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Malcolm Baldridge National Quality Award 1998 Recipient Boeing Airlift and Tanker Programs

Boeing Airlift and Tanker (A&T) Programs designs, develops, and produces the C-17 Globemaster 111 airlifter. Capable of carrying a 170,000-pound load, these aircraft are used by the U.S. Air Force, the company's primary customer, to transport large, heavy cargo to sites around the world. A&T is the dominant supplier in the military market for heavy-lift aircraft, and it is the sole U.S. competitor in the emerging global commercial market. A&T also supplies parts and services for transport aircraft and in-flight refueling tankers. Sales in 1997 exceeded \$2 billion.

A&T is part of the Aircraft and Missile Systems Group, the St. Louis-based segment of The Boeing Company. In addition to building the C-17 Globemaster 111, A&T is responsible for aerial tanker aircraft and other U.S. Air Force and U.S. Navy airlift programs, including the Seattle-based C-32 and C-40 aircraft programs. A&T employs over 8,700 people at its headquarters in Long Beach, CA, and facilities in Macon, GA; Seattle, WA; and St. Louis, MO. A&T also has personnel assigned to customer support facilities at Air Force bases in South Carolina, Texas, and Oklahoma. Seven unions represent 55 percent of A&T's workforce.

In addition to other awards, A&T received the California Governor's Golden State Quality Award for management in 1996, and its Macon facility received the Georgia Governor's Employer of the Year Award in 1998.

Quality Response

A&T is in the midst of fulfilling the largest contract ever awarded by the U.S. government—a \$14.2 billion agreement to deliver 80 C-17s to the Air Force. Signed in 1996, the contract affirmed a major turnaround in the company's performance and its ability to make and deliver the world's most advanced airlifter on time and within budget. Since 1995, A&T has maintained an on-time delivery record of 100 percent. A few years earlier, the Defense Department had threatened to cancel the C-17 program. Technical problems, cost overruns, and late deliveries vexed the complex concurrent development and production effort.

A&T's customer demanded immediate improvements. The organization, then a unit of the McDonnell Douglas Corp., responded with a complete overhaul of its business, aiming to become "process-focused and customer-driven." It initiated partnerships with customers, unions, and suppliers. It replaced manager-controlled teams with empowered teams that now function like small businesses motivated by common, systematically developed goals. A&T directly involved its 7,000 Air Force customers and suppliers in planning and decision making at all organizational levels.

In 1993, A&T began to work more closely with its customer to use Customer Performance Assessment Report (CPAR) ratings as valuable feedback to identify areas for improvement. The CPAR is the Air Force's primary tool for rating contractor performance. Since 1993, A&T has received "satisfactory" or "exceptional" ratings in all CPAR categories.

Interconnected Processes

Interdependence and integration characterize A&T's organizational structure and its approaches to performance improvement. A high-level "enterprise process model" defines the entire business as eight interconnected process "families." These major groupings range from enterprise leadership and new business development to production and post-delivery product support. Each family encompasses up to 10 major processes, which, in turn, are made up of several tiers of supporting subprocesses.

The result is a coherent framework for process management. The model provides a direct line-of-sight from A&T-wide initiatives to the work plans and goals of teams and workers. It also helps to identify apparent operational dependencies that link subsets of process families. A&T manages these cross-cutting relationships as "mega-processes" that typically extend to suppliers and customers.

David Spong, A&T vice president and general manager, heads the Leadership Team that sets the organization's strategic direction using its 10-step Integrated Planning Process. A key responsibility is defining the requirements and expectations of A&T's customers, workers, suppliers, shareholders, and the local community. Beyond analyses of A&T's diverse collection of data, executives draw on information gathered during their many direct contacts with these major stakeholders. Leadership Team members spend up to half their time communicating with Air Force customers. Interactions include daily phone calls and "stand-up" (to ensure brevity) meetings, videoconferencing meetings, weekly reviews, and formal program evaluations. Inside A&T, executives meet with employees in roundtable discussions, focus groups, and a variety of other venues. In addition, senior executives lead quality awareness sessions with A&T suppliers, who number more than 600 and account for two-thirds of the cost of the C-17.

