

The power

How process improvements also create better environmental and workplace safety performance

By Jennifer Cram

In Long Beach, Calif., mechanics who help assemble the wings of the C-17 transport are saving days of flow time—what took six days to prepare for production now takes only a few hours.

The same kind of success story is playing out in Renton, Wash., where a 737 wing assembly team has improved the production process—while cutting waste and costs.

At both locations, and throughout Boeing, employees are unleashing the power of Lean+ to drive efficiency—and help protect the environment and create a safer workplace. The initiative even has been extended to Boeing’s global suppliers.

“Lean+ is about creating a culture of collaboration and continuous improvement,” said Bill Schnettgoeke, vice president of Boeing’s Lean+ growth and productivity initiative. “Its philosophies, which include waste reduction, resource conservation and competitiveness, are in natural alignment with environmental and workplace safety performance improvements—and will help Boeing achieve its goals.”

As part of its commitment to continual improvement, Boeing is pursuing aggressive five-year environmental and safety targets at its operations. The goal is a 25 percent improvement in energy efficiency, greenhouse gas emissions intensity and recycling rates, as well as hazardous waste reduction, at Boeing’s major manufacturing facilities by 2012. This year, Boeing also launched a companywide effort called Safety Now, which aims to improve workplace safety performance by 25 percent over the next five years.

All employees can play an important role in taking steps to conserve energy, contributing to environmentally progressive aerospace designs, and identifying safer and more efficient work processes. Take, for example, what the Boeing team has done on the C-17 program in Long Beach with the installation of stringers—the structural support stiffeners for wing skin panel assemblies. Mechanics used to remove plastic coverings from each of the 156 stringers per shipset, sort and load the stringers into sawhorses, kit them into lifting straps and finally transport them to several staging areas. It took about six days to complete all of those jobs. Not only was the process time-consuming but there were ergonomic risks associated with the repetitive tasks.

To streamline the process, the C-17 team held what are known as Accelerated Improvement Workshops on the production floor and with stringer supplier Contour Aerospace. Using Lean+, the team developed a streamlined approach and new tooling that significantly reduced setup



PHOTO: Boeing Commercial Airplanes Support Center project manager Samantha Reed (standing) plans a Lean+ event with production system consultants Lauren Wood (left), Brent LeBlanc and Tom Kato. GAIL HANUSA/BOEING

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of Lean



time and reduced the risk of common injuries. Now, stringers arrive from the supplier in kits for specifically assigned aircraft wing assemblies. Each kit contains stringers pre-loaded into straps, so mechanics can load stringers directly into assembly jigs. The changes eliminated 48 major crane moves and some 27 miles (43 kilometers) of movement by workers performing all the various tasks. Not only was the risk of injury reduced, but so was the potential damage to components.

And the benefit to the environment was huge. “We used to fill four Dumpsters with plastic wrap per shipset,” said John Rainwaters, Department 517 staff analyst. “Now, only one half a Dumpster is filled, reducing waste by over 87 percent.”

In addition to lowering maintenance costs and creating a cleaner work environment, more than 3,200 square feet of floor space (about 300 square meters) was opened for other use by reducing or eliminating so-called “monuments” such as storage racks, said Trevor Whiteside in the Wing Integrated Product Team, Tool Engineering.

“We relied on the experience of a cross-functional team to get us these benefits,” said Linda Sanchez, Department 517 senior manager. “Without their combined knowledge, enthusiasm and skill, we wouldn’t be seeing this much success.”

The C-17 team was recognized for its innovative efforts with several awards, including a 2008 Boeing Silver Eagle Award, a Bronze level award in the California Team Excellence Award competition, and a 2009 International Team Excellence Award Finalist and Attendee Choice Award Certificate of Recognition from the American Society for Quality.

SLASHING SEALANT WASTE

Like their Boeing colleagues in Long Beach, members of the Commercial Airplanes 737 wing spar team in Renton also held an Accelerated Improvement Workshop to help identify ways to cut waste, according to industrial engineer Brandy Feltes.

Spars are the internal support structure that run through the full length of the wings and provide support for slats and flaps. Mechanics and sealers apply sealant, or “seal,” to the structure to prevent leakage or corrosion. But before applying the seal, sealers must remove the appropriate number of tubes of seal from a freezer and thaw them to a specific temperature. Any leftover seal not used within a given period of time must be discarded as hazardous waste. When employees noticed that up to half of the seal tubes were not fully used before being disposed of, they conducted an Accelerated Improvement Workshop. That led to three key improvements:

- + An employee now makes sure co-workers have the right amount of seal when they need it.
- + A dispensing station was established for brush-coat (or pre-coat) sealant that allows employees to obtain only the amount of seal needed to do their job.
- + A 1-ounce seal tube is now an option, in addition to the existing 3-ounce and 6-ounce tubes, to accommodate jobs that only require a small amount of sealant.

PHOTO: Structure mechanic Pete Alvitre loads pre-kitted stringers directly into assembly jigs. The process reduces the risk of injury and the amount of plastic packaging waste, while saving significant flow time. PAUL PINNER/BOEING





“The results were outstanding,” said Chuck Kurzhal, Spars manager and Value Stream Team leader. “We reduced discarded seal tubes from approximately 86 per day to only 20, and lowered seal waste by more than 50 percent” without compromising the quality of the seal applied to the spars.

