

# DASSAULT AVIATION

Revolutionizes aircraft development with the Virtual Platform and PLM



# Company overview

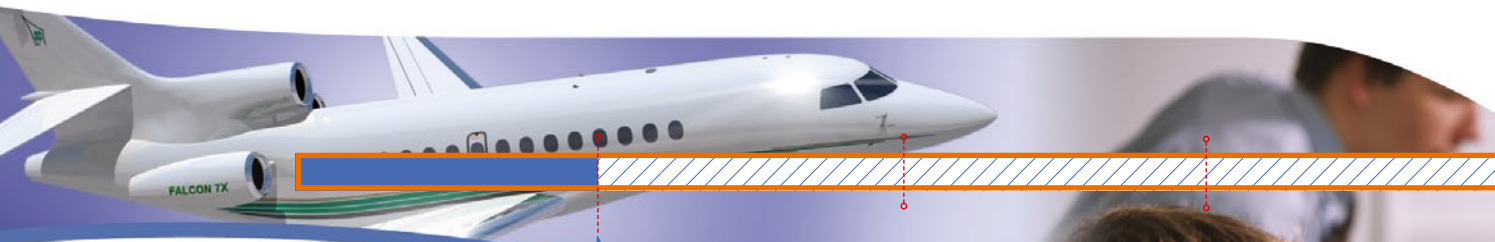


Founded in 1936, Dassault Aviation Group is a major player in the global aerospace industry with 9,000 employees and 2003 turnover of €3.3 billion. Today, the company is present in more than 70 countries across five continents.

Dassault Aviation is a world leader in the executive aircraft market with business jets from its Falcon series, and in the military aircraft market with its fighter jets such as the Mirage and Rafale. The Falcon division represents more than half of Dassault Aviation's business.

## Business challenges

- + Deliver high quality, secure jets tailored to client requests
- + Develop aircraft with risk-sharing partners from across the globe
- + Provide superior maintenance and support



# Situation

To maintain its lead in today's highly aggressive executive jet market, Dassault Aviation must remain one step ahead of its North American rivals who are unaffected by fluctuations in the dollar.

"Staying competitive means delivering more than our competitors in all areas of aircraft development," said Christian Decaix, executive vice-president, Operations.

Dassault Aviation must focus on delivering high quality, secure aircraft that are custom-tailored to client requests.

The company must also constantly innovate and optimize its business processes and operations to remain flexible in the face of economic variations.

Since the life of an aircraft can span more than 30 years, Dassault Aviation must make aircraft maintenance and support a priority.

Finally, as new aircraft projects involve large groups of risk-sharing partners, Dassault Aviation has to develop its aircraft in concert with a geographically dispersed team of global partners



*"Our aircraft must not only be of the highest quality and security, they must also be tailor-made to customer specifications. Business jet buyers are a limited club. We have to give them what they want."*

Christian Decaix, Executive Vice-President, Operations

# Solution

To address its business challenges, and in particular, optimize development of its new Falcon 7X business jet, Dassault Aviation, using IBM PLM Solutions developed by Dassault Systèmes, created the world's first virtual development platform.

The goal of the virtual platform was to enable Dassault Aviation and its 27 partners in Europe, the USA, and Canada to concurrently design the Falcon 7X from their home sites.

In September 2002, Dassault Aviation linked its partners through a single, virtual collaborative workspace in which they shared a common, configured, constantly-updated digital mock-up of the Falcon 7X.

The mock-up was based on the Falcon 7X definition that more than 300 partner representatives and 200 Dassault Aviation engineers had developed together on a "physical" platform during the aircraft's joint definition phase at Dassault Aviation's St. Cloud site near Paris.

"Thanks to the virtual platform, we were able to work together right from the conception stage, sharing the same database and the same tools, which is something we could not do in the past," said Jérôme Camps, aerospace engineer, Dassault Aviation.

In parallel to the virtual platform project, Dassault Aviation launched an ambitious plan to restructure the company's entire IT system. This included expanding its PLM platform to integrate product development from conception to manufacturing to maintenance.

"We expanded our use of PLM for the Falcon 7X program in order to optimize the aircraft from the outset and throughout the entire development process," said Jacques Pellas, CIO, Dassault Aviation. "The virtual platform is based on CATIA V4 and V5 for product definition and digital assembly, ENOVIA VPM for real-time sharing of digital mock-up. We also use DELMIA from Dassault Systèmes for definition of maintenance operations."