These and other face-to-face interactions sharpen the Leadership Team's understanding of more than 30 formal assessments of factors ranging from

customer requirements to market risks to the regulatory environment. Cross-comparisons also are performed during the integrated planning process. For example, results of customer, workforce, and supplier surveys are correlated to help the team uncover high-leverage opportunities for improvement.

The planning process yields short- and long-term objectives for increasing customer satisfaction, improving processes, and strengthening market position. A&T also identifies deficiencies, formulates strategies to close these performance gaps, and develops implementation plans. These outputs are organized into an annually updated 10-year operating plan.

Process-Based Management

To help it "perform to plan," A&T has developed a seven-step approach for defining, managing, stabilizing, and improving processes. This process-based management, or PBM, methodology also is used to set performance metrics that are indicators of efficiency and the chief drivers of customer satisfaction: quality, timeliness, and cycle time.

PBM is the principal tool of A&T's more than 100 Integrated Product Teams (IPTs) and the even larger number of functional and self-directed work teams that support the IPTs. Made up of engineering, work-team, customer, and supplier representatives, IPTs oversee the design, production, and delivery of the C-17's more than 125,000 parts and supporting services. Inclusion of work-team members ensures a systematic approach to process design and clear communication of the most important elements of the product to be manufactured or assembled. Customer participation helps to maintain the focus on priority requirements for quality and performance.

Using the PBM approach, IPTs have become adept at zeroing in on process improvement opportunities. One team, for example, developed a dry sealant to pre-coat the 1.4 million fasteners used to assemble a C-17. The innovation stemmed from the IPT's desire to replace a "wet" sealant that was difficult to apply and cost more to dispose of than to buy. The innovation reduced rework, improved airframe quality, reduced structural fatigue, and enabled mechanics to work "faster, cleaner, and better."

IPTs manage their own resources and are responsible for meeting all quality, technical, schedule, and cost requirements. High performance work teams, which are part of the IPTs, go through four stages of training and development to foster shared commitment, impart technical skills, and teach team-based decisionmaking methods. As teams move from one stage to the next, their autonomy and responsibility increase. The facilitator measures team-based competencies and behaviors, task performance, and results-in short, the team's readiness to become full "owner" of a product, service, or process.

In partnership with its unions, A&T has created a seamless environment that enables union and non-union workers alike to participate and contribute. Production job classifications have been reduced to 10 and the number of duties in a category has been increased considerably. Two-thirds of factory employees are in the same classification, and 90 percent of engineers occupy a single job family.

Results

A&T's share of the U.S. military airlift market is 84 percent, almost eight times larger than its nearest competitor. The company credits its team structure with a better than 60 percent improvement in productivity, measured as revenue generated per employee. Productivity has increased from \$200,000 per employee in 1994 to a projected \$327,000 in 1998. For three of the last four years, A&T's productivity levels have topped those of its best competitor.

Partnering with suppliers also has paid off. Rejection rates have dropped from 0.9 percent in 1994 to 0.08 percent during 1998, and supplier on-time delivery has jumped to 99.8 percent, up from 75.9 percent. With its PBM methodology, A&T has improved the performance of its 50 major processes. From 1994 to 1998, performance on key quality measures has improved by 50 percent. Over the same span, A&T cut cycle time by more than 80 percent.

Since 1992, time spent on rework and repair of the C-17 has been reduced by 54 percent, a solid indicator of quality gains. Mean time between corrective maintenance has increased eightfold since 1993; the C-17's current level of performance is nearly four times better than that of the next best competitor's aircraft.

Trends in key measures of financial performance parallel gains in quality and operational performance. A&T's return on net assets was nearly seven times better than the next best competitor in 1997. Net asset turnover has improved by a factor of seven since 1994, while return on sales has improved nearly threefold.

Baldrige Website comments:

baldrige@nist.gov

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