INSTANT OFFENSE

Imaging software helps Lockheed engineers design fighter jet

By Andy Dworkin
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In Lockheed Martin’s secretive Southern California “Skunk Works” plant, workers spend months painstakingly hand-building two prototypes of the Joint Strike Fighter.

But at Lockheed Martin’s fighter plant in Fort Worth, engineers assemble their plane virtually in seconds, using powerful 3-dimensional modeling software that could make fighter design cheaper, faster and easier. The computer program lets engineers and assembly line workers alike see how thousands of components come together to form the warplane, an ability they’ve never had before, according to Lockheed Martin engineer Bob Lynch.

“When I was a kid, I took my bike apart and put it together 100 times…It’s difficult for them to actually do that out in the factory,” Mr. Lynch said.

But computers make such tinkering possible, along with the software provided by a small but rapidly growing company from Ames, Iowa. That firm, Engineering Animation Inc., formed a partnership last week to develop new kinds of 3-D visualization software with Fort Worth-based Lockheed Martin Tactical Aircraft Systems.

According to Marty Vanderploeg, Engineering Animation’s chief technology officer, the company’s software works by pulling together the separate bits and pieces of products designed on other computer programs. Although the computer drafting software used today can draft intricate parts, it would take too much memory to combine those into a complex machine.

That really requires a radically different software," he said. The software must have "very intelligent management of memory" to show all the parts without overwhelming the system.

The Iowa firm’s first project at Lockheed Martin was to make a computerized model of the F-22 Raptor fighter’s midfuselage, which is built in Fort Worth. That meant integrating computerized designs of 37,000 parts.

For the Joint Strike fighter, the company’s model now has about 2,000 parts. But Lockheed Martin is still in the early stages of designing the jet and in a few years that model will include many tens of thousands of parts. Eventually, Lockheed Martin will use the software on all its jet projects and will use it to communicate with distant engineers at partner firms such as British Aerospace and Northrop Grumman.

As a recent demonstration of the software at Lockheed Martin shows, this ability to put all the pieces together has many uses.

For one, the computer will show areas where two engineers have designed different pieces of the jet to fit in the same space, Mr. Vanderploeg said. Before, it often took time-consuming physical mock-ups to reveal such mistakes. But on the computer, problematic parts can be found and altered at an early stage of the design process, which is cheaper than trying to fix things later in the game, when the design is more firmly set.

Also, the computer program lets the company watch the assembly process step by step. This lets engineers decide on the most efficient order so assembly runs quickly and smoothly.

The computerized assembly also lets factory-floor workers visualize how they will fit parts together on a jet they’ve never tried to assemble before. Today, the workers pore over thousand-page manuals filled with diagrams.

And because of the way Engineering Animation’s software is structured, even laptop computers can call up the diagrams.

So marketing personnel in the field can access pictures of the jet for soldiers, showing how new bombs load onto planes.

Maintenance workers can refer to the images to help them repair planes.

"The more people that are able to visualize a product, . . . the better payoff you get," said Woody Sconyers, director of virtual product development for Lockheed Martin. Mr. Sconyers said the payoffs could be vast: The cost and time of development could be cut in half, and maintenance time could fall 30 percent.

Low cost will be especially important in the Joint Strike Fighter program. Lockheed Martin and Boeing Co. are competing now for a 2001 contract award worth more than $200 billion, and the military has said affordability will be a prime consideration.

Matt Rizai, Engineering Animation president and chief executive, said current users such as Ford and Mazda probably haven't seen 50 percent savings, but Lockheed Martin's software is the newest and most powerful. And those auto companies have seen "a significant amount" of savings, he added, though he couldn't disclose how much.

As for Engineering Animation, it could gain a lot from its partnership with Lockheed Martin as well. Already the company is expanding quickly - from revenue of $20 million in 1996, it is expected to report almost $50 million in 1997 revenue, moving to $85 million in 1998, said Raj Seth, an analyst with Cowen & Co.

And though Mr. Rizai wouldn't disclose terms of the Lockheed Martin partnership, Mr. Seth said that "it's a big deal." Not only will the fighter maker give EAI a lot of business, he said, but "when you get a significant endorsement like that, it tends to drag other people along with it."