

# Education Is Action at United Electric Controls

## **Company-wide accountability for problem solving.**

Per Johansen

During the last few years, United Electric Controls Company in Watertown, MA has taken brave steps toward World-Class Manufacturing. Its improvement plan, dubbed "Education is Action," produced significant results (see Figure 1). The company recently received the North American Shingo Prize for Manufacturing Excellence.

The main steppingstones for the company's improvements: Dr. Shigeo Shingo's JIT, Single Minute Exchange of Dies (SMED) and Poka Yoke (mistake proofing) techniques, coupled with Dr. Ryuji Fukuda's Cause and Effect Diagram with the Addition of Cards

(CEDAC), a problem-solving methodology for work teams. United Electric employees adapted these tools, putting their own stamp on application of these

concepts and transforming their company culture to boot. The company's traditional chain-of-command hierarchy changed to a more participative man-

### **Performance Gains Since 1987**

Leadtime	Reduced from 8-12 weeks to 1-2 weeks
Work in process inventory	Decreased 80 percent
Finished goods inventory	Dropped from \$1.2 million to \$300,000
Stores inventory	Cut 50 percent
On-time deliveries	Rose from 65 percent to 95 percent

**Figure 1.**

agement style. Working together in groups called action centers, employees expect to make continuing performance improvements every day.

### **Laying the Foundation**

Groundwork for revolutionary improvement began in 1987, when Vice President of Manufacturing Bruce Hamilton and his staff developed a manufacturing plan using cause and effect analysis. They sought answers to questions such as, "Where do we stand?" and "What are the business issues, such as rising inventories, parts shortages, etc.?" Specific targets for inventory reduction, etc. were set for the Education is Action improvement plan. Management pledged to treat all employees as "partners in prosperity" — people with solutions who deserve respect. Hourly and salaried distinctions were eliminated (all employees are salaried). A 401K program (a tax-deferred employee savings plan with a matching company contribution of 25 percent) began in 1989, and job evaluations changed to emphasize improvement in every job.

Education is Action guidelines called for value-added manufacturing,

elimination of waste (overproduction, transportation, storage, waiting, defects, motion, unnecessary processing), batch size reduction, and shared quality responsibility among *all* employees.

### **Management Leads the Training Charge**

Hamilton and the manufacturing management team began disseminating JIT, SMED, and Poka-Yoke concepts among all company employees. At first, they simply purchased key books and encouraged employees to read them. Then Hamilton and other managers began training sessions to link the improvement ideas, employee involvement and implementation, and bottom line performance (including the impact on long-term job security).

Structured seminars, led by United Electric employees, began in 1987. A week-long, on-site 1989 training session with Dr. Fukuda on CEDAC methodology for continuous systematic improvement helped to accelerate team problem-solving.

Voluntary "action centers" (action teams), launched in February 1987, developed solutions to specific on-

time delivery and other problems. Team "initiators" define problems, call together team members from any functions relevant to the problem, work with the group on solutions, and disband the team when problems are solved.

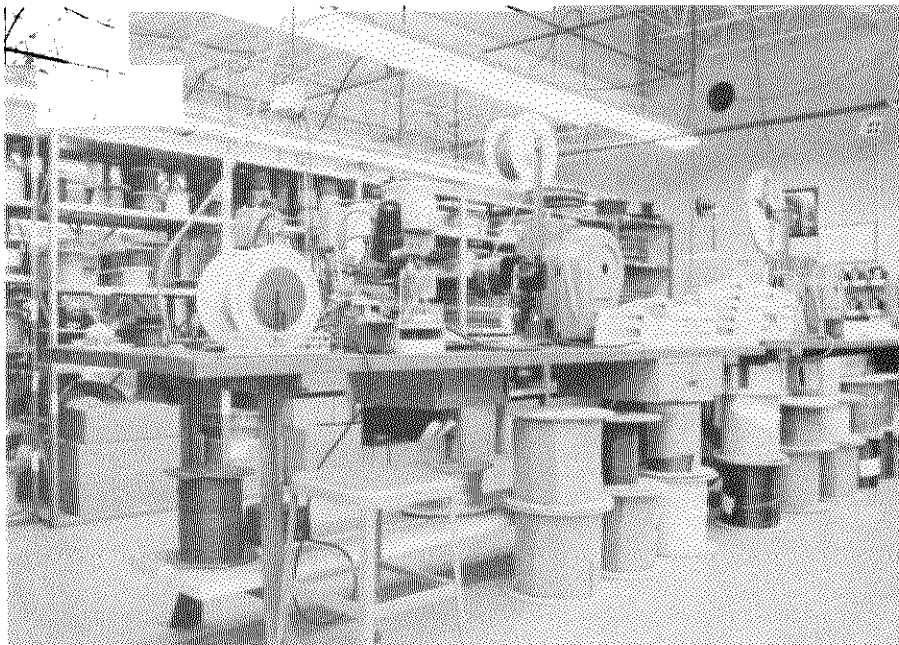
Employees' self-directed problem-solving activities nourished leaders of the change process — and provided surprises. Some 40-year employees proved more aggressive in applying improvement concepts, while some of the younger employees seemed set in their ways. Management's respectful appeal for employees' help worked well. Ninety percent of all employees have participated in one or more action centers. At any given time, a third of the employees participate in these activities.

