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Malcolm Baldridge National Quality Award 1991 Recipient Marlow Industries, Inc.



In 1987, Marlow Industries set out to improve a manufacturing and service operation that did not seem to need fixing. Founded in 1973, the Dallas-based company increased its share of the world market to more than 50 percent for customized thermoelectric (TE) coolers – small, solid-state electronic devices that heat, cool, or stabilize the temperature of electronic equipment.

But Marlow chose not to sit tight. Instead, it initiated a structured, yet evolving system of continuous improvement through Total Quality Management, setting ever higher performance standards and challenging itself to exceed ever more demanding customer requirements. The company has worked to strengthen all areas of its business, and again to set new targets for improvement and innovation.

Since 1987, employee productivity has increased at an average annual rate of 10 percent, the time between new product design and manufactured product has been trimmed, and the cost of scrap, rework, and other non-conformance errors has been cut nearly in half. For customers, these and other gains have translated into products that exceed performance specifications by wider margins, on-time deliveries, extended warranties, and prices that have remained stable or decreased. Not coincidentally, Marlow Industries' worldwide market share continues to improve, even in Japan where the company has local competition.

MARLOW: A SNAPSHOT

Marlow Industries is fully vertically integrated. The company processes raw materials into thermoelectric semi-conductors, assembles these devices into TE coolers, and integrates the coolers into heat exchangers for commercial and defense applications. Manufacturing operations consist of three materials "minifactories" and five assembly minifactories organized by market segments. Each is staffed by about 15 employees cross-trained in several jobs and directed by a supervisor, who is empowered to make decisions affecting all facets of production within his or her minifactory.

Commercial customers include makers of laser diodes, such as those used in fiber-optic communication systems, as well as medical instrumentation manufacturers. Marlow products also are used in heat-seeking missiles, inertial navigation systems, satellites, and other defense and space-related technologies.



Started in 1973 as a five-person operation, Marlow Industries now employs 160 people and has total annual sales of \$12 million. Exports account for 15 percent of annual sales.

Although the company earns most of its revenues from sales of TE coolers designed to meet one-of-a-kind customer needs, Marlow Industries has set its sights on applying its Total Quality Management philosophy to enter new markets.

TQM SYSTEM

Marlow describes its Total Quality Management System as a "top-to-bottom" approach to continuous improvement. The emphasis on quality begins with CEO and President Raymond Marlow. As chairman of the TQM Council, which crafts the company's 5-year strategic business plan and oversees efforts to accomplish short- and long-term goals, he has daily responsibility for quality-related matters. A senior-executive team headed by the chief operating officer attends to day-to-day management. Marlow's leadership has provided an environment that encourages all employees to participate and to be involved in the continuous improvement process.

Employee involvement is fostered through a flat organizational structure and a variety of participatory mechanisms. Marlow includes worker representatives in weekly TQM Council sessions. Monthly companywide meetings are held to review company performance, recognize employees for quality contributions, review quality values, and make widespread acknowledgement of teams. In 1990, 88 percent of all personnel – as compared with 44 percent in 1988 – participated on "action teams," which focus on attaining corporate and departmental goals, or on "employee effectiveness teams," which concentrate on preventing potential problems in specific work areas. Each team has a senior-executive mentor, and all teams regularly make formal presentations before the TQM Council.

All workers – from CEO to hourly employee – have taken Marlow's voluntary "quality pledge," committing them to the same performance standard:

"Do it right today, better tomorrow." Training programs, averaging 32 hours a year per employee, impart the skills needed to achieve the standard. All workers, even temporary employees, receive quality-awareness training, and the entire permanent work force has completed initial courses in statistical problem solving. Three-fifths have undergone the second round of more comprehensive training in the use of quality tools.

An information system consisting of 500 data categories describes all essential elements of company performance -- from customer satisfaction to manufacturing process control to supplier quality -- and helps Marlow Industries set tangible goals and track its progress. Much of the data can be accessed through any of the 80 personal computers connected through a local area network. Systematic data cross-checking fosters reliability and consistency, and regular reviews ensure that the information supports effective management of the company.

Marlow uses a well-integrated, systematic approach for assuring the quality of its products and services. Extensive use of Design of Experiments Techniques has resulted in improved quality and stabilization of its major processes. In the last 3 years its yields have improved significantly while manufacturing costs have been reduced and cycle times improved. These improvements were accompanied by major reductions in waste stream environmental disposal.

Supplier partners figure prominently in Marlow's TQM system. The company continues to consolidate its list of suppliers, retaining only those key suppliers that score at the top of the Marlow Supplier Quality Index. By the end of 1991, it anticipates that 15 of its top 20 key suppliers will be certified to "ship to stock" without inspection. Marlow cultivates long-term partnerships and includes the technological expertise of valued suppliers at the start of its product and process improvement efforts. These suppliers often provide the small company with design and analytical expertise that is not available in-house.

Over 90 percent of the products produced by Marlow are custom designed to meet its customers' requirements. Because customer satisfaction is the overriding aim of its continuous improvement efforts, Marlow has developed an exhaustive system of feedback mechanisms -- from several types of surveys to quarterly meetings with major clients. This information helps ensure that Marlow focuses on the principal needs of customers. When combined with the

results of the company's benchmarking program, customer feedback points the way to strategic improvements in products and service.

Since 1988, Marlow has won six major quality awards from customers, and it passed on first inspection all 30 audits of its quality assurance system performed by defense industry customers. Over the last 10 years, Marlow has not lost a single major customer, and, in 1990, its top 10 customers rated the quality of Marlow TE coolers at 100 percent.

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