

Malcolm Baldrige National Quality Award 1998 Winner
Solar Turbines Incorporated

With customers in 86 countries, Solar Turbines Incorporated is the world's largest supplier of mid-range industrial gas turbine systems. The San Diego-based company's turbine engines and compressors are used in the production and transmission of oil and gas, for industrial power generation, and in the propulsion systems of high-speed ferries. Solar provides full service support-including financing, installation, field service, and overhauling-for all products. New-product sales and aftermarket services totaled nearly \$1.3 billion in 1997. One of the 50 largest exporters in the United States, Solar sells more than 70 percent of its products in foreign markets.

A wholly owned subsidiary of Caterpillar Inc. since 1981, Solar was founded in 1927 as the Prudden San Diego Airplane Company. Leveraging its expertise in manufacturing complex products for high-temperature applications, the company built its first industrial gas turbine in 1959. Today, more than 10,000 Solar gas turbine systems are installed worldwide. Eighty percent of Solar's 6,200 employees are distributed among 15 locations in the United States. Sixty percent are located in San Diego, and another 16 percent are based in Texas, where the company has four facilities. About one-fourth of the workforce is deployed among sites in 23 foreign nations.

"Strategies to Win"

Solar vies for new and repeat business in a consolidating industry as a fully integrated global organization with the flexibility to respond quickly and effectively to the local needs of its widely dispersed customers. Following its six "strategies to win," the company has increased its share of the world-wide market for new turbine equipment to a position of strong global market leadership since 1992.

Five of Solar's strategies focus on meeting customer requirements, building the performance capabilities necessary to quickly deliver superior products, and engaging the full potential of its workforce. Sustained progress in these areas has enabled the company to realize its sixth strategy, delivering investor-grade returns in a low-margin industry.

Hallmarks of Solar's approach include a dynamic strategic planning process, an extensive teamwork system that is aligned and coordinated throughout the entire company, and an "authority delegation process" that enables employees who are closest to the work to design, manage, and improve work systems and processes.

Solar's structure of integrated teams begins with its leadership and extends to cross-functional work teams. At every level, teams are effectively linked to others, ensuring that decisions and actions do not occur in isolation or without understanding of business-wide impacts.

Shared Leadership, Shared Goals

Solar's three-tier leadership system cascades from the company president and staff to an "expanded

leadership team" consisting of the top executives, an Operations Council of 74 leaders from across the business, and more than 400 managers and supervisors. In turn, this team is linked to a set of 10 interlocking committees, including the Operations Council. These committees integrate and coordinate improvement activities in all business areas.

Through this system of cross-organizational and cross-functional linkages that extend outside the company to customers and suppliers, Solar systematically gathers and assimilates information on market, industry, and regulatory developments from all parts of the globe. The entire organization is kept up to date. Led by the Operations Council, strategic planning has become a dynamic, nearly continuous process, helping Solar to initiate the short- and long-term adjustments that respond to changing conditions.

Outputs of Solar's core business principles and the planning process include Solar's "strategies to win," a set of "critical success factors" that distills each strategy into goals, and "top tier measures" that set annual and long-term targets for reaching business and strategic goals. Each critical success factor has an owner, a member of the company president's staff. All are pursued through "work agendas" carried out by teams. From five to 15 work agendas, which usually require contributions from multiple business units, support each of the company's seven critical success factors. Within departments, individual work plans are aligned with work agenda items.

Metrics include the high-level, top-tier measures and supporting sets of "lower tier measures" that are process-specific. To help it stay on track, the company conducts annual internal assessments of all programs, using the Baldrige National Quality Award criteria.

Human Resources: Agent for Change

The importance of Solar's workforce to achieving company goals is underscored by its strategy to "engage the full potential of people to improve business results," which explains why employee satisfaction is one of Solar's carefully selected top tier measures. In 1997, 86 percent of Solar's domestic employees recommended the company as a good place to work.

In the early 1990s, Solar totally revamped its approach to employee management, transforming its human resources focus from administering salaries and benefits to becoming a powerful agent for change. Solar abandoned the traditional method of boosting production by adding proportional amounts of material, capital, and labor. Instead, it set its sights on increasing productivity through the initiative and capabilities of a self-directed workforce.

The company flattened its organizational structure, restructured into work teams, and delegated authority to the point of customer contact or to the work performed. In its "pro-employee" approach to work system teaming, Solar does not differentiate between union and non-union workers. Developing people, rather than overseeing tasks, became the primary job of managers and supervisors.

Devised with knowledge gained from benchmarking other organizations, Solar believes its authority

delegation process is unique. It has reduced non-value-added steps in decision-making and helped the company to respond quickly to changing customer needs and competitive conditions.

Training and education needs are formally addressed during strategic planning. Solar estimates that total expenditures for training are equivalent to about 15 percent of its payroll. Awards and bonuses reinforce the workforce's commitment to achieving business goals. Incentive payouts have helped Solar to meet or exceed goals for increasing its return on assets. Payouts increased 7.6 percent of salary in 1994 to 10.4 percent of salary in 1997.

Results

Sources of information on customer requirements and competitors' capabilities include competitive business reports by field service representatives, regular visits to customer facilities by Solar executives, annual satisfaction surveys, end-of-project surveys, complaints, and reviews of won and lost bids for business. This and other intelligence gleaned from listening posts around the world is analyzed for emerging business opportunities.

Using a four-phase new product introduction process, the company has been quick to seize opportunities. The process integrates the efforts of 30 or more teams and sub-teams that involve all stakeholders, including customers and suppliers. Since 1994, the new product development cycle has been trimmed from 39 months to 22 months, and quality has improved. The number of warranty claims has decreased significantly since 1995, and non-recoverable commissioning costs have been cut.

For customers, benefits resulting from gains in quality include lower maintenance costs. Industry-sponsored studies show that maintenance costs for Solar-made industrial turbines are 42 percent lower than the average for all suppliers.

Ultimately, the company aims to distinguish itself as the best among suppliers of any type of equipment, not just turbomachinery. In 1997, 43 percent of customers responding to a survey question named Solar as their best equipment supplier.

Solar's share of the global market for new turbine engines has risen from less than 20 percent in 1970 to a position of global market leadership. Since 1988, the company has tripled its annual revenues and increased its profits by a factor of 11. Improvements in productivity have fueled these gains in business performance. Revenues generated per employee increased by 61 percent between 1993 and 1997.