*"We created the virtual platform in order to work as though we were on a physical platform, and to share a common database among our 27 partners around the world in near real-time."*

Jacques Pellas, CIO



Tooling costs: -66%



# Results

Dassault Aviation has set new standards for aircraft development thanks to PLM and its virtual platform:

## Unprecedented product quality

Since the Falcon 7X was entirely defined with 3D digital precision prior to assembly, including 40,000 parts, 200,000 fasteners, and the aircraft's sophisticated equipment and systems, Dassault Aviation was able to construct a business jet of unparalleled quality.

"Thanks to PLM, we created an absolutely perfect definition of the aircraft," said Christian Decaix, executive vice-president, Operations. "When we reached the assembly stage, from the first aircraft, we had the quality that previously took us several dozen aircrafts to achieve."

## Assembly time cut in half

By defining the parts and structure of the Falcon 7X digitally with its partners via the virtual platform, Dassault Aviation dramatically reduced the assembly time of the aircraft.

"Parts that are defined virtually fit together perfectly the first time to one-hundredth of a centimetre," said Jean-Claude Hironde, deputy senior vice-president, Research, Design and Engineering. "Previously, an assembly used to take us 16 months. For the first Falcon 7X, it took us only seven months."

## Total elimination of assembly problems

Through the virtual platform, Dassault Aviation's risk-sharing partners were able to share and refine the detailed design of their sections in context of the Falcon 7X. This upstream co-development set the stage for a flawless assembly.

"We have eliminated assembly problems by 100%," said Jean-Claude Hironde. "The few times we did have some difficulty were due to the fact that the parts did not respect the digital definition in CATIA."

## Reduced tooling costs

Prior to the virtual platform, Dassault Aviation required specialized tools to assemble its aircraft. However, thanks to the precision of digitally defined parts and the perfect alignment of drill holes between sections, many positioning tools have become obsolete.

"We have cut tooling costs by at least two, maybe even three times because we require significantly fewer tools for the Falcon 7X than for previous aircrafts," said Christian Decaix.

## Elimination of physical prototypes

The digital mock-up of the Falcon 7X is so precise that Dassault Aviation was able to cut out the costly and time consuming step of building a physical prototype.

## Sustainable Development

IBM PLM Solutions contribute to Dassault Aviation's policy of sustainable development by helping the company to advance economically while ensuring environmental quality.

"From an economic perspective, PLM increases our competitiveness through optimized development processes and reuse of corporate knowledge," said Jérôme Camps, aerospace engineer.

"From a social perspective, it enables us to improve conditions for people by anticipating and optimizing ergonomic factors."

"Environmentally, it allows us to use only what is required to build an aircraft., and we no longer produce physical prototypes."



Assembly problems: -100%



*"Thanks to the digital mock-up configured with ENOVIA, we have eliminated the need for a physical prototype of the Falcon 7X."*

Jean-Claude Hironde, Deputy Senior Vice-President,  
Research, Design and Engineering



*"With PLM, we support sustainable development by optimizing our work methods, using less energy, and reducing waste."*

Jérôme Camps, Aerospace Engineer



Physical prototype: eliminated



# Future

Dassault Aviation will continue to enhance its use of PLM by migrating from ENOVIA VPM to ENOVIA V5.

The company also plans to extend use of the virtual platform to other projects such as the Unmanned Combat Air Vehicle (UCAV). In addition, it intends to increase

the functionality of the virtual platform by increasing the frequency of data exchange and to offer e-conferencing to enhance real-time collaboration.

# Conclusion

IBM PLM Solutions developed by Dassault Systèmes have enabled Dassault Aviation to meet and exceed the challenges of the executive business jet market.

With its ground-breaking virtual platform, Dassault Aviation has not only reinforced its position as a leader in the aerospace industry, but also revolutionized the way all aircraft will be developed in the future.

“The Falcon 7X project made the whole company feel younger,” said Christian Decaix. “You can feel the enthusiasm at each production site you visit.”

## – 50% Aircraft assembly time

Assembly time reduced from 16 to 7 months

## – 66% Tooling costs

Fewer tools required to construct aircraft

## – 100% Assembly problems

Total elimination of assembly problems due to collaborative part design

## Eliminated physical prototype

Physical mock-up replaced by digital mock-up





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