Every step must be well thought out, from planning to instruction to follow up.

There is a growing concern in the U.S. over a skill shortage in the technical trades crucial to run American industry. With many seasoned veterans planning retirement in the next 3-5 years, the question of how to transfer knowledge becomes more and more important. A well-planned and executed training program becomes the key to maintaining the level of expertise that is needed to keep American industry competitive.

Planning a training program

An effective training program starts with management support. Management should understand that there will be an up-front cost that has to be paid to put a program in place, but that the cost will usually be paid back quickly through numerous mechanisms, including decreased downtime because maintenance personnel have better skills to prevent equipment failures as well as less turnover in personnel who see the investment management is making in them.

A plan that describes the goals of the training program must be put together. The plan should draw upon information gathered in a training needs analysis (TNA), which is an exhaustive survey of plant operations, maintenance procedures, and equipment. It includes interviews with the technicians who maintain the equipment to determine the different skills they possess, and thus, the skills that should be maintained by anyone working on that equipment.

The TNA should include everything from union issues governing work practices to government regulations about plant operations to special ongoing problems in operations of all the different types of equipment in the plant.

From this needs analysis come the objectives of the training program. These objectives determine the exact nature of the needed training, which usually combines many methods, including classroom instruction, on-the-job training (OTJ), consulting for specialty subjects, and even outsourcing to companies that specialize in intense theory to practice-type training.

Classroom instruction

Classroom training offers a focused atmosphere in which to learn. The classroom curriculum should be based on the TNA. It should start with the basics: purpose and functions of equipment and basic operation, including theory of operation, how equipment interacts with

the larger systems, etc.

The curriculum establishes a baseline of knowledge so that everyone is on the same level when more advanced training begins. Depending on the complexity of the equipment, this training could last anywhere from 1 hour to 1 week. Along with a good curriculum, the key to effective classroom training is a good instructor.

A good instructor has worked with the actual equipment and understands all aspects of it, from preventive maintenance required to how to troubleshoot unexpected problems. This person should understand the hazards involved in working with the equipment and the way the equipment interacts with other plant components. Safety should always be at the forefront of every discussion so as to incorporate it as part of the culture of plant technicians.

Before classroom instruction begins, the instructor should give a brief introduction of his or her experience to demonstrate expertise and understanding of what students will face in their day-to-day jobs. Next, students should give brief introductions of themselves to give the instructor an idea of the different skill levels and what they expect to get from the training. These introductions are crucial in setting up a comfortable place in which to learn.

The information should be complemented with visual aids, such as a computer-projected slide presentation, a white board or flip chart, or show-and-tell with parts from the machinery.

Also, there should be question-and-answer sessions throughout the presentation, and instructors should be able to answer questions effectively. It is common that if one student asks a question, over half of the class has the same question. Although a question from a student can disrupt the flow of the material, good instructors use the disruption to engage the class even more fully, and in doing so the instructor shows that questions are desired and will be answered in a way that will add to the comfort level of the learning situation. (See accompanying text "Steps to Answering Student Questions.")

Other attributes that make a good instructor are the ability to communicate the curriculum clearly and concisely, the ability to maintain control of a classroom and keep the students engaged and on topic, and the desire to improve. A critique of the instructor should be done by all students at the end of the class so the instructor can learn what was done well and what

can be done to improve the presentation. A good instructor and curriculum are crucial for the beginning stages of any effective training program.

Hands-on instruction

When a trainee understands the theory behind how a piece of equipment operates, the next step must be taken—on-the-job training. OJT reinforces what students learn in the classroom with a hands-on, learn-by-doing approach. Again, it is very important to have developed a curriculum by which to carry this out.

OJT can consist of students assisting qualified technicians in carrying out daily routines or assisting in preventive as well as repair maintenance. OJT must be incorporated into the work scheduling process and controls must be in place to ensure that it is effective and safe. The Occupational Safety & Health Administration, Environmental Protection Agency, and other regulatory agencies have guidelines and regulations involving training that discuss liability issues and the safety of workers.

Tracking progress

OJT should include a system in which to track a trainee's progress. For example, a series of tasks could be listed in which the trainee has to participate under supervision of a qualified technician, who then would sign and date the task when it is accomplished to the supervisor's satisfaction.

The curriculum for the OJT also should have a pre-existing set of questions that the qualified technician uses to quiz the trainee during the task being performed to ensure that the trainee fully understands all that is involved for each task. With an OJT program in place and running effectively, the knowledge transfer begins to take shape.

Follow up

To know whether the training program is effective and to continually improve upon it, follow up should be done with trainees. Surveys should be done periodically, possibly 30, 60, and 90 days after completing each segment of training.

These surveys should include questionnaires and quizzes that can gage the retention of knowledge by trainees and the applicability of what they have learned. They also should

include a place for comments, so the trainees can make suggestions for improving the program.

Outsourcing and consulting

As stated earlier, outsourcing and consulting can be effective tools in setting up a training program. Experts in a particular field can assist in a variety of ways, from building the program from scratch to a more limited role, such as reviewing the safety controls in place to ensure regulatory compliance.

Some companies have already developed generic training curriculums with a wide range of industrial topics to choose from. These courses can be tailored to a specific arrangement or used as they are, the next step being that the organization will then build the OJT portion in-house.

Training pays off

The skills shortage is not an easy thing to fix. It takes management support, exhaustive TNAs, well-thought-out objectives and goals, participation from veteran technicians, and a program that employs the most effective means available. It includes an understanding of the complex workings of industry from regulatory compliance and safety to basic theory of machinery.

However, it is a continuing part of successful companies who understand that training does not cost—it pays. It pays through decreased downtime as technicians have the tools to troubleshoot costly problems, as well as decreased turnover as employees understand the investment the company is making in them. This endeavor, if done well, will keep the focus on smooth operations that, in the end, contribute to the success of the company. **MT**

Alan Lovett is the director of new product development for National Technology Transfer, Inc., P.O. Box 4558, Englewood, CO 80155; (800) 922-2820

Steps To Answering Student Questions

An effective instructor should address questions in the following manner:

1. After the question has been asked, the instructor should go to the front of the classroom and get the students' attention by saying something to the effect of, "Good question, Jon Doe. Did everybody hear the question? Jon asked. . ." Then the instructor would repeat the question to ensure that everyone heard it.
2. The instructor should answer the question using the appropriate slide from the presentation, a drawing on the white board, a simulation using a show-and-tell item, or a combination of all of these things.
3. The instructor should ensure that he has answered the question to the satisfaction of all of the students by asking, "Does this answer your question?" and then reading the body language of the students. Asking the students follow-up questions that have to do with the original question will give an instructor a feel for whether the question was answered fully.

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