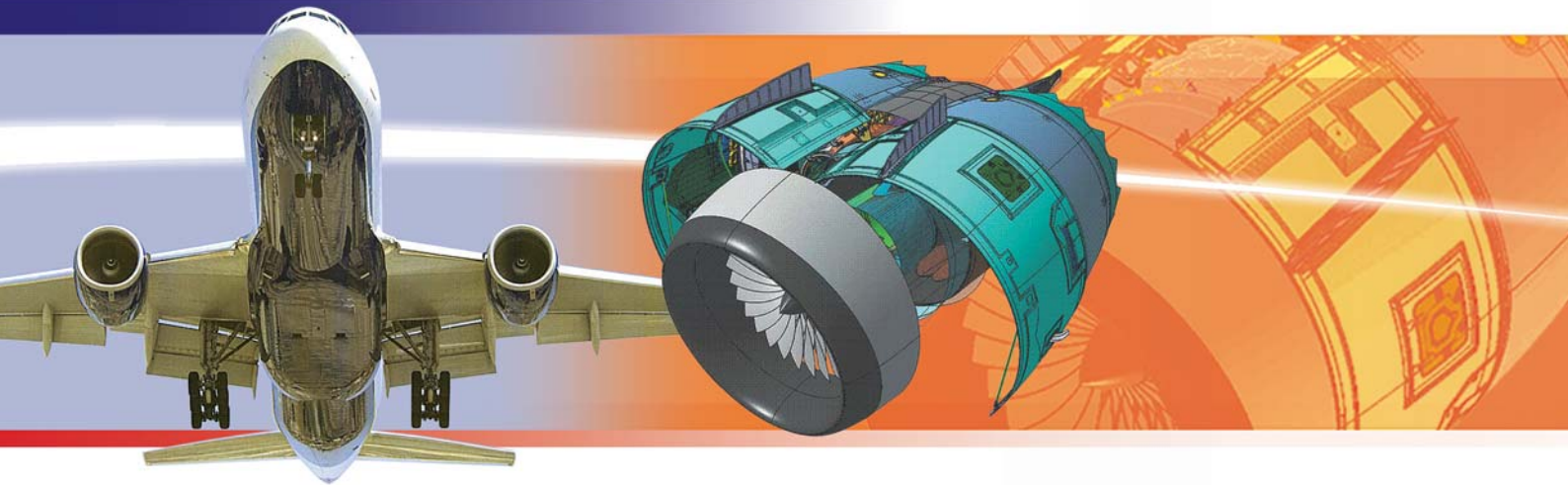


Goodrich Aerostructures

V5 PLM enables excellence in record time





Goodrich Aerostructures Objectives

- *Apply lean principles to design and development functions*
- *Drive common processes and methodologies across businesses*
- *Reduce repetitive work to increase innovation*
- *Achieve product maturity with first deliveries*

“No one has ever done the amount of design and testing on two nacelles in as short a time span as we have. V5 PLM helps make that possible.”

Curtis Reusser, President,
Goodrich Aerostructures

GOODRICH Company Overview

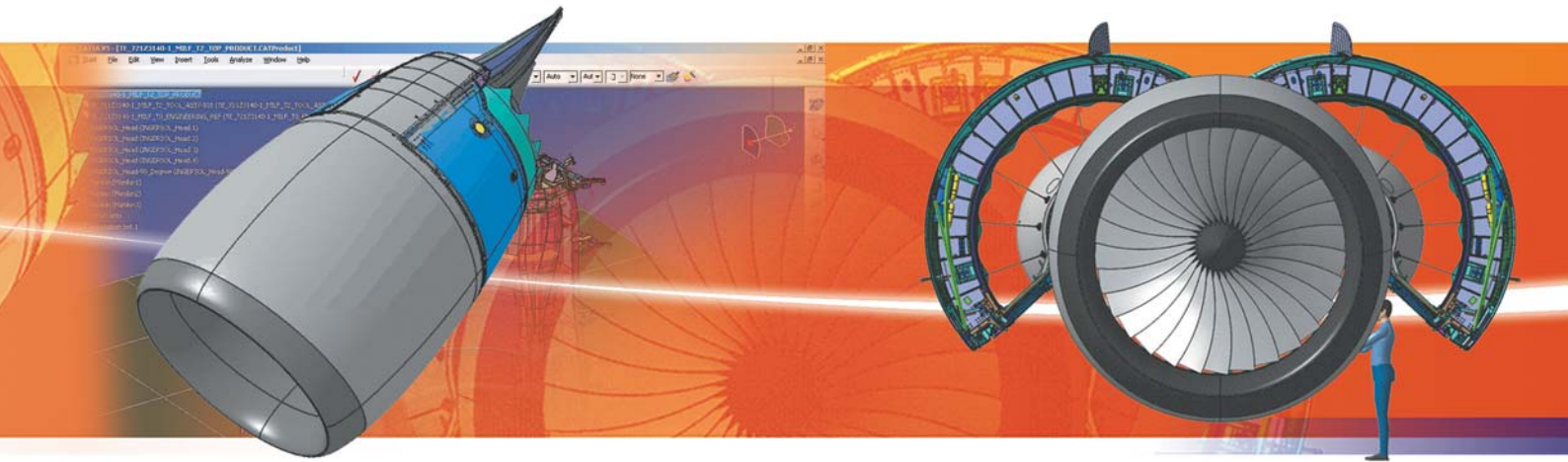
Goodrich Aerostructures is the world's leading independent full-service supplier of nacelles, thrust reversers and pylons. The company partners with Airbus and Boeing, global leaders in airframe development and manufacturing, and with premiere engine manufacturers such as GE, Pratt & Whitney and Rolls-Royce, and provides direct support to more than 450 airlines. To ensure continuous improvement and competitive advantage, Goodrich Aerostructures practices lean manufacturing and product development, achieving 50 percent reductions in product build hours and flow times across critical areas of its global operations.

