

Picture this!

Computer graphics and sophisticated automation ensure smoother, safer operations at Boeing widebody paint hangars

By Bill Seil

The importance of graphics at Boeing widebody paint hangars goes well beyond the livery on airplanes. Automation that supports the operation of these hangars, located at the company's Everett, Wash., plant, uses computer graphics to present a clear view of the buildings' complex systems. These include a new collision avoidance system, which has been highly effective at preventing painting platforms from coming in contact with airplanes.

The development of the collision avoidance system by Boeing and Concept Systems Inc., of Albany, Ore., is a prime example that persistence and determination to "find a way" can overcome obstacles.

The most sophisticated automation can be found at the plant's 45-03 paint hangar, which recently underwent a complete upgrade. The automated systems are linked into a common computer network used to manage the hangar's operation. Computer graphics show the position of painting platforms—such as "crane stackers," which are large movable platforms that carry painters and equipment, and wing and tail stands—relative to the airplane. Overall, the computer images give maintenance personnel clear, real-time information on the status of the hangar's many systems. Paint supervisors can check a computer station to get precise information on their work environment and equipment.

"Graphics are better than data because everybody understands them," says Neil Kuntz, an automation designer for Shared Services' Everett Site Services Plant Engineering. "They give you a quick look that provides a lot of detailed information."

The 20-year-old 45-03 paint hangar—which is now used for 787 and 777 airplanes—was badly in need of modernization in 2006 when design work began. Bill Dill, Commercial Airplanes decorative paint operations senior manager, told Kuntz he wanted a collision avoidance system that was 100 percent effective and did not interfere with the work of the painters.

"I'll have to say, this caused a little panic," Kuntz said. "He was asking quite a lot. But this led to some intense research by us and Concept Systems, our systems integrator, that resulted in this highly effective new system."



PHOTO: Neil Kuntz, automation designer for Everett Site Services Plant Engineering, monitors systems from the control room of the 45-03 widebody paint hangar at the company's Everett plant. The newly installed systems are linked to a computer network that is used to manage the hangar's operations. GAIL HANUSA/BOEING

Concept Systems uncovered a new software called Proximity Query Package (PQD), which had been developed by the computer science department at the University of North Carolina, Chapel Hill. The PQD application, along with CATIA digital plane dimensional data, was embedded into a custom collision avoidance software package for the paint hangars.

Kuntz, who prepared the automation design specifications, said the goal of the upgrades was to provide technology to support painters' needs without creating overly complicated, difficult-to-maintain systems.

New, more sophisticated equipment was installed and linked into a network. New crane stackers and wing stands were installed. The building's processed air and solvent recovery systems were replaced, as was the basic infrastructure, including lighting and pumps.

"From an automation standpoint, this is the first building where we've substantially networked all of our equipment," Kuntz said. "It's fully integrated, so all the systems are talking to one another. For instance, the crane stackers always know where they are relative to the airplane and each other."

Kuntz sees the new collision avoidance system as the most successful project of his Boeing career. Various systems to prevent crane stacker contact with airplanes have been in use since the hangar was built, but until now the results were sporadic.

If a moving or repositioning crane stacker touches an airplane, damage can range from a scratch in the paint to a dent. In worst-case situations, airplanes must be sent back to the factory for repairs.

"The crane stackers are very large, so the potential for damage is very serious," Dill said. "The painters are focused on painting the airplane and they can't see every point where the stacker could come in contact with the product." Since the collision avoidance system has been installed, "we haven't had any significant incidents," Dill said.

The concept behind the collision avoidance system is simple. After each airplane is rolled into the paint hangar, it is scanned with a theodolite coordinate measurement system. This sophisticated tool precisely measures the airplane position relative to the hangar structure and painting equipment. Data from the scan, along with the aircraft model, engine type and flap positions, are used to create an accurate 3-D model in the computer system. Specialized software tracks and prevents contact between the airplane and the crane stacker.

Dill and his decorative paint operations team have found the new collision avoidance system to be highly reliable—greatly reducing the risk of airplane damage. It also helps them to keep pace with fast-paced production schedules.

Dill and his line managers and painters also speak highly of the building's new automated systems. Line managers say they are able to look at the graphic displays and instantly understand what is currently taking place. System problems can be tracked down and resolved more quickly. Supervisors enjoy being able to go to a computer and call up activity reports—something they weren't able to do previously.

Kuntz, a Boeing employee for more than 20 years, has spent most of his career working on ways to ensure that the widebody paint hangars operate smoothly and identifying technologies that can improve their operation. He believes this latest upgrade has been particularly effective, demonstrating how the Shared Services Group has been a valuable partner in helping its Commercial Airplanes customer work better.

"The thing I love most about this job is the technology; it's constantly changing," Kuntz said. "Sometimes it's tough keeping up with all the advancements, but it's never boring. The ultimate satisfaction comes when those advancements improve efficiency and the work environment." ■

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PHOTO: Everett Site Services Plant Engineering automation designer Neil Kuntz works on one of the 45-03 paint hangar's crane stackers during the collision avoidance calibration process. The stackers are overhead hoisting platforms that painters operate and ride to allow access to the entire surface of the airplane.

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