BOEING FRONTIERS

Getting in gear with CHAKU CHAKU

Portland facility touts efficient production style

BY KATHLEEN HANSER

The term "chaku chaku" may sound funny to most employees, but it's serious business in Boeing's Portland, Ore., bevel gear-making organization.

Boeing Chairman and CEO Phil Condit inks in a "Daruma doll," signifying the completion of the project's initial start-up for the bevel gear chaku chaku line.

Japanese for "load load," chaku chaku is an efficient style of production in which all the machines needed to make a part are situated in the correct sequence very close together. The operator simply loads a part and moves on to the next operation. Each machine performs a different stage of production, such as turning, drilling, cleaning, testing or sandblasting.

In the past, using the "job shop" method, these machines were located in separate areas of the factory, and each required a separate machinist to operate it. They turned out hundreds of parts in batches that were then loaded into baskets for transporting to another area, or simply sat there in stacks waiting until they were needed or the whole batch was completed.

"This equipment was large, complex and expensive," said Andrew Takamiya, Production System manager at Boeing in Portland. "By incorporating the fundamental principles of the Lean production preparation process and designing equipment specifically for the type and size of the parts being manufactured, we've reclaimed 2,076 square feet of factory space."

The machines in the new chaku chaku line are located in a U-shaped flow line. "The machines eject the parts automatically and everything is timed just right, so the operators don't spend time unloading or waiting," said machinist and Lean Manufacturing team member Jack Mitchell. "By the time the operator gets to the end of the line, the machine cycle of the first machine is completed and the whole process can start over again."

This flow line is assigned only those resources (equipment and labor) that are required for the specific activities to be performed. Included in the line are appropriate inspection tools to ensure no quality problems are passed on to the next operation.

Because each flow line is responsible for turning out a completed product, it is easier to keep track of how many parts are being produced and to stay on schedule. "We get a certain amount of raw material each day, so we know exactly how much work we have to do," said Mitchell. "Before, we were never sure how much would get done in one day, because one part might be held up in another area, preventing us from moving forward."

The road to chaku chaku began two years ago when a small team of employees in the Portland Fabrication organization took on the task of improving the flow of products through the factory.

"We started by showing some of our ideas to consultants from Shingijutsu [Co. Ltd] who were assigned to help us," said Mitchell. "But they quickly taught us that the best way to improve the system was to first learn the basic principles of Lean Manufacturing and the production preparation process. The most important learning comes from working on an actual project to figure out how to do it ourselves."

FRANK BUCK PHOTOS

Boeing Chairman and CEO Phil Condit (right) talks with Portland employee Gil Rodriguez about the Flux Control Unit moving assembly line.

The team decided to apply the Lean principles to the Next-Generation 737 bevel gear line, which represents 40 percent of the bevel gears produced in Portland. These gears drive the flaps on the 737's wings. This represented the first time within Boeing that the chaku chaku production concept was applied to such a complex process. The team used mock-ups to simulate the specific bevel gear production process and design the right-sized equipment for the line. Many of the unique machines were internally developed and built by the team. They also used a combination of modified surplus, existing and purchased equipment.

"This task required breaking down many barriers along the way, including the old way of using massive, complex and expensive machines to produce small parts," Takamiya said.

During this time, several team members traveled to Japan for advanced training. They learned how to incorporate all the necessary elements of Kaizen required to build a successful chaku chaku line. "Kaizen" is the Japanese term meaning the relentless process of finding and eliminating waste. It seeks continuous improvement through incremental change.

One element they put to especially good use is "setup reduction." One of the key machines in the line is a Gleason bevel gear generator, a 60-year-old machine requiring more than four hours of setup time. The team concentrated on the problem in numerous Shingijistu- and internally-led workshops and reduced the setup time to 241 seconds.

"Team members came up with many clever ideas and used lots of shop-made accessories to accomplish this goal," Mitchell said. "They learned what a determined group could accomplish when they set their minds to it—without spending a lot of money."

Phase I of the Portland chaku chaku line was completed May 14. One of the last jobs was to complete the traditional Japanese Daruma doll, which is really a soccer ball-sized head. The doll symbolizes the team's commitment to the project and was a gift presented to the team. Tradition calls for one eye to be painted at the beginning of a new project, and the honor of this task went to Christer Hellstrand, general manager of the Portland site at the time.

"This is one of the finest examples I have seen where natural leaders come forward and challenge the status quo," Hellstrand said. "It's a fine example of the extraordinarily talented workforce we have in Portland. I think it's our job as leaders to provide the environment where this type of teamwork flourishes—it's how we will continue to be competitive."

After witnessing a part go through the line, Boeing Chairman and CEO Phil Condit said, "That was really a great display. ... Lean is really beginning to happen in a number of places. ... This is a great example of that." Condit, who on May 14 visited the Portland factory as part of his "Point to Point" tour to meet Boeing employees across the U.S., was given the honor of painting in the second eye of the Daruma doll to signify the completion of the project's initial start-up.

Takamiya credits the project's success to the working-together principle. "We involved many people who were not officially on the team as well," he said. "The combined experience, knowledge and efforts of everyone involved are responsible for overcoming the many challenges involved in changing existing long-standing processes."

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