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When it actually is rocket science: SkyReal Suite for aerospace design

By Sébastien Lozé

In recent years, we've seen a surge in the use of virtual reality for industrial design including aircraft and other vehicles. But while aerospace engineers might understand the benefits of designing in VR, they tend to focus their talents where they're needed: toward the efficient development of quality aircraft and spacecraft. Taking the time to learn new tools for VR could be considered an unnecessary distraction.

This is where SkyReal (https://sky-real.com/) comes in. The Paris-based company builds custom Unreal Engine-based VR solutions for aerospace clients like Airbus (https://www.airbus.com/), ArianeGroup (https://www.ariane.group/), and STELIA Aerospace (https://www.stelia-aerospace.com/), where engineers can edit design, experiment, and collaborate in a way that feels natural to them without special training. "Physical prototyping can be complex and expensive for these large-scale projects, but the engineers and other stakeholders want to be able to feel and touch the design," explains Hugo Falgarone, CEO and Founder of SkyReal. "In VR, they can have the same experience but without the prototype."

In addition to providing an accurate platform for testing and experimentation, SkyReal reduces design cycle time by up to 30 percent by saving on iterations between designers and stakeholders. "They don't need to build a miniature or prototype or physical version of any kind," says Falgarone. "Instead, they can build a daily digital prototype."

Making VR iterations autonomous

It's no mean feat to create a tool that's both effective for complex, large-scale virtual design, and also easy to use. Falgarone, along with Benjamin Ray, CTO at SkyReal, started developing VR solutions at Airbus, where they worked on internal projects. After around 10 years, the team spun off a separate company to produce SkyReal Suite, a standalone product that could be offered to companies outside the Airbus family.

Image courtesy of SkyReal
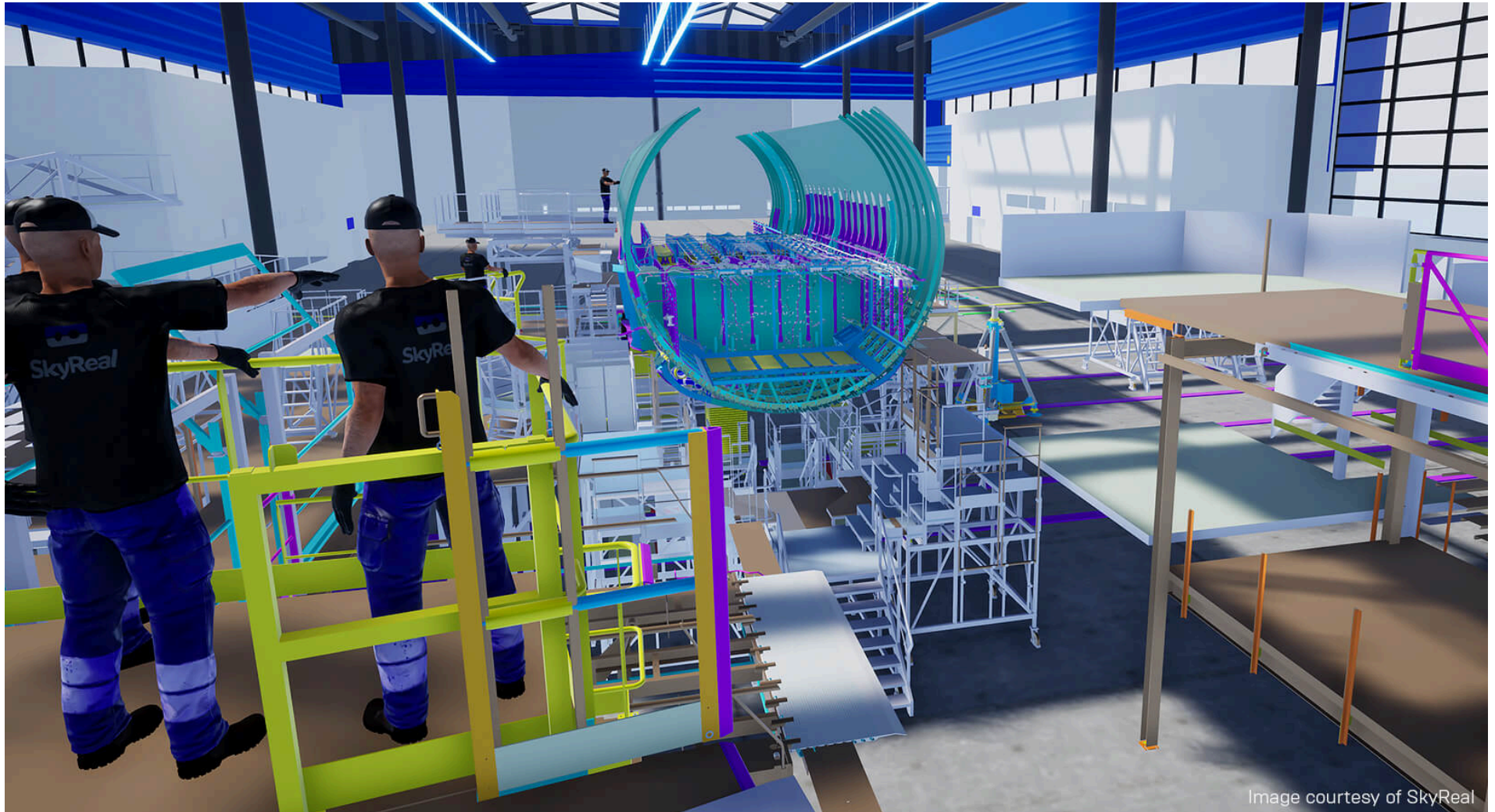
"If your business is designing launchers, or cars, or boats, you don't want to spend your time building or operating a complex VR system," says Falgarone. "You just want to see the latest modification of your design, to click and play and iterate with your colleagues. That's what SkyReal Suite is built for."