The changes also helped cut costs. “We used to stock a lot of tubes, and now we’ve been able to reduce not only our consumption but also the inventory we stock in our freezers,” said sealer DeeDee Christensen. “That means we rotate through our seal more quickly, so we always have the freshest material.”

The team is continuing to explore ways to further reduce seal waste, such as creating an even smaller tube size option, and its innovations have been shared with other teams for replication.

CUTTING ENERGY CONSUMPTION

In addition to saving time, reducing costs and eliminating waste, the Lean+ initiative is also being used to reduce energy consumption. Since 2002, Boeing’s Shared Services Group Conservation Initiative team has conducted 57 Lean Energy Assessment events at Boeing sites across the United States, and has identified potential ways to save enough energy to power some 28,400 homes for one year. Boeing has reduced energy consumption by almost 12 percent during this time, according to Jeff Nunn, SSG Conservation Program manager.

The assessments, conducted over several days by a small team of experts, identify opportunities for improvement. These include retrofitting buildings with more efficient lighting systems, improving heating and air conditioning systems, and having these systems operate when employees are actually in the building. The assessments also identify ways employees can help reduce energy consumption, such as turning off computer monitors, lighting and equipment when not in use.

“Lean+ provides a common approach to evaluate a site’s energy consumption and identify ways to reduce it that might otherwise go overlooked,” said John Norris, Lean Energy Assessment team leader.

Earlier this year, assessments were conducted in Houston, Renton, and Huntsville, Ala. An assessment is planned this month in Heath, Ohio.

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– John Norris, Boeing Lean Energy Assessment team leader

PHOTOS: (ABOVE) DeeDee Christensen, a sealer in the 737 spar area at the Commercial Airplanes factory in Renton, Wash., was part of a team that helped reduce sealant waste by 50 percent. MARIAN LOCKHART/BOEING
(BELOW) Ed Stefanski (left) of Philips, a Lean Energy Assessment supplier, and John Norris, Boeing Lean Energy Assessment team leader, assess lighting systems for energy and cost savings. ALAN MARTS/BOEING



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– Mary Armstrong, Boeing vice president, Environment, Health and Safety

SUPPLIER SOLUTIONS

Boeing’s Lean+ initiative is also helping Boeing suppliers improve their environmental footprint.

This year, Supplier Management developed methods to better measure environmental improvements during Lean+ events. While leaner processes naturally reduce waste and energy use, these benefits had not been consistently documented. By actively measuring these benefits, the actual savings is realized, which in turn helps drive further environmental improvement.

Pilot projects show significant environmental and cost savings. For example, one effort with a supplier resulted in the reduction of more than 14 pounds (6 kilograms) of dunnage (packaging materials such as plastic bags and Bubble Wrap) per box, which will lead to reductions of about 1,100 pounds (500 kilograms) of waste per year. Brent LeBlanc, a production system consultant in Commercial Airplanes, noted the new process also reduced setup time by 12 percent and people travel by 8 percent.

“We’re really excited that Lean+ is such a natural fit with reducing environmental impact,” said Ray Healy, director of the Commercial Airplanes Supplier Management Operations Center. “It directly supports the business and isn’t something extra we have to go do.”

Commercial Airplanes’ Supplier Management team plans to hold about 500 Lean+ events with 58 suppliers next year to help them better measure their environmental footprint and identify and apply reduction opportunities. Those events will include emphasis on reducing packaging and carbon dioxide emissions, primarily from parts transport and energy consumption. The team estimates those efforts could reduce dunnage by up to 10 tons (9 metric tons) and drive significant flow and productivity improvements in the supply chain, said Steve Patneau, senior manager for the Support Center.

“Boeing employees are leaders in innovation,” said Mary Armstrong, vice president of Environment, Health and Safety. “Their talent, pioneering spirit and enthusiasm will help us achieve new levels of performance—resulting in safer workplaces, improved environmental performance and a better future for our company, our employees, our customers and our communities.” ■

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Get involved in Lean+

You can help improve the safety of your workplace and drive environmental efficiency:

- + Identify process improvement opportunities.
- + Evaluate processes, use Lean+ tools to improve environmental performance and reduce workplace safety and ergonomics risks.
- + Measure results and set improvement goals.
- + Seek and share best practices.

Need more information? Resources and tools include:

+ EHS and Lean+ Integration Course

Training on how to embed environment, health and safety thinking into Lean+ is available on the Boeing intranet at http://leo.web.boeing.com/ProductService/EHS_Course.cfm. The course includes checklists to help identify environmental, energy, ergonomics, and safety and health risk factors that exist in the job or process and reduce or eliminate them.

+ Accelerated Improvement Workshops

AIWs are incorporating environmental considerations in addition to traditional metrics such as cycle time, lead time, safety and ergonomics. The updated workshops began in June and have been held in Auburn, Renton and Everett, Wash., and at the Spares Distribution Center in SeaTac, Wash. Full implementation is expected in the coming weeks.

+ Initiatives Database

To find information, best practices and “lessons learned” that promote continuous improvement, employees can search for initiatives-related projects in the Initiatives Database (IDB) on the Boeing intranet at <https://initiatedb.web.boeing.com>. The database facilitates replication of projects that can significantly reduce energy use, ergonomics risks, time and cost. If you have a potential environmental or workplace safety-related success to share, contact your business unit IDB focal listed on the IDB Web site.

To learn more about Lean+, visit <http://leanplus.web.boeing.com/index.cfm> on the Boeing intranet.