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What happened to employee training? I mean REAL training AND qualification to do specific tasks right the first time, every time.

Companies across America invest millions in new equipment, but little (if any) on employee training to set it up, operate it, maintain it or repair it. This is NOT sound business sense.

I began developing operations and maintenance training back in the early 1970s—*something I continue doing now*
. I focus on training for apprentices, training for new employees, training to optimize old equipment and training on one-of-a-kind high-tech equipment. As we moved into the 1980s, automation reached new levels with microprocessor controls, PLCs and robotics. Machines "talked" to each other and became an integrated process. Mechanical and electrical components were blended into hybrid devices. Learning ability and mechanical aptitude became critical hiring or job-assignment criteria. Equipment purchases often included specific requirements for structured employee training. This made perfect sense.

I believe there is NO excuse for assigning an untrained employee to do a task, especially on state-of-the-art equipment, without job-specific and procedure-based training and qualification processes. Without formal and specific training and qualification, equipment is treated like other—*older, less technologically advanced*—machinery in the area. Often improperly operated and maintained, it is damaged by default.

What to do

The National Association of Manufacturers (NAM) and the Manufacturing Skills Standards Council (MSSC) have been defining and attempting to address the critical skills shortage for over 10 years. They've made real strides. The general public and school systems, though, have been slow to respond.

Individual companies must attract, train and retain the most appropriately skilled and knowledgeable people if they wish to remain competitive. Employees' skills and knowledge must be developed to allow them to master the unique requirements for operations and maintenance of new equipment as advanced manufacturing technologies are added to the business. Without appropriate skills and knowledge deployment in the workplace, new equipment simply will not perform as designed during its planned life cycle. This sad state of

affairs MUST change.

How to do it

There are many ways to boost employee skills and knowledge. The most frequently used—*but least-effective*
—process is based on classrooms, teachers, manuals and books or online courses. Formal and structured, this approach tends to be long, drawn-out and theoretical, with minimal hands-on applied learning. Another common approach is vendor-supplied training for new equipment. Unless there is a detailed "training specification" unique to your plant and employee needs, vendor-supplied training often doesn't hit the mark, either. It tends to be of an informal, unstructured, "show-and-tell" nature,
with limited print materials (documentation), and almost never a "qualification" component where employees demonstrate their skills and knowledge.

The MOST effective workplace training is very focused, fast and sustainable. We discovered this fact during World War II, in our deployment of a structured process called "Training Within Industry" (TWI). From 1940 through 1945, TWI was the predominant method for training U.S. military personnel, as well as for training housewives working in the factories that supported the war effort. Training for job-task "mastery" was essential. Later on, Douglas MacArthur and Dr. W. Edwards Deming used TWI to help rebuild Japan's industry. Although this method that contributed to ending the war eventually fell out of favor in the U.S., it is still used today in progressive Japanese companies worldwide—*including the U.S.-based operations of Toyota, Honda and Nissan.*

Numerous variations of TWI have been developed and used in our military and manufacturing operations since the '60s. Generally, they still follow an "Instructional Systems Design Model" to specifically address business' and employees' learning and training needs. Alas, over the past 20 years, countless U.S. firms that once invested in strong training and development programs discontinued them as part of cost-cutting initiatives and reductions of "non-value-adding" activities. Today, many of these businesses are feeling the uncomfortable results of those cutbacks. Meanwhile, most emerging industrial nations (Mexico, India, China, Turkey, etc.) have recognized the value of advanced manufacturing technologies AND formal employee training.

Investing in training

Imagine what might happen if you were to give your car keys to a teenager and say: "Figure it out for yourself. I'm confident you can learn to drive this car. Go for it, but be careful. It's a new car."

In many cases, today's equipment and processes are more complex than the family car—*and as complex as a helicopter.*
Equipment costing millions of dollars coupled with little or no employee training will fail prematurely and cost significantly more than planned to keep running. Training is NOT a COST, it is an investment. Operating and maintaining equipment WITHOUT employee training is an uncontrollable COST. Therefore, why NOT invest in training?