SkyReal Suite consists of three modules: one to prepare and import CAD data, another to store the data in "rooms" that users can explore, and a third to provide the VR interface and environment. The system is designed to present models at 1:1 scale.
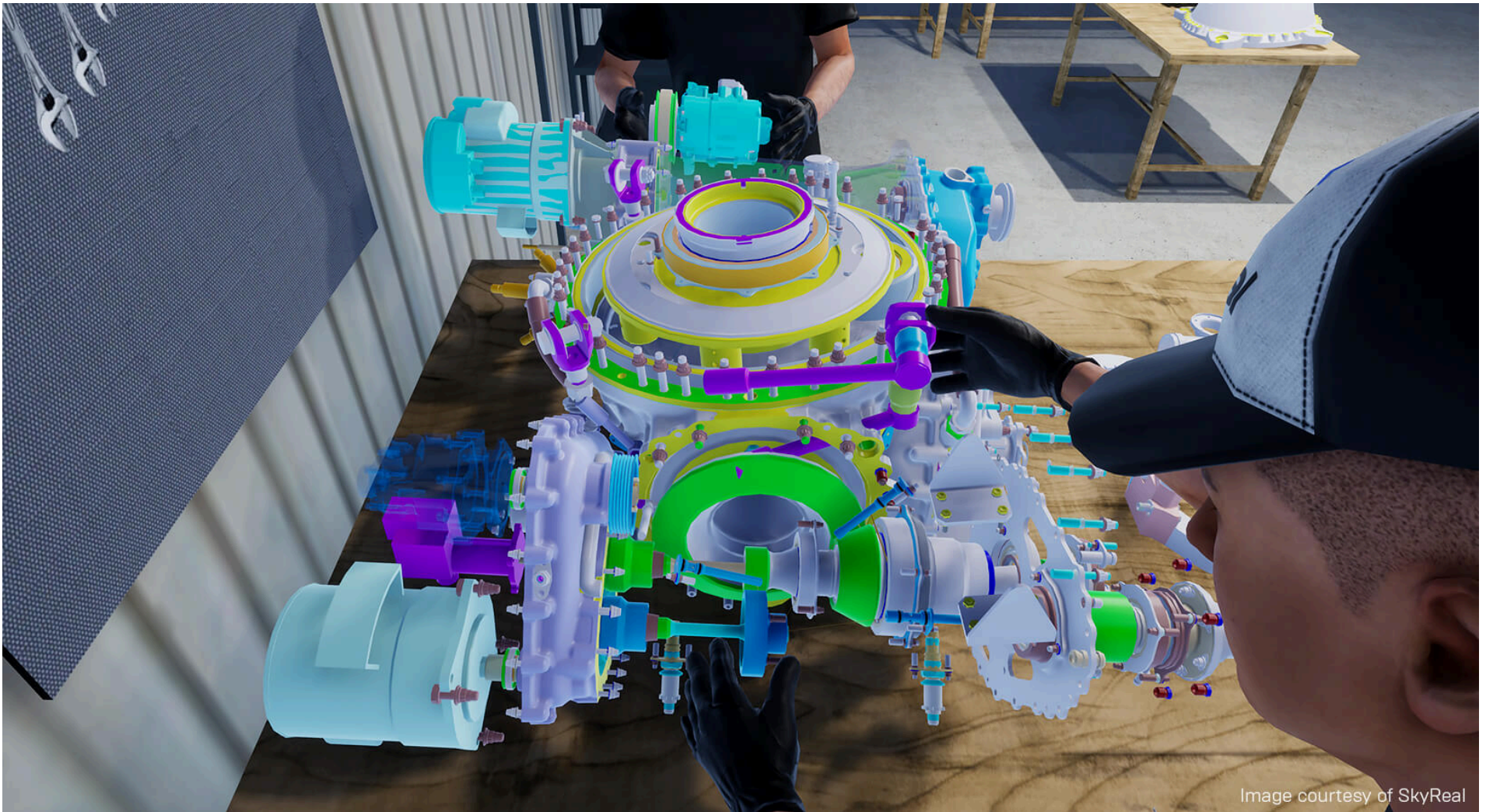
The Unreal Engine import toolset Datasmith (https://www.unrealengine.com/en-US/datasmith) has been available for some time, so the conversion of CAD data to Unreal Engine assets isn't new. What SkyReal Suite adds is the seamless conversion of complex systems to a high-level VR experience within the engine, which in turn can be converted back to CAD data. This abstraction of complex structures is particularly important for large-scale design in real time, where the number of objects in the project can easily reach 100,000 or more, and poly counts routinely top two million.