Business Challenges

Goodrich Aerostructures won contracts to supply the nacelles (aerodynamic structures surrounding the engines) for the Boeing 787 Dreamliner and the Airbus A350 XWB. Each program requires the design and manufacture of nacelles in 30 percent less time than previous programs. The contracts also stipulated that all products be optimized for weight, aerodynamics, fuel efficiency and maintainability from the first part delivered, an unprecedented requirement.

Aerodynamic considerations often change the shape of the housing late in the design process, forcing adjustments to virtually everything inside the nacelle – changes that must be incorporated across a global value chain.

“The aerodynamic performance of a nacelle is pivotal to how the aircraft and engine perform,” says Charlie Johnston, A350 Program Director. “We may not get the final data until three months before our first delivery date, but we still have to respond on time.”



Solution

Goodrich Aerostructures could not afford errors or delays, so it chose V5 PLM from Dassault Systèmes to support the Boeing 787 and Airbus A350 initiatives by creating a unified model-based definition (MBD) for each product design. Its goals were to facilitate collaboration and synchronize work-in-process data among global design, manufacturing and supply chain partners; employ design reuse and standard parts and processes to accelerate Preliminary Design cycles; automate the propagation of downstream changes; make parts fit right the first time; and optimize designs for manufacturability and maintenance.

CATIA V5

“Our vision for relational design is that the previous nacelle can provide the seed for the next nacelle for the same customer, even though it will have different geometry and different surfaces,” says Technical Support Director Warren Potts. “We can start with a mature design and focus on the changes rather than rebuilding the basics, which also improves quality.”

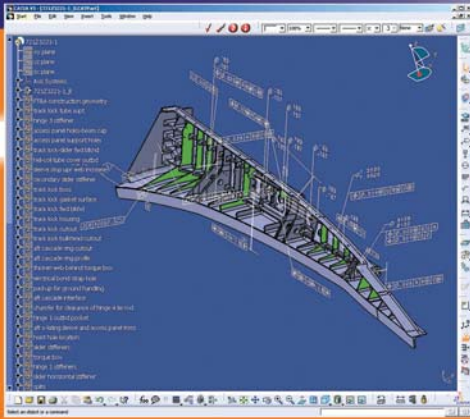
CATIA V5's digital mock up (DMU) capabilities facilitate collaboration and coordination across diverse CAD/CAM systems and global locations, improving product quality and performance in the virtual phases of development and improving part fit. CATIA V5 Knowledgeware and part libraries also help engineers jump-start designs and meet rigorous standards. “We have built a library of 10,000 standard parts that designers can use on a cut-and-paste basis, which saves time and ensures that designs are built according to best practices,” Potts says. “We can automatically build complex assemblies in hours instead of weeks, based on rules and parameters.”



“Our goal is to provide downstream visibility much earlier in the process, say Day 100 instead of Day 1,000.”

Katherine Wood, IT Director,
Goodrich Aerostructures





“ENOVIA VPLM is great at work-in-process because it provides a single source of data.”

