Sharing the dream

How the right tools and an inclusive culture support the 787's global partner network

By Bill Seil

The 787 program's Global Collaborative Environment advances a Boeing tradition that has distinguished the company since World War II.

Boeing Commercial Airplanes is creating the 787 Dreamliner with the support of a network of global partners. Designing the new airplane requires real-time coordination between engineers in the United States and in other nations. Thanks to sophisticated technology, the program's approach to the development of the airplane has been as revolutionary as the jetliner itself.

Kevin Fowler, vice president, Systems Integration Processes and Tools, said the 787 program began with the expectation that any group that was designated to build part of the airplane would also be responsible for designing it. That was a change from previous programs, where Boeing did most of the design work and other companies built most of the airplane.

"This separation of the design and build functions created problems, because you ended up in a situation where it was difficult to incorporate changes to the design," Fowler said. "So it became clear we needed to share some of the design responsibility in order to more effectively partner with some of the great aerospace construction companies around the world."

COLLABORATIVE DESIGN

But the idea of globally dispersed design would only work with the right tools. The program needed precise coordination, with partners having access to centrally stored data. Also required: systems for "collaborative design," so teams can share design changes in real time.

As new approaches were developed, the team benefited from lessons learned on the 777 program. Leaders of the 777 team had broken away from the tradition of completing the structural design first, then moving on to the systems design. They had found a way to do both at the same time, thus saving time and reducing the need to adapt the structural design to new systems. This was a big advance, but the tools were still not available to spread design work among global partners.

A look at the first skin panel of the center wing box for the first 787. Fuji Heavy Industries is responsible for this component of the new airplane. Their involvement in the 787 program was made possible by new collaborative tools.

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It wasn't until 2001 that the picture started to change. The World Wide Web and various e-enabled tools permitted collaboration. In addition, Dassault Systemes developed its Product Lifecycle Management tools to support global collaboration. This "V5" suite of tools included CATIA for collaborative product development, DELMIA for engineering lean manufacturing processes and ENOVIA for decision support and lifecycle management.

Fowler said there are two major advantages to holding the data locally but letting people work it remotely. When designers are close to the build activity, it's easier for them to see what's working and what's not. In addition, "we know people aren't as effective when they have to work away from home for extended periods of time," he said.

GLOBAL PARTNERS

Steve Schaffer, vice president, Global Partners for Boeing Commercial Airplanes, said the traditional phrase for his job is "supplier management." But with the 787, "global partners" suggests a supply base that is more an extension of Boeing factories than an outside entity. Schaffer emphasized, however, the word "global" includes the United States and the Boeing business units.

Boeing had high standards for selecting companies to manufacture major sections of the Dreamliner, Schaffer said. Fewer companies would be needed because each was taking responsibility for providing a higher level of systems and structures—and bringing in their own suppliers. The companies also would be sharing in the risks and benefits of launching a new airplane, with each paying its own upfront costs related to engineering, facilities, equipment and tooling. Contracts with each of the partners have common provisions, based on the philosophy that what's good for one is good for all.

Schaffer noted the partners also have considerable experience in the principles of Lean. The idea is to extend Lean strategies from the 787's global base of partners to the factory floor during final assembly. This supports two of the company's four initiatives to boost long-term growth and productivity: Lean + and Global Sourcing.

Although 787 development is very much a team effort, there's still a need for a single decision maker on important points. Those questions are decided by Boeing management.

"We share information with our partners, we listen to them and we influence each other," Schaffer said. "But at the end of the day, there's no doubt that Boeing is leading."

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Steve Schaffer, vice president, Global Partners for Boeing Commercial Airplanes, said the partners on the 787 program have considerable experience in the principles of Lean manufacturing.

COLLABORATION TOOLS

Kevin Fowler said long-distance communication has been facilitated by the creation of more than a dozen "collaboration centers" at Boeing facilities in the Puget Sound region of Washington state, with the latest in video and teleconferencing equipment. Partners have created comparable centers. Multiple rooms can be linked per session, with encrypted transmissions to ensure security.

The 787 program also uses global collaboration tools available through Exostar, an online trading exchange for the aerospace and defense industry in which Boeing is an investor. Other collaboration tools include the Dassault Systemes V5 suite, Radiance Technologies' tools for the transmission of high volumes of data and the Boeing supplier portal.

Also critical: personal communications devices, particularly for a global partnership covering multiple time zones. "The wide availability of cell phones has been a very significant advancement in our ability to communicate," Fowler said.

These tools create a highly collaborative environment. While the term "network-centric" isn't common in the 787 program, many of the same principles are at play. As Schaffer noted, there is a strong emphasis on "situational awareness" among the 787 partners. There also is a culture where the ability of partners and team members to self-organize helps to advance the program.

The collaborative environment also strengthens the ability of the 787 program to draw on the talent of other Commercial Airplanes teams and personnel from across Boeing business units. The Dreamliner program has been a leader in advancing the use of common processes and tools, allowing it to send work packages to Integrated Defense Systems engineers in St. Louis, Southern California and Philadelphia. ■

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