Perhaps most importantly, when an engineer changes a part while in virtual reality, the change is automatically propagated back to the CAD software, eliminating the need for a manual export/import cycle. The idea was to create a software suite where the user could work autonomously without needing to train someone on data management or virtual reality development, and without requiring help from an outside or custom service every time they update a design.

"We deliver not only the technology, but also the capability to produce each design iteration," Falgarone says. "This means

that every week or every day, they can reproduce the experience by themselves."

Image courtesy of SkyReal

Beyond aerospace design

Another benefit of the SkyReal workflow is that the manufacturing team can make use of assets created for the design process. After that, assets can be further repurposed all the way through to sales, support, and training. Because the

assets are all in Unreal Engine, training tools can make use of game logic for a rich VR training environment from the actual design, and materials and lighting can be applied to create advertising-quality mockups for marketing and sales.

Because SkyReal Suite presents models at 1:1 scale, it can be used for any large-scale design project—customers have used it to visualize the engineering behind ground vehicles, boats, and even factory machinery.

More importantly, it helps engineers detect design issues before they become costly, or worse, cause the design to fail altogether. "By using SkyReal, our partners can detect and qualify their mistakes at a very early stage, and eventually find solutions to the problems they encounter," says Jan Børre Rydningen, Senior Advisor at ÅKP (https://www.aakp.no/aakp-en), which uses SkyReal for shipbuilding. "They can avoid and anticipate a multiplied series of errors that could be fatal for a project."
