

# F-35 Lightning II

## Flies High with Serena Dimensions™



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## Background

Hailed as the most complex, sophisticated, and technically advanced fighter ever to take flight, the F-35 Lightning II is being designed and built by the best engineers and developers in their field, spanning nine countries.

The amount of computing power required to successfully accomplish its missions exceeds that of a typical aircraft several times over. Its communication system enables data sharing with other platforms in the air, at sea and on the ground through Web-enabled logistics support developed via a new standard common across the nine countries involved in its development. And the F-35's Multi-Function Display System will give pilots six full-motion video images simultaneously with a display rate of one gigabyte per second, which is just one of the features making it the most advanced tactical display ever developed.

In a recent monthly report on the F-35 Joint Strike Fighter program, Deputy Secretary of Defense Gordon England was quoted as saying, "The F-35 Lightning II will be the centerpiece of airpower in the 21st century for America and our allies."

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JSF Dimensions Architect, LM Aero

## Challenge

With a project span of 10 years and more than 1,000 software developers writing and testing the more than 19 million lines of code<sup>1</sup> needed to support the aircraft's technological superiority, the Lightning II commands an equally robust and effective system to manage and enforce process in a collaborative and distributed group environment to keep the project within exact specifications.

Managing these processes within all International Traffic in Arms Regulations (ITAR) across the team of developers spanning many companies across nine countries is the mission of David Sopko, JSF Dimensions Architect at Lockheed Martin Aeronautics Co. It's Sopko's job to ensure that the structural integrity, connectivity, security, and uses of the Lightning II's software development process management solution is appropriate, enabling partners to collaborate and ensuring that the mission's software development processes are followed. Sopko is also charged with training users on the most effective use of the system.

## Solution

To meet these challenges, Lockheed Martin deployed Serena Software's Dimensions™ solution. Lockheed Martin has standardized on Dimensions for all of its military aircraft software development projects involving more than 3,500 developers, such as the F-22, F-16, C-130, - C-5 and many other aircraft.

Sopko uses Dimensions to track and enforce several hundred processes in software development and production change-management in order to keep the program within specifications.

As specific and proprietary processes are defined by each group on the project according to their own way of doing business, these processes are embedded into a change document and Serena's Dimensions forces them to do business that way.

<sup>1</sup> GAO 06-356 Joint Strike Fighter Acquisition, March 2006, p. 12.

## An Essential Component

Dimensions has become an essential component of the software development behind the Lightning II. Some of the specific ways Dimensions is being used in this environment include the following:

**Custom Reports:** According to Sopko, using custom reports in Dimensions has become a longstanding critical component of configuration management, starting with previous fighter plane programs and continuing with the F-35 Lightning II today. “We find that the ability to create and use custom reports in Dimensions is essential to the way we do our configuration management in the JSF program,” Sopko said. “Over the years we have generated many different customized Dimensions reports that have become the backbone of our CM schema. Many of these reports were created in previous fighter programs but are still pertinent to the F-35 program.”

**CM Auditing:** Lockheed Martin also uses Dimensions for CM auditing such as determining who and when a user checked out (or in) a file or made any changes to any Dimensions object. Regarding the CM auditing capabilities of Dimensions with the JSF project, Sopko commented, “The tool’s CM auditing functionality is very complete and provides our JSF users with all of the normal CM auditing features we need.”

Lockheed Martin depends on Dimensions to track file history, track file versioning, capture metadata, and through PC Client, to customize the interface. “These functions are, in my opinion, complete and useful for our JSF end-users,” Sopko noted.

**Security:** Using the latest release of Dimensions, Lockheed Martin enjoys new levels of security to support the company’s highly distributed user base on the JSF project. “This particular improvement in Dimensions is critical to the way we need to design our Dimensions architecture to simultaneously serve multi-company, multi-national, remote and local end users,” Sopko reflected.

**Ease of Training:** With more than a thousand Dimensions users on the 12-year development phase of the international JSF project, training is a key factor in the product’s ongoing success with the project. Sopko has no issues training Dimensions administrators and end-users, and he finds the PC client interface to be intuitive and very easy to teach.



## Benefits

Sopko finds that the biggest benefit Dimensions provides is in enforcing these critical processes in the program, which is Dimensions’ greatest strength. “When it comes to the enforcement of processes, it’s right at the top compared to other change management products,” Sopko stated.

“Without Dimensions, we would have to have a lot of manual processes. We’d need more oversight by personnel management, so it saves a lot of micromanagement and overhead since it enforces the process and saves time,” he added.

“For example, developers can follow processes dedicated to error checking and take some pretty rigid processes and assure that they’re being followed. With Dimensions, we have the ability to check reports to see who’s doing what, and where it has occurred, pretty easily.”

The JSF team is also using Dimensions to enforce processes associated with version control – a critical process in a development project of this magnitude.

## New Dimensions on the Horizon

Having standardized on the product for years, Lockheed Martin has been a loyal Dimensions organization throughout several major product upgrades and anticipates continued benefits from future releases. Among the most valued new features of Dimensions 10 at Lockheed Martin are its extended privileges, providing the ability to see user work areas and additional attributes.

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