Phil Bjornsson, Design Technologies Manager, Goodrich Aerostructures

ENOVIA VPLM

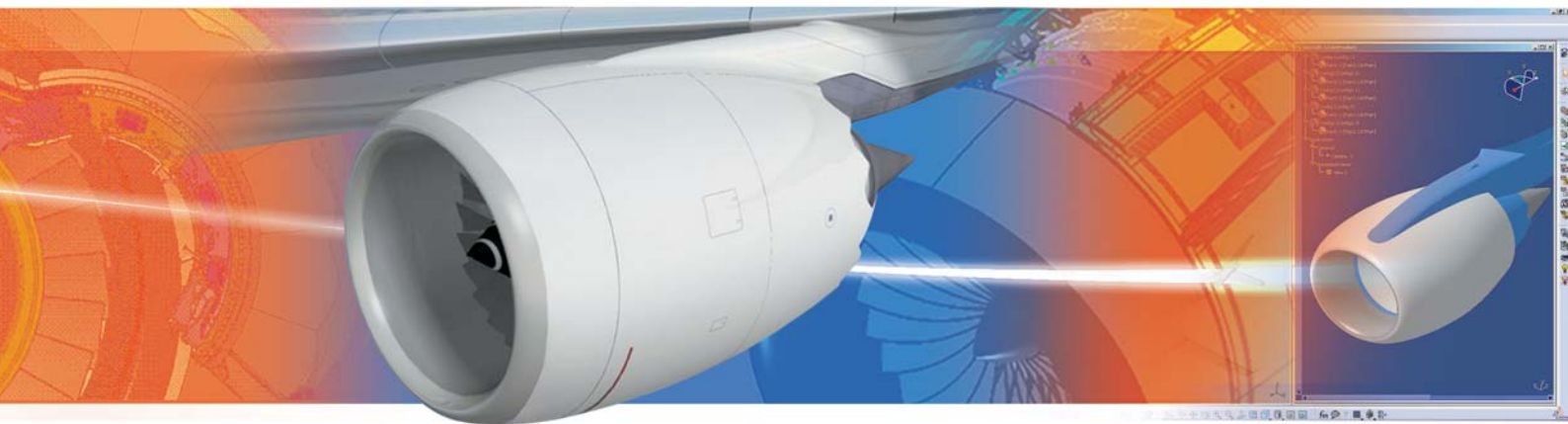
With multiple teams working concurrently on thousands of parts, keeping work-in-process data in synch and accessible is critical. “ENOVIA VPLM is great at work-in-process because it provides a single source of data,” says Phil Bjornsson, Design Technologies Manager. “It cuts down on the amount of engineering checking we need to do regarding linkages and eliminates searching for data because you always know right where to go to get it, and you know it’s current.”

ENOVIA V5 also enables advanced relational design by managing the dynamic knowledge and associations that drive engineering innovation. When iterations are finalized, ENOVIA automatically propagates the design changes across thousands of parts and communicates them to multiple teams and partners.

“The word around here was that we didn’t want to attempt another major program without ENOVIA,” says Steve Wood, A350 Product Development Lead. “It’s been an important part of our program since day one.”

VPM Navigator

VPM Navigator provides immersive search and navigation of the ENOVIA database from within CATIA, enabling easy manipulation and sourcing of product structures and related engineering knowledge. To optimize design decisions, impact graphs within VPM Navigator let engineers browse and assess the relationships between features as parts change and designs mature.



Results

Streamlined Communication and Collaboration

"V5 PLM helps us communicate with a very large engineering team and with a very large base of suppliers that is increasingly international and on multiple platforms," says Aerostructures President Curtis Reusser. "It gives us a common set of processes for sharing information quickly, in a meaningful manner, to cut down design and engineering flow times."

Early Visibility into a Unified MBD (Model-Based Definition)

By making designs widely available earlier in their evolution, V5 PLM helps to accelerate downstream processes and drive improvements in tooling design, manufacturability, production planning and procurement. "As soon as we have a reasonable idea of the component details, we bring in the manufacturing engineers to look at assembly, accessibility and maintainability," says IT Director Katherine Wood. "Our goal is to provide downstream visibility much earlier in the process, say Day 100 instead of Day 1,000."

Early visibility is also critical given the lead time for many components is a year. "Our V5 PLM processes give us greater confidence, allowing us to procure long-lead materials earlier in the product development lifecycle to support our manufacturing schedules," says Michael Collier, Staff Engineer for Design Technologies.