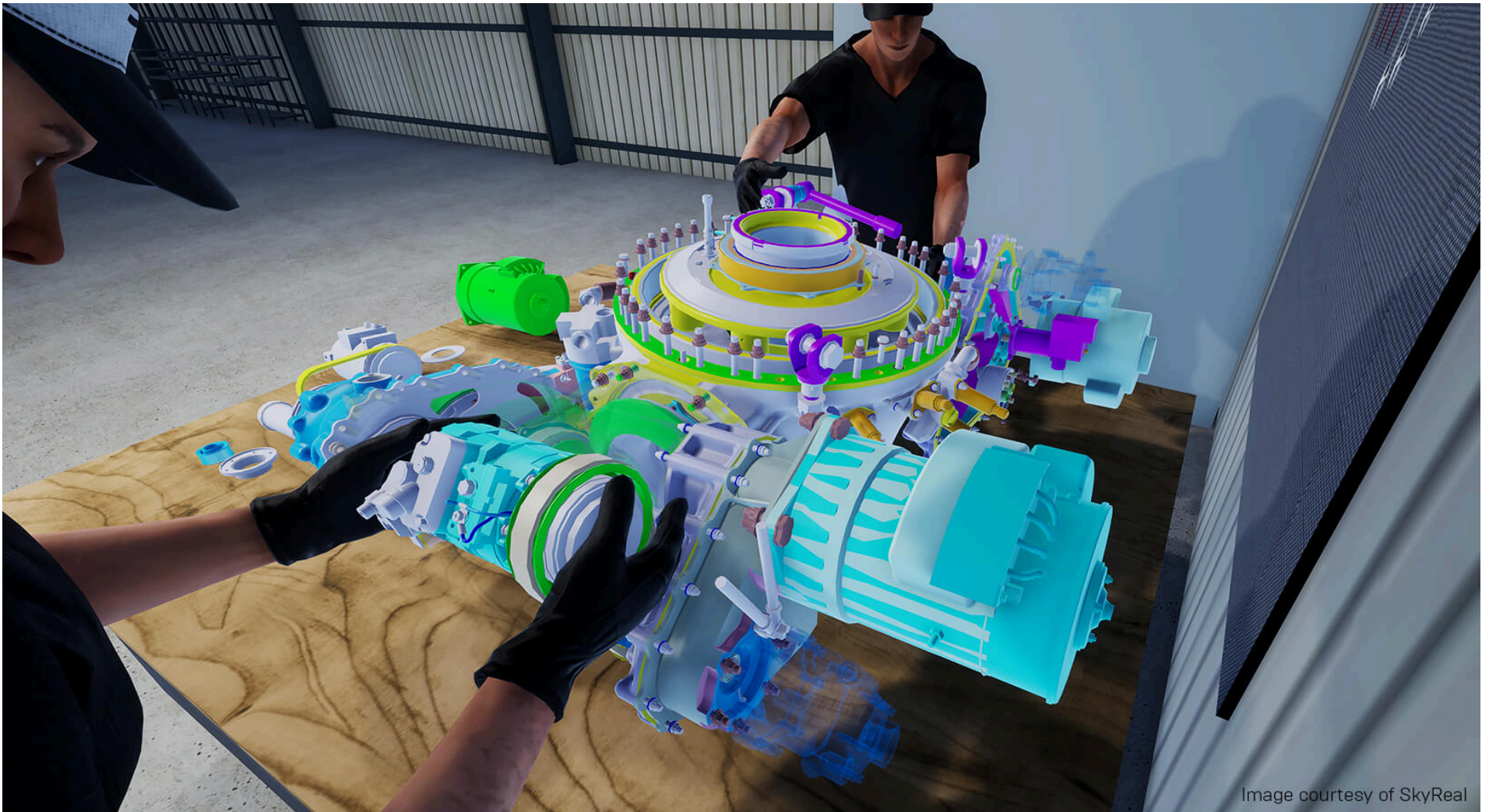

Image courtesy of SkyReal

Unreal Engine: tools for a complete solution

When developing SkyReal Suite, Falgarone and Ray had the choice of a number of real-time engines, but chose Unreal Engine for its rich feature set. "Collaboration is very important inside SkyReal, and Unreal supports this really well with things like Replication Graph," says Ray. "We also needed something that would support remote access and control."

He adds that the ability to accurately simulate physics is an important part of many projects. Also, Unreal Engine's nDisplay technology (https://www.unrealengine.com/tech-blog/explore-ndisplay-technology-limitless-scaling-of-real-time-content) comes in handy for the multi-screen and multi-projector displays many of their customers use for VR, such as powerwalls and CAVEs.

While SkyReal could create their own custom branch of the source code—an option available to any Unreal Engine developer at no cost—SkyReal chooses to always use the currently shipping version while still providing a dedicated experience for engineering. The benefit is that SkyReal always has access to the latest features, and can update their software with these features shortly after each point version of Unreal Engine is released.

When asked to name the most important goal for SkyReal Suite, Falgarone is quick to answer. "Reliability! We want to be 100% reliable, no matter how large the project," he says. "Our customers are always pushing the limit—they want to get more and more models inside the same simulation.

"We need to be inventive to keep up," he continues, "and Unreal Engine gives us what we need to be inventive."

Want to explore the use of real-time technology for design? Get in touch (mailto:simulation@epicgames.com) and we'll be happy to start that conversation.

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