Continuous Improvement Boot Camp

People at Delco Remy learn how to focus on customers and trim the fat in leadtimes and inventories.

Margaret Hodson-Howell

Changing from a firefighting culture to a customer-focused culture, where process problems are solved quickly and correctly the first time, is a strong challenge for traditional managers. At Delco Remy, a long-time leader in the development and manufacture of automotive components, management realized the need for a drastic change in mid-1987. Domestic car sales were continuing to decline, while foreign competition reduced leadtimes and increased inventory turns. People at Delco Remy had become accustomed to temporary "Band-Aid"-type fixes for their problems, changing the bandages every few months as needed.

Finding the origin of problems, and then solving the problems before passing along the product in the manufacturing cycle, would involve new skills and new attitudes. To bring about these changes, the managers of the Delco Remy Control Systems Strategic Business Unit (CSSBU) in Anderson, IN looked to Continuous Process Improvement (CPI) concepts. After consulting with Michael Tatham of Tatham Process Engineering in Toronto, Ontario (Canada) about CPI on one of Delco Remy's soldering processes, they decided to adopt this approach throughout the operation.

Continuous Process Improvement Begins

CPI offered a means of finding the origin of problems. It provided a systematic, commonsense approach for identifying root causes of problems, correcting problems, and then continually improving the processes.

Delco Remy employees are learning to use the principles of CPI through two-day workshops called "Boot Camp." These sessions are called Boot Camps because Delco Remy is engaged in a global economic war and must learn to fight effectively. Strategy, common sense, and company-wide commitment are the basics.

Delco Remy has had more than 20 two-day workshops in Anderson, IN, with 15 participants in each session. First, top management of the Control Systems Strategic Business Unit learned CPI basics. They have since trained most of the engineering staff, manufacturing supervisors, and many of the production workers. Many of the workshops have included people from all three areas.

The two-day workshops are conducted off-site, away from daily problems and ringing telephones. Many people feel they can not afford to be away from their jobs for two full days, and that they will get even further behind schedule. They are too busy fighting fires to learn how to put an end to the source of the flames. A majority of Boot Camp recruits become believers in a better method. Many cannot wait to use what they have learned on some of their own problems.

Boot Camp: Day 1

Ken Jessup, manager of technical support, kicks off morning sessions, answers questions, and discusses upper management support for this training.

Jessup says, "CPI Boot Camps are always a pleasure to do. Instead of just complaining about our competition, the Boot Camps show our people what they can do, as individuals, to improve our operation. Participants learn that it is up to them to change our culture, and they go away believing in themselves as agents for improvement."

Two instructors facilitate the Boot Camp, working as a team. While one instructor is lecturing, the other is setting up the next exercise or demonstration. Since time is limited, teamwork is a must.

The exercises are designed around a mini-business. A product is made to customer specifications. Boot Camp participants assume the roles of customer, manager, production supervisor, buyer, vendor, engineer, quality assurance shipper, material handler, and several product assemblers.

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Continuous Process Improvement (CPI)

