



Structural test mechanic Doran Reano cuts a series of triangular gussets from a steel plate. Reano and other Flight Operations, Test & Validation employees at the Developmental Center in Seattle took the initiative to develop process improvements.

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A pattern of empowerment

Flight Operations, Test & Validation team takes process improvement personally by devising, implementing better ways to get job done

By JEFF WOOD

It takes sturdy fixtures to hold an airplane fuselage section or wing box in place as it undergoes the rigors of a structural test. Equally strong is the sense of empowerment that helped Flight Operations, Test & Validation employees at the Developmental Center in Seattle dramatically improve processes.

The FOT&V weld shop is where structural test fixtures come together. It's also where engineers come when the need arises to fabricate or strengthen a fixture, repair tooling, or cut and weld a unique brace, bracket or connector.

"We're an emergent requirements shop," said team leader Bill Speck. "For long-lead developmental program requirements we work to the program's schedule. But much of the work that comes in on a daily basis is generated by unforeseen needs." Often those requests are urgent, coming at crucial points in a test program.

WORKING WITH UNWIELDY MATERIALS

The weld shop's raw materials include steel plates that can measure 8 feet wide by 12 feet long and up to 6 inches thick—and weigh

up to 8,000 pounds (2.4 meters, 3.7 meters, 15 centimeters and 3,600 kilograms, respectively). Welders and mechanics team across job classifications to fashion these unwieldy materials into fixtures that meet engineering specifications with precisions in thousandths of an inch.

However, outdated equipment locked the weld shop into a time-consuming, repetitive, and labor-intensive process that also required coordination between several organizations. In addition, wear and tear on aging cutting torch guide systems limited the precision of the cutting process, so many weld-shop products had to be sent to other areas to be machined to specified dimensions.

Shop members worked with FOT&V manager Monte Melvin and got the go-ahead to research new equipment that not only would reduce the time it takes to cut parts, but eliminate several steps in the process.

"These were ideas that came from the employees," Melvin said. "They knew there was a better way to get the job done, and I cleared the way for them to make the case for new equipment."

The team was particularly interested in a digitally controlled, automated cutting torch, or "burning," system that works directly from an engineering data set or drawing to cut any shape in a single operation.



Structural test mechanic Greg Staples examines the pivot fittings fabricated at the FOT&V weld shop. Hydraulic actuators used in validating 787 wing box designs will attach to the fittings.

JIM ANDERSON PHOTO

empowerment.

After performing research, the team was ready to see a few burning systems in action. Right-sizing was an important consideration, Speck said. He pointed to a sign on the office wall that states an FOT&V guideline: “Spend Boeing money as if it is your own.”

Visiting several fabricating operations in the Northwest, the team interviewed operators to identify the kind of system that would meet FOT&V’s needs. For example, the team specified a system with both plasma and oxy-acetylene cutting torches, configured for cutting any plate thickness. To meet safety and ventilation requirements, the team specified a system with a downdraft table that extracts exhaust gases. To realize the full potential for process simplification, the team specified a system with control software that allows the operator to select and edit preset shapes to match the patterns and dimensions of emergent engineering requirements.

Facilities equipment engineer Ken O’Donnell recognized that installing the team’s choice of

equipment would require significant modification of the facility. However, the budget allotted for the equipment upgrade would not cover the modification costs. O’Donnell did some additional research and identified a similarly capable burning system that could be installed in existing infrastructure. He consulted with the weld shop team, and all agreed the alternative pattern burner met the team’s requirements. “Ken went the extra distance to make this improvement happen,” Speck said.

With the equipment identified and the facilities plan in place, capital focal Walt Heckel joined the team to guide the request through the steps required to obtain funding for project go-ahead.

“I made sure that the people who needed to evaluate the proposal got the full story of the benefits the new system could deliver,” Heckel said. “We don’t replace equipment just because it’s old. With proper maintenance, equipment can continue to do the job for many years. But this equipment would actually in-

crease the capabilities of the work group, so the emphasis was on the benefits to the wider FOT&V operation.”

BIG PAYOFF

Those benefits proved to be significant. Since the pattern burner was installed, redundant touch labor has been reduced 92 percent. Flow times have been cut by 83 percent. Many tasks that previously had been sent out to other organizations or suppliers are now completed at the weld shop. Speck estimated the first time the pattern burner was used in support of a major program, the cost savings added up to more than half the cost of purchasing and installing the equipment.

Now that the new system and processes are in place, the team’s ongoing empowerment continues to earn dividends. For example, mechanic Doran Reano noticed the slats that support work pieces during the cutting process needed to be replaced frequently. Reano designed slats that have a saw-tooth edge, rather than the standard straight edge. The saw-tooth slats are less likely to be damaged when the cutting torch passes over them. The new design also helps prevent plates from moving when heat from the cutting torch causes the plates to expand. Beyond a maintenance savings, the saw-tooth slats increase the precision the machine can achieve.

Speck said the equipment upgrade and process improvements succeeded because employees and managers across multiple functions and organizations took personal ownership of their part of the process.

“Each team member at every step along the way took the time to understand our goals in requesting the upgrade,” he said. “By making those goals their own, they were able to come up with solutions that exceed our original expectations.” ■

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