

Human Resource Professional

VOL. 8, NO. 3

Training in Manufacturing Continues to Evolve

The goal of functional training is to make sure that everyone knows not only what to do, but why it matters. The best programs directly involve the employees and help them learn to learn.

By Vicente F. Estrada

We all know the factory is changing. But what about the factory worker?

World-wide markets, national and international regulations, and technical innovations are combining to redefine manufacturing effectiveness and create a new way of life in the factory.

In today's high performance plants, manual labor is becoming obsolete. Yet the worker is still the most important partner in the process — and, regrettably, often underutilized.

The age of knowledge workers is here, but most industrial enterprises give short shrift to training. The most important consideration, often the only one, is cost control. American companies spend less than one and one-half percent of payroll on training. Estimates are that European and Japanese companies spend three times that much.

Traditional programs — the classroom, on-the-job training, vendor-sponsored workshops — are tried and true, but seldom meet the changing needs of a specific factory or industry.

On-the-job training, with higher seniority workers teaching new hires, can perpetuate bad habits, blunders and irrelevant skills. Instruction provided by vendors — the people who supply the machines — is often generic and remote from the needs of the specific workplace and worker. Classroom instruction seldom receives follow-through on the factory floor.

None of these approaches' fully addresses training the worker as a partner in the factory's changing operations.

Another approach is functional training. Functional training focuses on the work to be done. It systematically uses selected, structured and documented workplace experience, combining theory with practice, and is guided by clearly defined behavioral objectives.

Most important, the best functional training programs involve the workers. In fact, the more actively the worker is involved, the more he or she will learn to learn. Only when workers learn to learn can they fully participate as problem solvers, decision makers and change agents.

Functional training's goal is that all employees know not only what to do, but why it matters.

New Goals

Manufacturing Technology Strategies began designing and implementing functional training programs nearly 30 years ago. Although the concept of functional training remains unchanged, the needs have. Back in the 60s and 70s, the process involved the individual workers and the employer.

In the 90s, third parties often participate, including customers, unions, ISO 9000 registrars, Occupational Safety and Health Administration (OSHA) inspectors, and other government agencies.

In the new marketplace environment, regulatory certification and qualification often must be built into the process. With its emphasis on certification of skills by demonstrating them while working at the job, functional training offers a clear foundation on which to build the processes to meet these legal or quasi-legal requirements.

The work itself is changing, from basic assembly and machine operations to computer-based, complex systems management and, increasingly, teams of workers who direct themselves. Workers don't need an engineering or computer degree, but they must be trained to be writers, trainers and problem solvers, as well as how to run manufacturing processes.

Training at Amoco

Take, for example, Amoco Chemical's Joliet, Ill., plant, which makes intermediate chemicals. Five years ago, the plant began installing a new training system that prepared all operations employees to validate each task in their job classifications.

The system improved the trouble-shooting and maintenance capabilities of the workers and helped reduce the need for supervision.

But to meet OSHA 1910.119 and ISO 9000 standards, the validation was a challenge. Over time, some employees created undocumented shortcuts and built them into their processes. These appeared to save labor but had drawbacks.

Workers were unable to perform their jobs in uniform and consistent ways. Many of the most experienced people were reaching retirement age and the plant was in danger of losing expertise. The plant was moving toward self-directed work teams, but using an external resource for training would undermine Amoco's work toward worker empowerment.

With the help of MTS, the plant adopted a three-phase system created externally that was designed to be totally its own.

It encompassed everything from a needs analysis to documentation, training, validation, certification, and computer-based tracking. The system used the plant's own production employees as manual writers and trainers. This helped significantly in giving the plant ownership of the system.

The first phase began with an audit of the plant's technology and equipment. Analysis

identified the skills training needed for 114 separate steps of operation in seven operating areas at three sites.

In phase two, twelve operations employees, mostly volunteers, wrote operations manuals for the complete manufacturing process. None of them had previous manual writing experience before participating in a two-week documentation writing process that MTS created.

These employees were able to write a first

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draft of a manual in two weeks on average. The drafts were circulated for review and editing by the entire 150-person operations staff. The entire work force contributed toward writing the manuals, which became the basic training texts.

In phase three, everyone was trained to participate in the system. The workers took a seminar called "Learning How to Learn." Employees who were to be trainers took a seminar called "Training Industrial Instructors." Supervisors learned to manage the training through a seminar called "Supervising Learning At-The-Job and Job Performance."

The system was administrated by training coordinators, a group composed of manual writers, trainers and supervisors. They scheduled and tracked 2,700 hours of training.

The training was designed to be flexible so it would meet the needs of all workers, whether they were new hires or had been on the job for 30 years.

The plant used a form of job-based training called At-The-Job Learning, which was created by MTS. Each worker — together with the supervisor, a worker who was trained to become a trainer and, when appropriate, team members — determined what he or she needed to learn, the best way to learn, and what objectives need to be met to show that the training succeeded.

The primary tool is a training needs analysis sheet that lists every skill needed to run, troubleshoot and understand each component

in every machine the employee's responsible for.

Each worker rated his or her ability to perform each task listed in the analysis sheet. Workers entered a 2, 1 or 0 to indicate, respectively, whether they needed full training for the task, needed some training or didn't need any. Since it's a negotiated process, a supervisor could require the worker to perform a given task to confirm the worker's rating.

The completed analysis sheet then became the master document controlling the training process. Each worker took responsibility for mastering all the tasks on the sheet. The actual training activities included self-study, group training, individual mentoring, or team study.

As each worker demonstrated competence, 2's on the list were transformed into 0's. As each worker's training was completed, the worker was certified. Through this system, the plant met the requirements for ISO and OSHA.