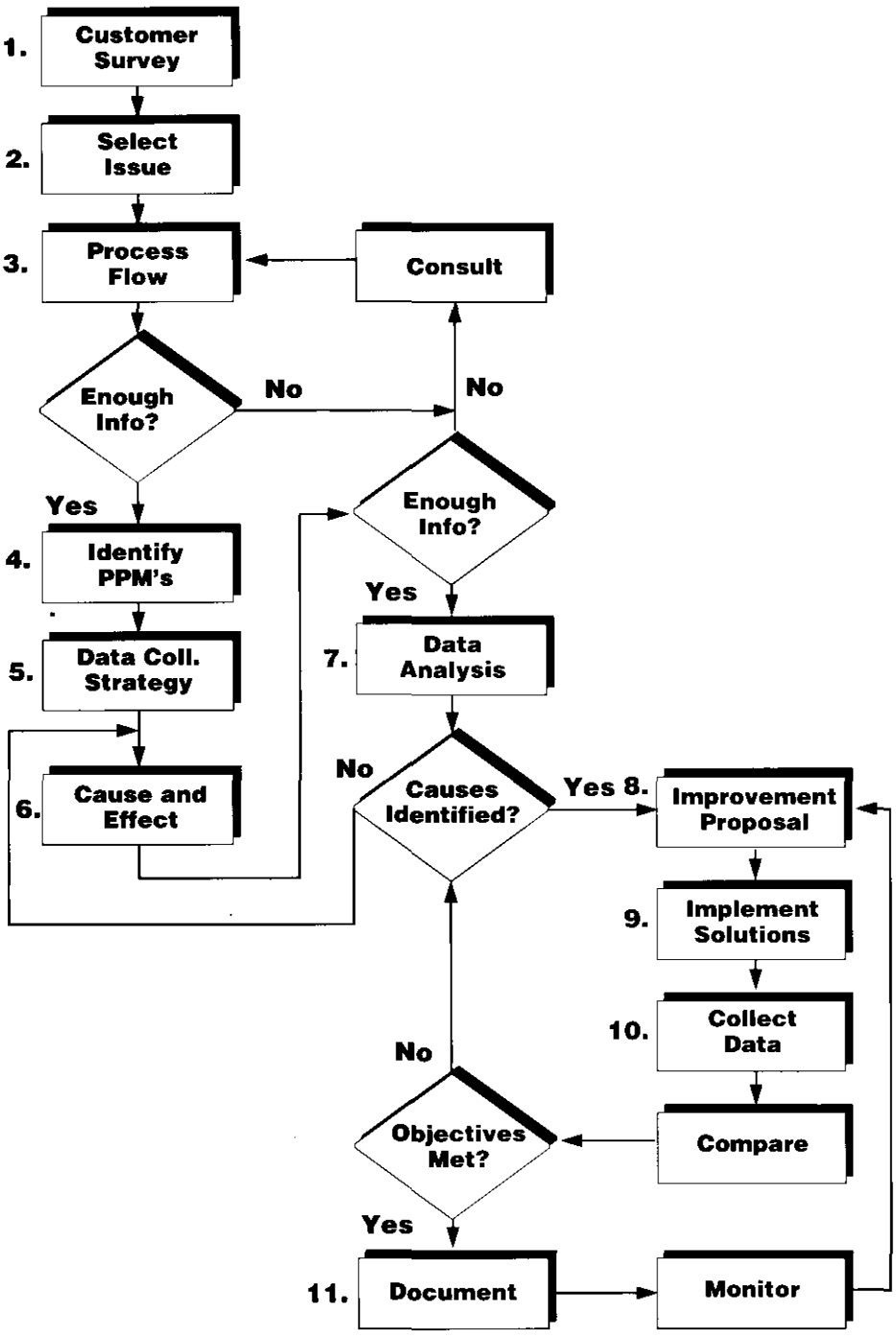

Fig. 1. Based on information from Michael Tatham, Tatham Process Engineering.

The number of 'recruits' can vary somewhat. Two good-sized rooms are needed to conduct a Boot Camp, or enough space for about 20 to 22 tables.

The Boot Camp product is a small circuit board. Eight terminals are staked to it; wires are then attached to the terminals and later they are soldered according to military standards.

During the exercises, different harassments are introduced. A customer product change is initiated, a new solder alloy is introduced, and the raw material flow is interrupted when the buyer cannot purchase what he wants from the vendor. All of the unplanned events that are so typical in a normal business day back at the plant find their way into the Boot Camp's "Push Corporation."

Participants are instructed to react during the exercises with the use of "response cards" and "action cards," and when to take action. The simulated line shuts down periodically for personal breaks, technical difficulties, and material shortages — much the same as the standard production line.

During the exercise, the Quality Assurance shipper, the buyer, and the engineer collect data. This information is later used to analyze their processes. Even though the participants are following published military standards for their solder process, the process is still out of control.

The simulated factory runs in the traditional 'push' fashion, where you start making products and then push the parts through the factory any way you can. Quality is generally ignored, inventory is stockpiled, and rework is constantly required.

