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Characteristics of a successful training program that improves the performance of a workforce.

Industrial managers who investigate the full potential of steam as a manufacturing resource are commonly surprised at how underutilized it is within the American industrial sector. A key reason they commonly find through further investigation is the scarcity of knowledge in steam's proper use—despite the presence of an abundance of steam training programs.

Many U.S. firms and their employees suffer from a disconnect between the provision of training and the acquisition of reliable, functional knowledge of steam's wisest and safest industrial use. This article hopes to begin bridging the gap, and seeks to share our experience in developing training programs that result in the acquisition of greater knowledge about this source of power and productivity. Attributes of a successful program include top to bottom commitment; adjusted attitudes; proper, measurable goals; and effective methods.

Steam is valuable

Steam is important in manufacturing today; more than 45 percent of all the fuel burned by U.S. manufacturers is consumed to produce steam. It provides process heating, process finishing, agglomeration, pressure control, mechanical drive, and component separation, and serves as a source of water for many reactions. Steam is also a power source for equipment, for indoor climate control, and for electricity generation. About $18 billion (in 1997 dollars) is spent annually to feed the boilers generating U.S. steam.

That dollar figure is reason enough to seek the significant savings in energy costs typically realized by the proactive training and knowledge-sharing gained through steam system training. Training also yields the benefits of safer, more reliable, and efficient provision of steam to equipment and processes.

A typical industrial facility can realize steam savings of 18.4 percent or more through wiser utilization of its steam systems. It is estimated that if steam system improvements were adopted industry-wide, the benefits would reach $3.312 billion in fuel cost reductions, as well as reductions in emissions reaching to 27 million metric tons.

A great percentage of this cost savings can be achieved by instituting an effective program of steam system training, providing a plant with improvements in the knowledge and capability of

its workforce.

In only one example from our experience, a large paper plant instituted steam training for the personnel involved with three paper machines. They achieved some notable results:

- Energy (steam) cost per ton of paper was reduced by 8.3 percent
- Startup times of the machines involved were reduced by 65 percent
- Unscheduled downtime dropped 17 percent
- The life of steam valves was significantly extended
- Condenser tube failures went down by 43 percent

Top-to-bottom commitment

One of the key determining factors in the effectiveness of steam system training is the ability to extend training's benefits as broadly as possible within an organization. The most successful training programs encompass everyone at a plant—from the plant manager down to the pipefitter.

If this level of commitment is not achieved company-wide, no amount of job-specific training will achieve the desired goal of maximum steam effectiveness.

A typical list of plant personnel who should attend training would include:

- Management
- Safety
- Environmental
- Engineering
- Maintenance supervision
- Maintenance
- Pipefitters
- Production

The correct training program assures that everyone involved leaves the training event with a

common level of understanding on steam systems, along with shared insights on the various solutions to common steam-related issues. This common vision is an essential part of a successful training program, and to the savings that can result.

Companies with successful programs also find they pay dividends which are not steam specific. Well-trained employees are more satisfied in their job functions and they appreciate the investment their company makes in their future. Satisfied employees are less likely to leave for new positions, improving long-term employee retention.

Adjusted attitudes

Training that produces substantial results begins by changing behavior, which ultimately changes attitudes. Unfortunately, most managers and many professional trainers get this backward. They attempt to build awareness in the hope of creating attitude change, expecting the desired behavior to follow naturally. Such is rarely the case.

Other training programs commit errors on the opposite side of the equation, presuming that attitude change will come by simply giving employees a crash course in the functioning of steam traps. In truth, steam traps make up only a very small percentage of the steam system.

A solid training program must encompass the entire system, not just one component. One of the main objectives in any steam system training program is to teach people to focus on the “system” aspect, and not to componentize the steam system.

Proper, measurable goals

Too often, employee training is reactive rather than proactive. It focuses on recognizing the symptoms of a failure, and fails to examine the reasons failures occur and how to prevent them.

