

Westinghouse Electric Corporation, Construction Equipment Division, Asheville, NC Plant; Creating Employee Ownership

Employees are responsible for customer satisfaction.

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In the early 1980s, the Construction Equipment Division of the Westinghouse Electric Corporation plant in Asheville, NC was operating in a survival mode. Product margins were eroding. Leadtime, product quality, and delivery commitments were unacceptable, and manufacturing methods were outdated. Stiff competition and mixed signals to customers indicated the need for more consistent performance. This article recounts the turnaround at Asheville, starting in the 1980s, which included employees taking responsibility for product quality and meeting customer commitments.¹

Starting With an Audit

Business unit quality examiners identified key areas for improvement in 1988 at Asheville: employee participation, training,

About Westinghouse Electric Corporation, Asheville Plant, Construction Equipment Division, Asheville, NC

The Westinghouse Asheville plant, one of six major domestic operations in the Construction Equipment Division, opened in 1977 in western North Carolina. It has 250,000 sq. ft. of manufacturing space and 85,000 sq. ft. of office space. Using JIT principles in the 1980s, the plant released 130,000 sq. ft. for other product lines; the division's St. Louis product lines were then consolidated with the Asheville plant.

Plant Manager Jerry Palmer and 530 employees are responsible for product development, customer order engineering, negotiation, and manufacturing for four product lines: Ampgard medium voltage controls, excitation control equipment, a line of grounders and resistors, and low voltage assemblies (DS switchgear and large switch boards).

Sales are approximately \$93 million.

supplier control, culture, and planning. In turn, management developed a mission for the operation. It was to become a customer-driven facility with a reputation for high quality and a

profit contributor to Westinghouse.

Management wanted to foster a participative culture, to achieve this mission. Hourly and salaried problem-solving and decision-

making training classes were begun. Cross-functional teams were launched in manufacturing and engineering. A cost-time profile for each product line was developed to help employees identify opportunities to reduce total order cycle times and costs while they improved customer satisfaction and product quality. Cost-time training was provided by site personnel and by the Corporate Productivity and Quality Center staff.

Product lines later were consolidated into mini-plants within the plant, called "focused factories." Six separate areas which had produced the Ampgard medium voltage motor control, for example, were moved to one area under one lead supervisor, with one customer due date.

Employees at Asheville eventually were introduced to, and then used, a range of improvement concepts: JIT manufacturing, focused factories, flexible manufacturing cells, continuous cycle time improvement, "empowered" business teams (self-directed work groups), statistical process management, intelligent order configuration systems, CAD/CAM integration, etc.

Continuous Cycle Time Improvement

All employees are involved in continuous cycle time improvement (CCTI) activities. This new mindset, according to Asheville management, stimulates the use of JIT, inventory reduction, quality improvement, and other improvements.

CCTI activities here included obtaining management commitment for change; developing cost-time profiles which identified the time spent at each step in the order cycle; training the organization in how to conduct effective meetings, how to reach consensus, and listening skills; and upgrading communications to employees through workplace team meetings and written media. CCTI teams include multi-functional members who form ad hoc committees to work on quality, safety, communications, training, product warranty, PC smart systems, internal customer problems, product development, etc.

Annual CCTI reviews were conducted by a multi-function team of managers from across the business unit; a presentation and a written report noted strengths, areas for improvement, and recommendations. Multi-

Changing Roles for Managers and Employees

Manager's Role

- Fewer production meetings, more management by walking around
- Less autocracy and control, more coaching
- Less suspicious, more trusting
- Less bureaucracy, more support

Employee's Role

- More multi-functional
- More direct communications
- More empowerment

Figure 1.

functional teams implemented the recommendations; team leaders represented various levels of employees, from management to hourly. Team participation was voluntary. Among the CCTI team results are correction of training deficiencies, supervisor hiring, and solution of customer problems.

Employee SDWTs

Roles played by managers and employees significantly changed in several SDWTs also organized at Asheville. (See Figure 1.) In the "old way," several layers of management served as a barrier between employees and decision making. Now, team members make informed business decisions, relaying their concerns and recommendations to coaches, and in turn to department managers and the plant manager.

The teams are led by volunteer team "champions" who want to get product design or method issues resolved. Now, during meetings, members work through problem-solving ideas together. Coaches facilitate the process but do not lead it. Each work group business team establishes its goals for the year which support plant objectives.

Training and Communications

Training and communications are additional keys to Asheville's performance gains. A communications audit in 1988 identified the need for developing a skills training program. In 1989, the team concept was introduced in manufacturing, marketing, purchasing, and engineering.