This exercise runs for one hour. During this time, no quality products generally are shipped to the customer. This situation provides the basis for participants to enter the problem-solving part of the CPI process.

Learning to Rethink

The concepts of *understand, document,* and *simplify* are explained and demonstrated. Without these key points, the *culture* will not change.

The idea that "you continue to work as you have in the past, because that's the way we've always done it" must be rethought. Upper management simply saying that the culture must change does not cause change to happen.

Boot Camp participants soon learn they do not know all they should about their processes. The recruits are introduced to business 'visions' and 'missions' and are asked to describe how they would like to see their mini-factory improve. The instructors use this information and help the group put together a 'mission statement' that

satisfies everyone. They also create a 'vision' of their ideal company.

Next, the group gets a glimpse of the CPI flow chart, (see Fig. 1). It shows how everything starts with the customer, and the continuous cycle of finding ways to improve the process and implementing those improvements. Recruits survey the customer for information on what areas to improve. The answer usually involves quality and delivery.

Now the group is ready to go through an exercise of flow charting (documenting) their assembly and soldering processes to see if they understand the correct procedures. They are practicing the first two steps of *understand, document, and simplify.*

Recruits learn the proper techniques for improving their product by listening to a soldering expert (on a videotape) and by working as a team to solve problems. They use cause and effect diagrams and Pareto charts to analyze data they have been collecting.

The remainder of the first day is spent improving their soldering processes and learning to work as a team, instead of following the traditional "hero" approach and trying to solve the problems as individuals.

Boot Camp: Day 2

On the second day of Boot Camp, the participants use all of the problem-solving techniques they have learned to run the simulated mini-factory a second time. This time, quality and assembly problems are eliminated. Conforming parts are now available for the customer.

However, inventory problems still exist. Inventory is stockpiled everywhere except where it is needed. (Sound familiar?) Participants run this exercise for an hour before the customer has to cancel his order because he does not get his product on time.

The group again 'surveys' the customer to find out his concerns. The answer this time is delivery.

The next step is for the team to analyze the inventory problem. They summarize what they know by doing another cause and effect diagram to help determine root causes of problems.

The recruits are then introduced to the concept of synchronous manufacturing and the theory behind it. The CPI instructors show them how to eliminate bottlenecks whenever possible, and to use 'management by sight' for inventory control. Five timed exercises demonstrate how reducing lot sizes and work-in-process inventory can result in improved throughput.

Pull Corporation Is Up and Running

In a final mini-factory exercise, the traditional push method of inventory control is converted to the pull method. Inventory is purchased and processed only on demand, just in time. The exercise runs smoothly, the parts are made to specification, and deliveries are made to the customer on time.

During the Boot Camp wrap-up, the participants are asked to explain what they have learned during the two days. Some of the typical comments are, "We learned how to communicate better," "We learned how to solve a problem instead of just fixing it," "We learned how to control inventory," and, "We learned how to work as a team by including everyone." A quick review of the 'mission statement' and their vision of the ideal factory emphasizes to the team that they have been successful.

Delco Remy Anderson Engineering Successes

One of the biggest CPI application successes in engineering is the team working on reducing the product development cycle for transmission solenoids. This team of individuals from several disciplines started by sending a survey to their external customers to get feedback about their concerns. The responses indicated that the team needed to take time out of their development process.

The team flow charted (documented) their process and found they needed to invite 'experts' from other areas to help them understand more about the development cycle.

During this documentation, the team identified more than 270 steps in the process. Almost half were actual value-added or essential activities, but the other half were non-value-added steps. All of these steps take time — which can mean the difference between getting the product to market on time or being beaten by the competition.

The team worked on the non-value-added steps to reduce their development cycle time. They have reduced this time by more than 30 percent and are still working to reduce it further.

After documenting and improving the product development cycle time, the team has encouraged other engineering groups within Delco Remy to adopt their process improvement procedures. Using similar methods and surveys, other teams have been quite successful, too. The Sales Release team reduced their cycle time by more than 80 percent.

