

PAL-V leveraged PTC Cloud and Windchill SaaS to make flying cars a reality

Innovation and technology bring the future to life

When it comes to advancing technology, the Dutch have always been pioneers. Pendulum clocks, metronomes, microscopes, and yachts can all be attributed to brilliant minds in the Netherlands. PAL-V (Personal Air and Land Vehicle) continues this long tradition of Dutch ingenuity by adding one more world-changing technology to list: the flying car.

PAL-V is an innovative company leveraging advanced technology to bring the aviation and automobile industries together. Founded in 2008 and headquartered in the Netherlands, PAL-V produces the dream vehicle of aviation and motor enthusiasts alike.

The idea for PAL-V was born when one of the co-founders began flying in 1999. He faced a hassle common to many pilots: he would drive to the hangar in order to depart by plane, only to arrive at his destination and need a car again.

Unpredictable weather conditions make this situation even trickier, as pilots often face the risk of not being able to fly back safely. More than 20 years and many dreams later, PAL-V now provides customers with an immediate means to "FlyDrive" to their destination, making aviation practical for everyday use.

PTC Cloud enables secure, high-performance data storage

As PAL-V grew rapidly and faced strict compliance requirements, they knew they needed secure data storage and management capabilities. By investing in the PTC Cloud, PAL-V ensured they could scale quickly without burdening their IT systems. In the end, the PTC Cloud provided a compliant foundation for data and processes on which PAL-V could confidently grow their business.



"Everyone has been a child and stood looking at the sky, thinking, I want to fly. I want to be as free as a bird," says Robert Dingemans, the CEO and Co-Founder of PAL-V. "The flying car today is made up of existing and proven technologies. It can be certified within existing regulations. When we started, we were just building a flying car. Now we're recognized as the leader in the future of flying mobility."

Rapid progress led a small team to recognize the need for advanced technology

Within the first few years of its founding, PAL-V progressed on their flying car prototype by combining the structures of a three-wheeled car and a gyroplane—a type of rotorcraft that uses an unpowered top rotor to develop lift, while thrust is provided independently by an engine-driven propeller.

As their prototype work unfolded, the team realized that their needs were outgrowing their technology capabilities. In the first few years of work, they had a small team of 10 and everything was done on-site. By 2014 the team had grown to 15, but their systems and methods hadn't changed—version control and configuration management of products and designs were still being done by individuals through a manual naming and numbering system. Today, their team has more than quadrupled its original size and is rapidly growing.

Furthermore, the European Union Aviation Safety Agency (EASA) has strict regulations for rotorcraft design and operation. Moving from an experimental prototype to actual production would require PAL-V to ensure their growing data was traceable and complied with strict regulations. PAL-V recognized that in order to grow their company, continue daily operations at scale, and abide by aerospace rules and regulations, they would need a stronger foundation to manage complete design specifications in a controlled manner.



PAL-V leveraged PTC Cloud services and Windchill SaaS to transform their product lifecycle management

With PAL-V's rapid growth and newfound need for strict data compliance, they searched for a product lifecycle management (PLM) software that could serve as a foundation for their business to build on. PAL-V determined that PTC was the ideal partner, and Windchill SaaS and PTC Cloud were natural fits for their product development needs.

Windchill SaaS is a comprehensive PLM software for data governance and traceability, providing an authoritative source of truth for data. Its open architecture enables easy integrations with other enterprise systems and serves as a foundation for a product-driven digital thread. The SaaS-managed service offering makes the PLM solution easier to configure, scale, and secure, and helps facilitate collaboration and agility across the extended enterprise—including in remote work environments. A key factor in PAL-V's decision to use Windchill SaaS was that it was the only out-of-the-box implementation they found which closely aligned with CM2 methodology, a global enterprise standard for change and configuration management.

When product changes are needed, Windchill provides the ability to capture issues or enhancements, document and implement related updates, and send out information through a



prioritized change notice to all stakeholders. Because Windchill connects systems, all affected items are automatically updated across the enterprise.

Leveraging the PTC Cloud, PAL-V ensures peak performance of their technology through proactive performance management. The functionality, performance, and security of the PTC Cloud enables manufacturers to take advantage of cutting-edge technology while reducing administrative burdens and hardware costs—allowing them to instead focus resources on high-value business opportunities.

