

"Skill of the Craft" -- A Key to Optimizing Worker Productivity and Job Safety

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INTRODUCTION

This guide provides a basis for using the skill of the craft during work planning and performance. The principles in the guide can be applied to the wide range of tasks and work environments found at Hanford.

The basis for this guide is DOE 4330.4B, *Maintenance Management Program*. This order describes the program elements for maintenance at DOE nuclear and non-nuclear facilities. It emphasizes an integrated maintenance philosophy and culture based on good stewardship and established industrial maintenance principles.

The "Traditional" Craft Role

The traditional role of maintenance personnel was to respond and repair failed items rather than to provide care and cleaning to prevent failures. They were "fixers" rather than "preventers." When applied to machinery this usually meant the equipment would run until failure. In a traditional organization the supervisor reviewed "work tickets," and after considering craft skills, personalities, and equipment knowledge, handed the work tickets to each craftperson at the start of the work period.

The craftperson was relied on to review the needed repairs, get the materials and tools, and independently coordinate the task. This resulted in lower "hands-on" time spent on equipment and more time spent preparing (planning and scheduling, obtaining parts, etc.) the work.

The "New" Craft Role

Much of today's work requires increased control because of the hazards at Hanford facilities and increased efficiencies caused by reduced budgets. Elements that must be considered include hazard recognition and control, schedule completions, and increased work documentation to satisfy stakeholder interests. During the transition from the traditional to the new craft role, various interpretations of the requirements have resulted in procedures and work packages containing a very high level of rigor and over-regulation of craft performance with little recognition of supervisory or craft contributions.

"The organization and administration of the maintenance function should ensure that a high level of performance in maintenance is achieved through effective implementation and control of maintenance activities." - DOE Order 4330.4B, Chapter II, 2.1

As defined in the order, a maintenance organization prevents equipment failure through preservation (preventive or predictive maintenance) and restoration (corrective maintenance), particularly failures affecting structures, systems, and components (SSCs) important to safe and reliable operation. What are the key maintenance roles and where does the craft worker fit into the new picture?

The U. S. Department of Energy contracts with individual companies to manage, operate, and maintain the facilities and sites in a safe, efficient manner. Senior management ensures the obligations and schedules defined in the contract are met. The first line supervisor and/or team leader is responsible for executing these obligations in the field.

The first line supervisor/team leader is accountable to senior management for the quality of work performed in the following areas:

1. Understanding and ensuring the correct use of appropriate DOE, site, facility, and department policies and procedures
2. Selecting qualified people to perform work
3. Identifying and controlling job hazards
4. Following an integrated work schedule to manage time and resources effectively
5. Periodically observing work-in-progress, while providing job site coordination and supervision
6. Ensuring proper equipment "return to service," including job site cleanliness and post maintenance testing
7. Maintaining the quality of the completed work packages to adequately record the work actions performed.

Craftpersons provide specialized hands-on skills. At the direction of first line supervisors/team leaders, the crafts perform those tasks necessary to preserve or restore the equipment. Craft responsibilities are in these general areas:

1. Maintain appropriate skill levels
2. Properly use and follow procedures and work instructions
3. Record accurate information
4. Using craft skills, perform work with good quality and environmental safety and health (ES&H) work practices
5. Identify and control job hazards.

The Balanced Combination

In today's "graded approach" work environment the "new" craft role is not suitable for all maintenance tasks. There are situations and tasks where the "traditional" craft role is an appropriate and viable approach. It is to these tasks that the term "Skill of the Craft" applies.

*"A balanced combination of written guidance, craft skills, and worksite supervision is required to achieve the quality workmanship essential to safe and reliable facility operation."
- DOE Order 4330.4B, Chapter II, 6.1*

This statement sums up work management. It explains the phrase "graded approach," and identifies three primary elements for focus:

1. Written guidance: instruction(s) provided to the worker to accomplish a task
2. Craft skills: the level of technical proficiency of the worker verifiable by some form of qualification or supervisory knowledge
3. Worksite supervision: the level of field supervision of the task, including pre-job briefing, job site observations, job site coordination, and post-job review.

A balanced combination of these three elements produces the appropriate rigor applied to complete the task safely and efficiently. Rigor is the amount of supervision and written direction based on the risk and complexity of the task and the known skills of the craftperson. The relationship of all three elements must be considered during task planning and personnel assignment.

Management, first line supervisors, and planners can use Figure 1 to evaluate maintenance tasks for a balanced combination. It must be understood that the task risk/complexity relationships shown are not fixed values, but simply demonstrate a range based on the balanced combination.

Figure 1. The Balanced Combination Matrix.