Three teams that did not reduce time but did improve communications are the Engineering Change Notice team, the Engineering Permit team, and the Engineer-

Delco Remy, a division of General Motors Corporation, has had its home office in Anderson, IN for over 60 years. Delco Remy produces many automotive components including charging systems, ignition systems, various switches, vacuum actuators, solenoids, sensors, horns, cranking motors, batteries, and magnetic products.

Delco Remy has plants in six states and five countries, employing over 10,000 people in the United States.

Delco Remy's customers include many of the GM car and truck divisions as well as heavy duty trucks, off-the-road vehicles, other car manufacturers, and re-manufactured parts distributors.

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Delco Remy Mexican Operations Improvements Using CPI

Department	Leadtime reduction	WIP inventory reduction
Hardware Ignition Switch	69%	21%
Transmission Solenoids	67%	37%
GM-10 Headlight Switch	95.7%	97.5%
Oil Pump Drive	50%	92%
Turn Signal Switch	92%	68%

Fig. 2.

ing Release team. They found that after documenting various processes, most people used the processes in a different way. Through documentation and training, they have created a system that works more effectively.

Other Delco Remy teams working on improvements include Cost Estimating, Gages and Test Equipment, Sample Build, and Purchasing.

Coordinating the activities of all the teams and communicating their successes became a major task. The tasks are handled by a team made up of team leaders from each of the CPI teams and all of the engineering managers. This team calls itself the Linking Pin. In monthly meetings, they discuss how the teams are progressing.

Linking Pin team goals are to emphasize customer focus, make sure the teams' projects do not overlap, and promote training. They also will oversee the publication of a book for engineers on all of the changes being made to the various processes.

CPI Introduced in Juarez Plant

Delco Remy Mexican Operations (DRMO) have been successfully using CPI for over a year. As can be seen in Fig. 2, DRMO has greatly improved many of its production operations.

Five disciplines also enhance their operations:

1. A place for everything and everything in its place
2. Small lot production quantities
3. Each process/operator is responsible for his/her own quality.
4. Zero repairs at the end of the day
5. Everything is visible.

Along with the reduction in leadtime and work-in-process inventory, a key to the operational effectiveness is the team implementation of U-cell production. All of the workers in a U-cell can do all of the jobs, understand small lot size necessity, analyze process data, and solve problems. U-cells have greatly helped improve space utilization, a much-valued resource.

The Mexican operations (Juarez and Chihuahua) have been successful in implementing CPI in production areas. Delco Remy Anderson is now starting to implement these same concepts in the manufacturing areas of their local manufacturing plants. Many departments within the plants are making the transition to Just-In-Time, but it is not an overnight process Change takes time.

As Delco Remy Control Systems Quality Manager Jerome Kelley says, "A fundamental approach to improving the organization and determining world-class levels of quality and productivity is the analysis of support and manufacturing systems and processes CPI provides a methodology that uses leadtime as the primary measurement and utilizes techniques that facilitate analysis of systems and processes. Using CPI as an improvement vehicle helps in our efforts to lower cost, reduce waste, improve quality, shorten leadtimes, and increase productivity."

Delco Remy management's biggest challenge is to encourage and stimulate the transition from the old culture to the new culture. Any change is difficult. Some Delco Remy employees have been doing business the same way for years. But as they plan for the future, continuous improvement is a key part of the plan.

Author:
Margaret Hodson-Howell (Ginger) is a senior project engineer at Delco Remy. She is responsible for CPI coordination for the Control Systems Strategic Business Unit. This assignment includes coordinating training, conducting CPI Boot Camps, facilitating CPI team meetings, and acting as a resource to help teams achieve their goals. She completed a four-year General Motors apprenticeship and is a journeyman toolmaker. She has an A. A. degree and a B.S. for Industrial Technology degree, both from Ball State University and is completing an MBA program at Indiana Wesleyan University. She has been a designer and maker of machine tools, a supervisor of toolroom activities, an instructor of applied Statistical Process Control, a production supervisor, a cost estimator, and a manufacturing engineer.