From Operations to Maintenance

Monsanto-Greenwood, a manufacturer of nylon fiber and other polymer based products, introduced the team concept in 1986. Teams at the South Carolina plant hire, fire, pay, and

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promote, doing everything and more than management once did. The company determined that training was critical to the quality of the work force and profitability. After all, if teams are going to run the plant, then team members must function at full potential.

As a result, the plant adopted a system of functional training. It required that workers function as trainers and writers.

Logistically, this posed a serious problem when the training system was implemented in maintenance. Established workers in advanced positions did not have the time to be trained to be writers and trainers.

Greenwood instead identified 25 workers who were to be trained, and in turn trained them to be the trainers and writers. In essence, the trainees became the experts, and have since qualified themselves for top technical jobs.

The emphasis on training is important because Greenwood promotes only from within.

Individuals are hired only after strict selection interviews are conducted by plant peer groups.

As a result, the effectiveness of a team is directly dependent on how well each individual is trained.

The teams themselves have established rigorous requirements. For example, to be considered for entry-level employment, candidates must first complete a specially designed eight-week course at Piedmont Tech, a local community college, which covers basic skills such as math and keyboarding, and even how to operate a battery-operated forklift.

Individuals are hired only after strict selection interviews are conducted by plant peer groups. To date, of 4,700 applicants, only 273 have been accepted.

According to the company, return on capital has improved dramatically since the implementation of high performance teams. Although all of this cannot be attributed to training only, training has been an integral part of the change.

More than Bargained For

What does a company do when a union not only supports training, but bargains for it? Unions, too, know that their members have a vested interest in upgrading the work force.

Aristech, a manufacturer of industrial chemicals in Neville Island, PA., needed to meet OSHA's process safety management requirements and the local union negotiated to provide training.

The company saw this as an opportunity to improve its operations and process training. Primarily, Aristech wanted to improve its operators' understanding of process chemistry, so they would know how it worked without having to call in a process engineer or supervisor, and still meet OSHA requirements.

Aristech put together a plantwide team of supervisors and unionized hourly workers to search for an industrial training firm. The team identified three different approaches.

Interactive video was one choice. It would provide generic information on basic theory and equipment operation, but developing interactive video modules customized to Aristech's processes was too costly.

Another option was the classroom approach. Professional trainers would use traditional academic elements such as class discussion, testing, and writing, but the training manuals provided would not be suitable as stand-alone training tools, requiring additional on-the-job training.

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in using available resources — trainers, supervisors, workbooks, mentors, and group training — to meet agreed-upon objectives. Manuals were detailed enough to be used for formal documentation.

Both the classroom approach and functional training were competitive in cost and in use at other Aristech plants, producing satisfactory results. To make a decision between them, the Aristech team developed a simple matrix which compared the two on the basis of a number of criteria team members felt were relevant, such as amount of on-the-job training required, quality of manuals, demands on time, and culture fit. The result was functional training won overwhelmingly.

Initially, Aristech thought its employees would have liked the idea of going to a classroom as a change from the factory floor. But the employees embraced the idea of controlling the process within the workplace.

Eight Principles

The above cases only begin to demonstrate how functional training is a flexible, ongoing training system for the changing industrial

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environment. Although each system must be designed specifically for a particular company or factory, there are eight principles which are common to all. Functional training should be:

1. Systematic. Training should systematically address the total plant environment. It should be founded on an analysis and definition of the plant's technology, the learning goals of the organization, the learning objectives for each job and the learning needs of each worker.

The documentation that results from this analysis becomes the basis of the training text. The success of the training is measured by how well employees meet performance objectives and plant goals.

2. A total learning experience. Training should give employees control of all the processes used in their jobs.

All workers in a plant know what to do, why they are doing it, what decisions they must make, and the constraints on their decision making. Workers have not only the ability to do their jobs; they also have a full understanding of their work and how they interrelate with the rest of the plant.

3. Conducted as a line function. Training should be done on the front lines where everyone in a plant or other enterprise is responsible for training and developing everyone else — employees, managers and associates.

Unless the training is reinforced every day on the job by supervisors and associates, it would be better not to train in the first place.

Training departments or external consultants may champion training and provide guidance and know-how but the actual process is implemented from the line. Workers and supervisors are trained to be trainers. Employees learn to

learn and are prepared to aggressively participate in their own development.

4. Inclusive. Everyone gets trained. In today's environment, management cannot hire people who are completely qualified for the work they are expected to do.

They have to be trained. The question is not whether to train or not to train, but how well. Frequently training is disorganized and catch-as-catch-can. This is the least efficient and most costly way possible to try to stay competitive.

5. Supported by everyone. Even apparently effective training may fail, because training does not exist in a vacuum. Willing and able learners may be sabotaged by their organizations.

Too often, the rules of the game change. "I don't care what they told you over there, at headquarters or the classroom. Do it the way I tell you to do it."

The way to prevent this is to make certain the whole line organization is directly involved and responsible for the training.

6. Followed through. Unless the training is reinforced everyday on the job by supervisors and associates, it would be better not to train in the first place. Only learning that's reinforced and repeated is retained. Training that is a class or an event and not a continuous process soon fades. Systematic follow-through must be an integral and formal part of the training program.

7. Relevant. Training must focus on the work to be done and learning should take place within the context of that work.

Employees learn the job by doing the actual work in the job environment or a close simulation of it.

8. Measured. Training must be rigorously designed, developed and managed so the results can be measured in a clear and objective way that demonstrates to everyone that learning objectives have been met.

It should be possible to relate each and every fifteen minutes of training to the organization's goals.

Ultimately, these principles are based on the realization that the physical plant and the products being made define what workers must be able to do and what they must know.

Functional training ensures that the learners and technology work together as opposite sides of the same coin to reach the highest level of manufacturing effectiveness.



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