HIGH RISK/COMPLEX TASK	HIGH RISK/SIMPLE TASK
<ul style="list-style-type: none"> • Detailed written instructions • Maximum supervisor involvement • Craft qualified for task 	<ul style="list-style-type: none"> • Guideline written instructions • Normal supervisor involvement • Craft qualified for task
LOW RISK/COMPLEX TASK	LOW RISK/SIMPLE TASK
<ul style="list-style-type: none"> • Guideline written instructions • Normal supervisor involvement • Craft skill sufficient for task 	<ul style="list-style-type: none"> • Verbal instructions • Minimum supervisor involvement • Craft skill sufficient for task

Upper Left: High Risk/Complex Task:

As an example, assume that an air compressor installed in a plant safety class system, in a radiological control area (RCA), requires a complete overhaul. The process piping may have internal contamination that poses an obvious health hazard. Management identifies the task as a high risk/complex task. Here, the "balanced combination" would be:

1. Written guidance - A detailed continuous use procedure to ensure work quality repeatability and worker safety, a detailed radiological work permit (RWP), and a second craftperson would be required (about 75% of the job balance)

2. Craft skills - A previously qualified journeyman or technician that has additional specific qualifications for radiological work (about 5% of the job balance)
3. Work site supervision - Pre-job briefing, job safety review, work site visitation, post-maintenance, and post-job critique would normally be expected (about 20% of the job balance).

Lower Left: Low Risk/Complex Task:

Assume that the same compressor is installed in a vehicle support building and requires a complete overhaul. Management identifies the task as a low risk/complex task. Here, the "balanced combination" would be:

1. Written guidance - A detailed continuous use procedure or approved vendor overhaul manual to ensure work quality repeatability and worker safety (about 70% of the job balance)
2. Craft skills - A previously qualified journeyman or technician (about 25% of the job balance)
3. Work site supervision - Pre-job briefing, job safety review, work site visitation, post-maintenance, and post-job critique would normally be expected (about 5% of the job balance).

Upper Right: High Risk/Simple Task:

For example, assume a gate valve with body-to-bonnet leaks is installed in a chemical processing system. The leaking fluid is a carcinogenic chemical. Management identifies the task as a high risk/simple task. Here, the "balanced combination" would be:

1. Written guidance - A detailed continuous use procedure to ensure work quality repeatability and worker safety (about 33 1/3% of the job balance)
2. Craft skills - A previously qualified journeyman or technician that has additional specific qualifications for that particular process system (about 33 1/3% of the job balance)
3. Work site supervision - Pre-job briefing, job safety review, work site visitation, post-maintenance, and post-job critique would normally be expected (about 33 1/3% of the job balance).

Lower Right: Low Risk/Simple Task:

Assume the same gate valve is installed in an irrigation water system in the "north forty." Here, the leak is just a nuisance. Management identifies the task as a low risk/simple task. The "balanced combination" would be:

1. Written guidance - A piece of paper that states: "Using appropriate safety precautions, replace or repair as necessary" may be acceptable (about 5% of the job balance)

2. Craft skills - A qualified journeyman or technician with suitable skills would be the normal requirement (about 70% of the job balance)
3. Work site supervision - Minor supervisory instruction, optional work site visits, and discretionary supervisory quality control would be appropriate (about 25% of the job balance).

Maintaining Craft Proficiency

"A maintenance training and qualification program should be implemented to develop and maintain the knowledge and skills needed by maintenance personnel to effectively perform maintenance activities." - DOE Order 4330.4B, Chapter II, 3.1

The training program was never intended to turn an unskilled individual into a skilled craftperson. Those skills are assumed to be present at time of hire. Training ensures proficiency on equipment of a specific facility, protecting the environment while maximizing the health and safety to the worker, plant and facilities, and the public.

The training program includes available **initial training** for new hires or promoted craft personnel, **continuing training** in a classroom setting to improve or update job skills and knowledge, and **on-the-job training** (OJT) where practical hands-on training is performed in the job environment.

Implementation Examples at Hanford

Several work management systems at Hanford have implemented "skill of the craft" differently. Two are summarized below. Both methods are acceptable.

At K Basins, fourteen types of activities are authorized for skill of the craft task assignment. A job hazard analysis matrix to match commonly identified hazards to the fourteen maintenance types is also provided. The current K Basins organizational structure follows the traditional vertical alignment.

PUREX organizational structure has recently been reengineered to reflect a project management and area team structure rather than the traditional vertical tree alignment. The makeup of the lower tier area teams provides a composite group who can authorize skill of the craft work. PUREX has developed a computerized Job Hazard Analysis "tool" to match commonly identified hazards to the skill of the craft activities.

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