

Start your engines

While team members observe, Jeff Kelsey of 787 Interiors demonstrates installation of main cabin ceilings in a replica 787 fuselage in Everett, Wash. The 787 Interiors team developed designs and processes that allow interior components to be installed quickly and efficiently.

WILL WANTZ PHOTO

Bucking tradition to meet time and cost goals in designing, building 787 interiors

By KATHERINE SOPRANOS

The 787 Interiors team got used to hearing that its time-saving goals and installation methods were “impossible” to achieve. But by bucking tradition and throwing out the blueprints, the team proved otherwise—creating solutions to build and install 787 interior components faster and more efficiently than people believed possible.

The goal to install interior components—such as passenger seats, galleys, overhead bins and cabin linings—efficiently in a short time is based on the objectives of assembling a 787 airplane in a matter of days, and to allow airlines to reconfigure their airplanes quickly. To meet its goal of cutting recurring costs for interiors installations by 50 percent, the 787 Interiors team took a different approach in designing and installing parts.

“To meet the vision we established for our team in 2001, we changed the culture of how we work together, how we do the work and how we get the results,” explained Nancy McCutchin, 787 Interiors manager. “The idea was to bring Lean+ processes and teams together in the beginning of the program to develop strategies and solutions to meet our installation goals, which were radical and aggressive. Some engineers thought we were crazy.”

Ultimately, the plan evolved to focus on establishing common interfaces between interior components on the 787. Currently, each of an airplane’s interior components has different interfaces—the way the piece connects to the airplane—and requires time and tools to install and configure to customers’ requirements. With the 787 interior’s common system, it will be swifter and more cost-effective to tailor and install interiors to each customer’s special requirements, using components designed to be installed efficiently.

“In this competitive environment, customers expect products to be the best. We have to learn how to far exceed prior design solutions to continue making our products appealing and competitive,” said Brian Melnyk, senior manager of 787 Interiors–Manufacturing Quality. “This is about changing the way we work. It’s the only way we can remain competitive.”

INSPIRATION FROM AUTO RACING

Traditionally, interior components were designed by engineers. Then, Manufacturing separately reviewed them for production or installation issues. Sometimes issues with parts weren’t discovered until the installation process began on a real airplane.

The team knew it had to make improvements. But with such aggressive goals, just changing the design wouldn’t be enough. The team had to improve the processes, too.

Inspired by the efficiency, speed and split-second accuracy of professional car-racing pit stops, the team decided to implement a “pit stop” concept for 787 Interiors.

“Our vision was to design interior architecture that allows both our factory and the airline customer to easily build, reconfigure, refresh and service the interior with the speed and precision of an auto-race pit stop,” McCutchin said.

The intent was to design simple components that fit intuitively and could be installed easily, quickly and safely—in many cases with few or



787 Interiors manufacturing technicians Echo Ashworth (foreground, left) and Jenn Jacobsen collaborate with Final Assembly and 787 Interiors team members on interior component solutions at the Payloads Validation Center, an Everett, Wash., non-production site to prototype interior concepts. WILL WANTZ PHOTO

no tools—and without affecting production. To achieve these goals, the team for the first time brought Manufacturing and Engineering together at the beginning of the Interiors process—before parts design began.

Engineering and Manufacturing found that by sharing up front their ideas, challenges and processes, they could design and build interior parts that helped resolve potential design or production issues before anyone touched the real airplane.

Collaboration among all the interior stakeholders, including suppliers, not only helped uncover issues early on and avoid rework, it also answered important questions: What worked? Does a part function the way it was designed to? What would and could be improved further?

“Once we got together and saw each other’s perspectives, we could find common ground and gained a new respect for our collective challenges,” said Joe Tinoco, a design engineer in 787 Interiors.

The results, said Melnyk, are more mistake-proof parts that are simple, lighter and ergonomically easier to install. “We’re even down to a very small number of tools—single drivers and fasteners instead of a cartful,” he said.

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The cost and time savings from improved designs benefit the customer. “By becoming more efficient, we are more competitive as a company and a work force, giving our customers less-expensive, better-value airplanes,” Tinoco said. “For an airplane’s life-cycle maintenance, the ‘pit stop’ philosophy speeds removal and replacement of parts for customers. For example, a damaged flight-attendant seat can be changed out at the gate with little schedule interruption, whereas in the past it could result in a canceled flight.”

DESIGNS PUT TO THE TEST

Since 2004, the team has put its designs—and the speed and ease it takes to install the parts—to the test in “Race Day” events at the Payloads Validation Center in Everett, Wash. At this nonproduction facility, design and manufacturing engineers create prototype interior concepts and install those parts into validation vehicles—replicas of the 787 fuselage.

In March, the team held its fourth auto racing-themed event, called the “Pit Crew Academy,” that included manufacturing technicians. The weeklong event demonstrated the installation process for nearly 25 787 interior components, including lavatories, floor coverings, dimmable windows and crew rests. Simulations installing Airplane No. 3 parts in the mockup vehicles validated the designs and improved production processes. Manufacturing technicians installed many parts with fewer or no tools, often reducing hours of work into seconds.

“By working together, the teams developed designs that met or exceeded our aggressive target goals,” McCutchin said. “The Pit Crew Academy validated the process from parts delivery to installation plans and provided manufacturing technicians hands-on experience prior to touching the real airplane.”

The Pit Crew Academy’s validated designs create a chain reaction of process and time-savings improvements, starting with Final Assembly.

“The academy re-emphasized the ease and speed that parts can be installed in the airplane,” said Bob Rohwer, senior manager of 787 Final Assembly–Manufacturing Engineering. “Our team welcomed the simplified interfaces between the airplane structure and interiors made possible by enabling architecture.”

He added that the Pit Crew Academy also served as a dress rehearsal for the content and format of initial interior component work instructions for manufacturing technicians.

Now, if someone wonders how Interior’s seemingly impossible, lofty goals were achieved, McCutchin has the answer.

“Thanks to our talented and innovative design teams,” McCutchin said, “mission ‘impossible’ accomplished, and vision achieved.” ■

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Changing for the better

Brian Melnyk and Nancy McCutchin were part of the 787 Interiors team that championed a culture change and a new way of doing business—which resulted in substantial efficiency gains. Here they offer insight on how to make improvements.

Melnyk: “You have to have extraordinary targets and shake yourself free from making incremental changes in order to make a true shift in finding a better solution. Diverse thoughts also bring success. People bring different views on how to do something. Amalgamating these ideas and beliefs results in successful designs. Be willing to accept risk, and drive by the belief that you’re doing the right thing for the company.”

McCutchin: “We have terrific products today. How do you convince people that they need to get better? Give them target numbers that seem unreasonable—downright crazy—and give them the tools to achieve them. Providing the tools to ‘find the way’ was the most important part. Without the tools, the teams may have floundered and not been as innovative. We did a lot of ‘try-storming.’ We created a safe environment to learn by trying different things—and designed better solutions.”

— *Katherine Sopranos*

The ideal ‘pit stop’

What exactly do you look for in an airplane interiors “pit stop” exercise? These—according to representatives of Engineering and Manufacturing:

- Parts fit through aircraft passenger doors
- Fit is intuitive; no adjustments
- Parts fit the correct way only
- Common interfaces
- Simple fastening methods
- Easy, simple, reliable installations
- Quality designed in
- Parts “designed for manufacturing”
- Easy to modify