PAL-V facilitates compliant processes and data management with Windchill SaaS delivered in the PTC Cloud

PAL-V's unique design process needs made a highly capable PLM system a necessity. PAL-V started by studying the regulations they would need to comply with, and then designed their flying car with those regulations in mind. This encouraged them to use a data system that would be compliant with local and international regulations as they made design changes in a controlled manner. Before implementing Windchill SaaS and PTC Cloud, maintaining compliance and making design changes required manual processes and paperwork. By combining PLM and quality onto a single platform, PTC helps organizations accelerate the delivery of high-quality products based on local standards and compliance. Now, processes are digitized, and change management is at the forefront of driving compliance.



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Jeroen Klein Lankhorst,
IT Manager and PLM Implementer at PAL-V

"Compliance requires a lot of paperwork, which is now digital. Aviation is all about making sure everything is safe and can be traced back to who supplied and designed it, to improve it and make it safer," says Jeroen Klein Lankhorst, IT Manager and PLM Implementer at PAL-V. "That's what Windchill SaaS and PTC Cloud enable us to do."

In fact, PAL-V established a foundation for compliance across the entire company. By having just one system implemented in the right way, they can successfully comply with the majority of regulations all at once. "The PTC system does 80 to 90% of everything we need for complying with product definition requirements. In that way, it lays a foundation for compliancy across the whole company—and that's really important," says Klein Lankhorst.

With the PLM platform, PAL-V can focus on what matters most: driving value and growing their business. "We've grown quite fast, and we expect to involve a lot of partners in the future, whether it's maintenance partners or flight schools. We need a solid system to grow on, and Windchill provides that," says Klein Lankhorst.



PTC Cloud enables high-performance, secure data storage and collaboration

PAL-V knew that continued growth would create the need for more data storage and sharing capabilities. As their IT systems couldn't scale to manage their increasing data needs without putting a significant burden on their IT team, they invested in the PTC Cloud to manage and store data. The flexibility of the PTC Cloud was crucial to PAL-V's mission, and they worked with the Cloud team and an integration partner to customize and configure their platform with the functionality they needed. Furthermore, PTC Cloud offered the high degree of security that PAL-V needed to keep proprietary design specifications safe.

In the production process, PAL-V is now able to involve suppliers through the PTC platform. ThingWorx Navigate for PLM data allows their team—and third-party collaborators, like outside design teams—to securely access the data whenever needed and without having to change their own infrastructure. "During the production phase, the possibility the PTC platform offers for collaboration is something I'm looking forward to," says Klein Lankhorst.

The addition of PTC Cloud allowed PAL-V to work with PTC service managers to solve system problems faster. When adding new functionality to the system, PTC service managers help PAL-V solve issues and ensure implementation is successful. Recently, a caching issue wasn't resolved in the testing environment. When PAL-V noticed it, PTC service managers helped identify and quickly correct the issue. Even post-implementation, PAL-V engineers stay connected to the PTC Cloud team to exchange updates about current and potential problems and how to solve them.



PAL-V laid the foundation for future growth

With the new PLM platform in place and bolstered by the convenience of PTC Cloud, PAL-V is on target to continue their 20% growth this year. PAL-V expects to maintain this level of growth, as their first product launch is just around the corner. In 2022, PAL-V will commence the production of about 90 PAL-V Liberty Pioneer editions of the flying car. PAL-V already has pre-orders in 11 countries, with 30 orders alone in the Netherlands. After the initial run of the Pioneer edition, PAL-V will continue production with the PAL-V Liberty Sport, the standard version of the vehicle.

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PAL-V is on a journey of continuous improvement, meaning they're taking advantage of PTC's flexible technology to explore additional functionalities and ways to leverage data. While they're only using Windchill SaaS and PTC Cloud for design capabilities, they'll soon expand those solutions to their production lines. They're also planning to incorporate PTC ThingWorx IIoT capabilities and explore AR functionality in the future. IIoT technology can enable flight data tracking systems within their machines, predictive maintenance for customers, and targeted data collection from Pioneer customers to fuel continual safety and performance improvements.

"The cloud component—the fact that we have a compliant foundation for our data and processes—gives us a lot of options down the road," says Klein Lankhorst.

When it comes to advancing technology, the Dutch have always been pioneers in their own right. In that spirit, PAL-V is on the forefront of new ways to support their customers. Through advanced technology and expert engineering, they're leveraging PTC technology to continually improve their products and services. With the breakthroughs in product design and engineering that are sure to come, the sky's the limit for PAL-V.

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