us forward with a scalable, future-ready approach, rather than falling back to 2D drawings and later struggling to rebuild momentum around 3D."

Creating 2D drawings adds a cost burden to an engineering organization in the form of resources and slower cycle times. And interpreting 2D

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drawings is slow and error prone. 3D MBD models, on the other hand, are faster to produce, easier to interpret, and better aligned with modern manufacturing workflows. “The move to 3D is already delivering ROI—speeding our ability to meet FAA requirements while driving additional savings in production and quality inspection use cases—and will pay for itself within 1–2 years,” Jesse Cannon noted.

Publishing recipes power automation and scale: Publishing one TDP manually is a reasonable task, but manufacturers can produce hundreds of thousands of TDPs a year as engineering data is released to a variety of downstream consumers. Without the right automation tools, engineering teams are bogged down by processing, publishing and validating TDPs.

BETA utilizes Anark publishing recipes to produce TDPs that require less and less validation. This allowed them to start building automation into their publishing process. The goal is a one-click TDP publishing process that creates complete watermarked data packages for review and release. Jesse explained the potential impact, “We’re about 75% automated today and we want to be at 95%. This will save our engineers anywhere from 15 minutes to 5 hours of work per part, depending on the complexity. So, automation will be another big win for us.”

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Extending the value for a high performing supply chain: When developing an aircraft, BETA works with a diverse supply chain made up of hundreds of different suppliers. And those suppliers need to receive and interpret engineering specifications and data packages to meet project timelines and delivery targets. Jesse explained how Anark TDPs play an important role, “We're a startup working toward aggressive timelines with all sorts of suppliers. We work with small shops, big shops, innovative shops, shops across a wide range of software experience. And so, we need to be able to provide a data package that anyone in that supply chain can interpret.”

For BETA and their supply chain, Anark’s 3D TDPs provide a universal visual format that anyone can access, open and investigate. All the dimensions and other PMI are available to help with quoting and costing, quality discussions, and other collaborative technical discussions. And the included STEP file provides a widely accepted neutral format for exchanging data between CAD systems.

Rick Florence summarized the impact the company has seen working with Anark, “We’re super appreciative of the work Anark has done with us, and their engagement with us at every level has been wonderful. **The help Anark provided our team allowed us to continue to move at the pace of a startup.**”

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