During 1991-2, all management was trained in team development by an outside university consultant, and a full-time training coordinator was certified. Such training aims to build employee "ownership," personal growth, self-esteem, and understanding of the

team environment and responsibilities. Four hundred and fifty-six employees (or 85 percent, including hourly, salaried, and coaches) have been trained in team development to date, accounting for 6000 productive hours.

Skills training also has been developed, covering such courses as general shop math, machine safety, soldering, reading mechanical and electrical drawings, etc. Thirty-four instructors (11 hourly, 17 salaried, six outside) volunteered to prepare and lead 17,000 classroom hours during the past four years. Another 6600 hours of quality instruction on ISO 9000 has been received by the total organization. Employees have written training manuals for each department.

Total Productive Maintenance (TPM)

Striving for better productivity through a higher rate of equipment "right for use," Asheville also adopted TPM practices. Productivity losses occur through equipment failure, setup and adjustment, idle time, reduced speed, etc.

Under TPM, the operator is challenged to perform additional tasks: failure prevention (clean, tighten, and lubricate equipment, etc.), failure resolution (participate in small group activities to identify equipment problems, etc.), inspection (of product made, equipment, tools, and process), and equipment upkeep (minor repairs, quick and accurate reports on breakdowns, etc.).

As a result of TPM activities, the plant operates with 40 percent fewer maintenance craftsmen than originally required prior to consolidating two plants into one.

Pull Systems

Today the pull system is practiced in manufacturing and with suppliers. Inventory, space, and cycle times decreased as a result.

Compared to the traditional push system's long leadtimes and large lot sizes, Asheville now has shorter leadtimes and leaner lot sizes. Storerooms shrank 75 percent, quality rose, and suppliers became "partners." Six-month blanket orders are issued to suppliers, and teams are involved in supplier negotiations. Electronic kanban releases, bar coding, a vendor rating system, and a vendor recognition system ("best" and "most improved"), and other supplier activities continue to evolve.

Meanwhile, paperwork decreased and inventory dropped 66 percent. Cycle times declined from four weeks to one week. (An example of improvement results is shown in Figure 2, while Figure 3 reflects supplier evaluation program results.)

Communications and Recognition Activities

A bias toward action resulted from management's focus on employee responsibility for customer satisfaction. Employees, in turn, worked toward improvements in quality, cycle time reduction, etc. This improvement effort was supported by communications and recognition activities.

Key communications activities included internal news publications, customer visits, workplace meetings with management, surveys, etc. Financial performance measures are shared monthly in all-employee meetings held by the plant manager.

Management recognized employee efforts and accomplishments:

- Skilled employees lead training sessions for new employees about mechanical and electrical product tests.
- Employees sign their names on equipment they produce, a personal indicator of quality assurance.
- Engineering employees made significant improvements in their design quality and productivity (internally-developed design databases, network of PCs, etc.).

Results

Among the results of this concentrated improvement effort:

- Cycle times decreased 50 percent.

Steel Shop Improvement 1991-1992

Before

- Poor housekeeping
- Constant reprioritization/no organized work flow
- Many stock outs
- Poor quality
- Segregation of work duties
- Three-four weeks' cycle time

After

- Floor clear
- First in, first out
- 87 percent reduction in stockouts
- Good quality/ownership (fewer rejects)
- Combine duties and cross train
- Four days' cycle time

Figure 2.

Supplier Evaluation Program

	Start July 1991	September 1992
Lots evaluated	2544	3123
On-time delivery rating	52%	83%
Quality rating (good units)	92%	99%
Number of vendors rated	86	

Figure 3.

- Compensation as a percentage of sales decreased 24 percent in four years (1987-1990) as volumes rose with existing personnel levels.
- Inventory as a percent of sales dropped 44 percent (1987-1991).
- On-time delivery performance improved from 50 percent to 96 percent.
- Product warranty costs decreased 75 percent in five years.
- Operating profit improved significantly.

Lessons They've Learned

Among the "lessons learned" shared by Asheville people during the recent AME workshop there:

- Don't Kanban every item.
- Get suppliers involved.
- Expect adjustments.
- Commit to necessary training/discipline.
- Don't give up if there is failure or slow success.

Where the Business is Going

Asheville people continue to accept new challenges. They are working toward more diffused authority, routine capability to respond to a wide variety of customer requirements, and faster-less expensive design changes for competitive advantage.



Figure 4. Westinghouse Asheville's Danny Norton, tester in ECE, explaining a basic diagram of Excitation Control Equipment to visitors.

1. The plant was noted in a *Target* article also by S. S. Cherukuri, published in the Fall 1988 issue, "Westinghouse Electric Corporation Asheville's Focused Factories Make a Difference — The 'Village Concept.'" Jerry Palmer was the plant manager at the time of the earlier workshop on which the article was based, as well as the recent workshop covered in this article.

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