I've used this rule of thumb for years: Employee training for new equipment should be budgeted at 5% to 10% of the total installed cost (maybe more depending on the complexity and sheer size of the project). Ongoing equipment- and job-specific training should be budgeted at 2% to 5% of payroll.

Training specifications
Another message for equipment procurement: Include a "training specification" in the bid, quotation and purchase materials. Describe the prospective training audience (operators, maintainers, setup/changeover staff, engineers, programmers, et al). Specify type and formats of training documentation to be provided. Specify criteria by which vendor-supplied training will be judged successful. Specify when various training will begin and end (i.e. pre-installation, pre-startup, startup and commissioning, running or steady-state operation). Withhold a percent of the final payment until the specified training is completed. Treat employee training as another project deliverable. To do otherwise is gambling with the reliability and performance of your new equipment—*and gambling with your business competitiveness.*

I believe in very specific employee training to assure that equipment performs as designed throughout its entire life cycle. I've seen this type of training work over and over again since the '70s—*in many different types of companies and industries*. It works every time! In my own experience as a mechanic and a tool and machine designer, I have personally seen the benefits of training, as well as the downside of no training.

Does your employee training miss the mark...or is it right on target? **MT**

Steps to efficient and effective training

1. Focus on "critical assets" as defined in corporate Strategic Goals, or which are identified as constraints in a "Value-Stream Map"of the process flow, as high maintenance cost or as high, unplanned downtime in a critical process. Focus on the critical few and make rapid and sustainable improvements.

2. Perform a "duty-task analysis" to codify targeted equipmentskills and knowledge requirements to operate, maintain,setup/changeover, supervise, train and coach. The duty-task analysis results in documents are used for: a) employee training-needs analysis; b) OJT (on-the-job training) guides; and c) on-job performance-qualification checklists. Review/consult the following:

- Equipment documentation, manuals, schematics, drawings, etc.
- Detailed procedures (operating, maintenance, calibration, repair, changeover, etc.)
- Current highly skilled employees (hourly and salary), aka "job incumbents"

3. Compile the duty-task findings in a readily searchable database. Include references to documentation, procedures and highly qualified individuals (current or potential "equipment specialists").

4. Verify the duty-task analysis findings with the highly skilled job incumbents, supervision and management. Revise as needed.

5. Gather materials to be included in training and developmentprocesses for a "training reference library." Reference these materialsin the applicable duty-task lists.

6. Develop new materials for training and development as needed, andreference them in the applicable duty-task lists. These materials include:

- Print materials to supplement equipment manufacturer's materials
- Detailed procedures (operating, maintenance, calibration, repair, changeover, etc.)
- Audio-visual media: bought or developed in-plant
- Supervisory and OJT coaching

7. Develop a company-specific "Training & Qualification Process"guide and process-flow map to show how the new training process shouldwork.

8. Define "Equipment Specialist" roles and responsibilities. These may include:

- Being involved in all activities pertaining to the targeted equipment
- Serving as coordinator of employee training on targeted equipment
- Conducting OJT/coaching on targeted equipment

9. Assign "Equipment Specialist" designation to the one person who is the most skilled and knowledgeable in the equipment and is willing to serve as an "Equipment Specialist" and training coach.

10. Perform a targeted employee-training "needs analysis" (assessment) using duty-task lists to determine the following skill andknowledge levels:

- Currently skilled and knowledgeable
- Needs training
- Needs refresher training
- Not needed

11. Develop targeted employee training plan for specific equipment and related processes that includes:

- Duty-task lists to be mastered
- Training reference library materials needed
- Assign "Equipment Specialist" as a resource person, training coordinator, coach
- Schedule for self-study time, coaching and OJT

12. Begin your training and qualification process based on priority needs of: 1) equipment; 2) manufacturing process; and 3) people on each shift or crew. Remember to remain focused on the business needs identified in Step #1.

13. Evaluate effectiveness of training and refine as needed to be sure that the business goals are achieved and that training for "qualification" to perform (or training for skill mastery) is achieved.

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