Faster Propagation of Design Changes

ENOVIA V5 helps Goodrich Aerostructures communicate and automatically propagate thousands of design changes across multiple teams and diverse systems, improving quality and virtually eliminating scheduling delays. "When Airbus changed its design intent for the A350, we were able to turn around a completely new proposal for the two nacelles in six weeks with five design people thanks to ENOVIA," says Dwayne Beaton, ENOVIA Data Administrator. "All we had to do was to modify the master geometry lines and ENOVIA adjusted everything."

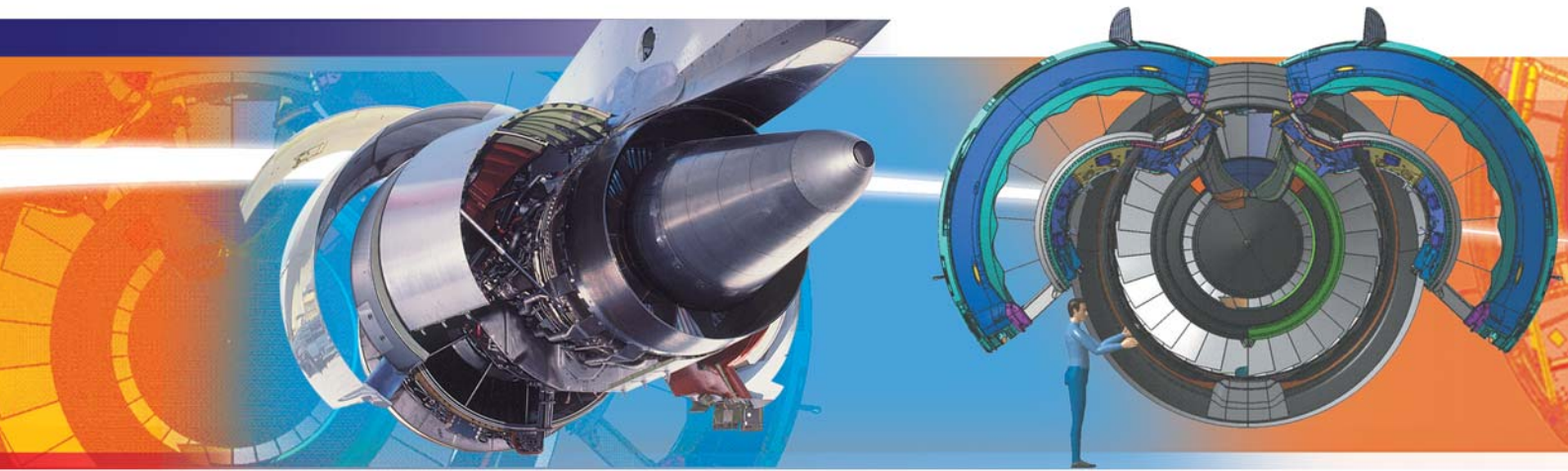
V5 PLM Key Benefits

-25% to -30%
Design cycle time reduction
Program cycle times to design nacelles have been reduced by nearly a third

-20%
Reduction in tooling costs
Changes happen faster and suppliers are better informed for better collaboration

100%
Part fit improvement
Approaching 0% errors for first article build and simulation; nearly 100% of parts fit right the first time

-75%
Time to propagate design changes
Two Airbus nacelles were redesigned in three weeks with just five people, compared to the three months required previously



Optimizing Design for Manufacturability and Performance

ENOVIA VPLM and CATIA V5 analysis and digital mockup capabilities help Goodrich engineers and analysts work smarter and faster to meet aggressive contract goals. “It’s a good tool for the designers because it allows them to test for stress, weight, etc., which gives those of us in Analysis a better part to analyze,” says Stress Engineer Ray Duncanson. “Plus the design is more accessible to us with ENOVIA. We enter a few parameters and the system finds the part for us, which saves the designers time as well.” Improved analysis and DMU also help to improve quality so that parts fit right the first time.