Results of successful action centers include elimination of three high bay storage units from the stockroom, conversion of 5000 sq. ft. of storage to production area, elimination of approximately 1000 inactive parts, and a savings of about \$25,000 annually in maintenance costs.

### **Striking Results**

On our plant tour, we saw many CEDAC boards with clear problem and target statements, performance graphs, fact and improvement cards, and implemented ideas (improved standards and procedures). Particularly striking: setup reduction, Kanban, and Poka Yoke improvements (achieved without extensive SPC use). CEDAC projects began during 1989 training sessions. Sixty percent of the company's employees are trained in the CEDAC methodology.

In some cases, CEDAC projects helped to reduce setups from 30-45 minutes to instantaneous, one-touch operations. Stockroom space was slashed in half. Most parts are on the production floor. With inventory cut in half, accuracy is 98 percent versus 47 percent in the past. Dedicated fixturing



**Figure 2.** In the old wire department, spools of wire had to be lifted and mounted on a reel above the bench. The wire machine was bolted to the bench, and the inventory was mixed with different colors and gauges.

### About United Electric Controls Company

United Electric Controls Company, founded in 1931, manufactures temperature and pressure controls, recorders, and sensors. Ranging from thermostats to computer-based, multi-function controllers, the product line is marketed worldwide through direct sales offices and distributors. The company employs 370 persons in its Watertown, MA facility. More than 60 employees have 25 or more years' service.

— interchangeable fixtures standardized with the same outer dimensions — is evident.

The Kanban system is simple. One example: Color-coded cardboard boxes are used in the wire work center. An empty box is the order to produce; no paperwork is needed.

An innovative idea in the wire work center: a mobile wire machine. Rather than move the wire to the machine, the machine moved on wheels to the appropriate wire, saving material and human movement. There used to be four or five people in this area; now there are two (the others have new assignments).

Some of the Poka Yoke devices on the plant floor were simple but effective. Operator Beatrice Bianco devised

a lazy Susan-type fixture to simplify and speed up a wire heating operation. While heating some wires, she places wires on the other half of the device. Made of plywood and nails, it cost almost nothing. Two or three people used to do the work now handled by Bianco. She received \$100 for her idea. Judging by her enthusiasm, being recognized as a creative, competent person was more important to her than the money. As line employees explained improvements, workshop attendees were impressed by their understanding of JIT, setup reduction, Poka Yoke, and how their ideas contribute to the company's bottom line.

In an electronics work cell, Production Supervisor Evie Wood described how the work cell action team

made layout and other improvements when the cell moved from the second to the first floor. In less than eight hours after the move, the cell was up and running, more efficiently than before.

### Company-wide Improvement and Culture Change

Workshop participants noted effective employee communications, a clear performance improvement vision, and an open, no-blame environment. The CEDAC methodology was used company-wide; first-line supervisors bought into the whole approach. Upper management's training leadership was cited by attendees as a powerful way to motivate employee participation.

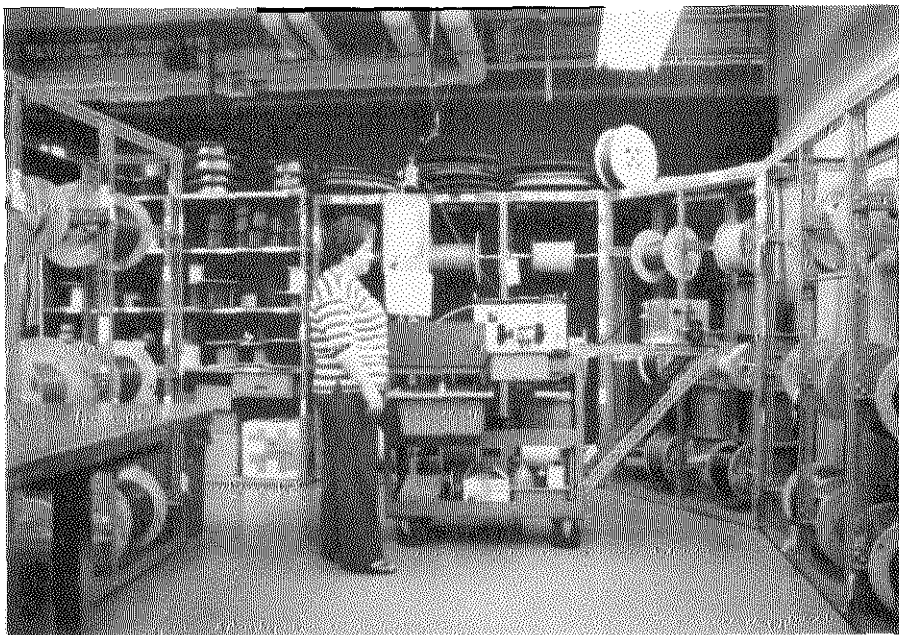
The Education is Action approach, coupled with active teamwork, changed the company culture. People who identified problems used to be labeled as troublemakers. Now they are encouraged, because they are the problem-solvers, according to Bonnie Rafuse, manufacturing education manager.

Armed with knowledge about world-class manufacturing techniques, the United Electric action teams continue to work toward improvements in quality, cost, and leadtime. They're the measurements the customer cares about the most.

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*Figure 3. In the improved wire work center, Beatrice Bianco stands next to a cart which is wheeled to an appropriate spool. Spools are mounted with lighter-gauge wire on top and heavier-gauge stock at the bottom. Each vertical section contains the same color wire, providing visual control of the inventory.*

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