There is a tremendous lack of training in root cause failure analysis (RCFA). If a steam trap fails and no RCFA is done before another steam trap is installed, the new trap is likely to fail as well. Unfortunately, steam system audits often reveal that the root cause of a system failure can be traced to individuals who do not possess the skill and/or knowledge to perform their jobs safely or properly in a steam system.

For example, water hammer in a steam system is a leading cause for premature failure of equipment and is extremely unsafe for plant personnel. Despite this, it is considered by many as normal. In fact, water hammer in industrial plant operations can lead to injury and even death.

Plant management must have the commitment to conduct periodic evaluations and review people, procedures, and training to ensure that the plant's needs are being met. When deficiencies in the steam system are determined, plants must develop strategies that will address the difficulties.

Properly trained employees will increase plant reliability and productivity, while boosting plant profits. Improperly trained employees, or employees trained for the wrong reasons, represent a real lost profit opportunity.

A successful training/improvement program should begin by committing some important background information to paper, then revisiting the documentation periodically as an aid in assessing the training process:

- Document the reasons a steam system training course is being conducted.
- Determine what changes in behavior and system performance are sought from the training.
- Brainstorm ways to get the greatest number of people involved.
- Benchmark the existing knowledge levels of the trainees through the use of a simple pretest.
- Prepare yourself for surprising results from the pretest—virtually all training program managers are alarmed by the scores commonly earned by employees who previously were thought to have a high level of steam system knowledge.
- Institute metrics to test the performance of the training instructor.
- Take steps to engage an instructor with current, documented success in steam training. Even an instructor with 30 years of steam knowledge does not necessarily have the ability to convey his knowledge—some do not even possess the correct steam system skills.
- Develop a plan for determining if the desired behavior and system performance changes are being achieved.

Alternative to "spray and pray"

One of the biggest causes of wasted training dollars is ineffective methodology. Industrial plants have been known to rely on a “spray and pray” method of delivering inspirational messages or running packaged videos and hoping for the best. Too many times, participants are motivated more by the free lunch, or time spent away from daily tasks.

When follow-up feedback on the training session is sought, the response is typically a noncommittal “it was good.” When managers continue the questioning, asking what participants learned that could help their work performance or the steam system’s effectiveness, they often receive an eye-opening response. The reality is that many existing training programs are more oriented toward selling products than changing personal behavior and sharpening everyday system operation.

The key to changing attitudes is involvement. Sound, effective steam system training should incorporate discussion groups and simulation exercises that get participants involved in the topic, rather than passively listening to videos or speakers. This type of involvement both coaches skills and impacts attitudes, which will ultimately change behavior for the better.

Before recruiting or hiring an instructor, make sure the individual chosen has a strong proficiency in involving students. Test the instructor if possible, to learn his level of skill at delivering training content. Too many times, training will fail due to the instructor’s inability to delivery the material using methods learners will be able to comprehend and put to use. Instructors who use stories all day long in their presentations are storytellers—not instructors.

The benefits of creating involvement are plain, and have ample documentation in practice.

As an example, we did a study with a private corporation on the comprehension levels achieved by various training techniques in steam system training at industrial plants. See accompanying section “ Comprehension Levels by Training Techniques. ” All groups were tested before and after training.

Group interaction is the best method of steam system training, along with the certainty of a test for the attendees at the completion of the class. When training, the trainer needs to teach knowledge of the steam system through the use of carefully developed exercises that assure proficiency. Trainers need to focus on examples, and allow the attendees to execute their

knowledge through exercises.

When this type of interactive, positive learning takes place, the result is improved steam system utilization, cost savings, and wiser use of energy. It also creates a more positive attitude toward training in general, which sets the stage for further profitable improvements in a company's future. **MT**

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Although this article is written specifically for steam system training, the concepts can be applied to training for other systems, such as compressed air or other utilities.

COMPREHENSION LEVELS BY TRAINING TECHNIQUES

Group interaction learning with certification

68.3 percent comprehension

Internet training with interaction and testing

43.9 percent comprehension

Individual CD training

32.7 percent comprehension

Video training

29.1 percent comprehension

“Spray and pray”

17.3 percent comprehension

All groups were tested before and after training.

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