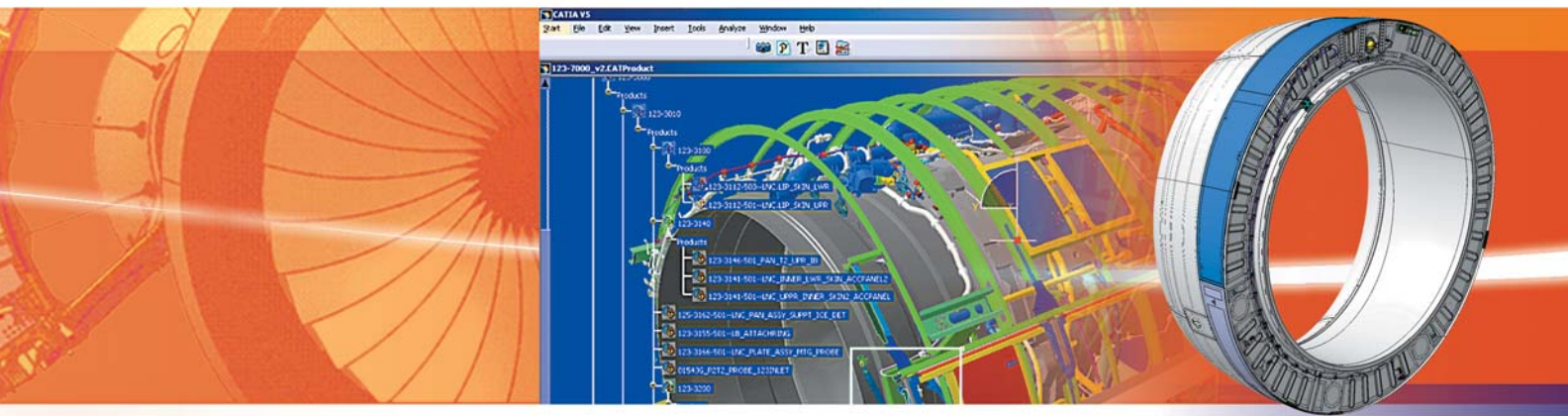
“We can automatically build complex assemblies in hours instead of weeks, based on rules and parameters.”

Warren Potts, Technical Support Director,
Goodrich Aerostructures

Enabling Best Practices to Drive Innovation

For Technical Support Director Potts, V5 PLM brings a valuable human element to Goodrich Aerostructures. “As a supervisor, I want to create an environment in which very talented people can enjoy what they’re doing because they’re not spending a lot of time with administrative tasks that take them away from the engineering,” he said. “We want to get the idea on the screen as quickly and easily as possible, and V5 PLM helps us do that.”

By enforcing common processes and design methodologies, V5 PLM also helps drive continuous quality improvements. According to Aerostructures President Reusser: “Standards let our engineers spend their time where it will add the most value, and we’re replicating those standards into our supply base as well.”



Future

During the next phase of deployment, Goodrich Aerostructures will extend the use of the CATIA V5 and ENOVIA VPLM to include more than 300 users throughout the Boeing 787 and Airbus A350 XWB program teams, in addition to its internal development group. “We wish to develop our V5 PLM processes and methodologies to improve collaboration and data re-use to support Goodrich’s Lean Product Development initiatives,” says Michael Collier, Staff Engineer for Design Technologies. Goodrich also plans to deploy DELMIA for manufacturing process planning and advanced robotic simulation. It is evaluating the use of 3D XML to streamline communication of designs and manufacturing service orders throughout the organization and across the supply chain.



“We wish to develop our V5 PLM processes and methodologies to improve collaboration and data re-use to support Goodrich’s Lean Product Development initiatives.”

Michael Collier, Design Technologies
Staff Engineer, Goodrich Aerostructures

V5 PLM for the Aerospace Industry

With more than 20 years of experience developing solutions for the aerospace industry, Dassault Systèmes has a legacy of innovation and success in one of PLM’s most pioneering markets.

Developed in close collaboration with leading aerospace OEMs and suppliers, the V5 PLM aerospace offering combines Dassault Systèmes’ V5 PLM portfolio of CATIA, DELMIA,

ENOVIA and ENOVIA SmarTeam with specialized best practices or work methodologies called DS PLM Practices. Leveraging the same digital manufacturing tools widely used in the automotive and shipbuilding industries, DS V5 PLM aerospace solutions allow manufacturers to significantly reduce time-to-market and costs, while advancing innovation and product quality.

For information about DS V5 PLM for aerospace, visit www.3ds.com

The Dassault Systèmes home page can be found at www.3ds.com

Dassault Systèmes
9, quai Marcel Dassault
BP 310
92156 Suresnes Cedex
France

As a world leader in 3D and Product Lifecycle Management (PLM) solutions, the Dassault Systèmes group brings value to more than 90,000 customers in 80 countries. A pioneer in the 3D software market since 1981, Dassault Systèmes develops and markets PLM application software and services that support industrial processes and provide a 3D vision of the entire lifecycle of products from conception to maintenance.

The Dassault Systèmes V5 PLM offering consists of CATIA V5 for designing the virtual product, DELMIA for virtual production, ENOVIA for global collaborative lifecycle management (including ENOVIA VPLM, ENOVIA SmarTeam, and ENOVIA MatrixOne), and SIMULIA for virtual testing.

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