HOW TO DEVELOP AND IMPLEMENT MULTI-SKILLED TRAINING

BY: RICKY SMITH, CMRP, CMRT, CRL

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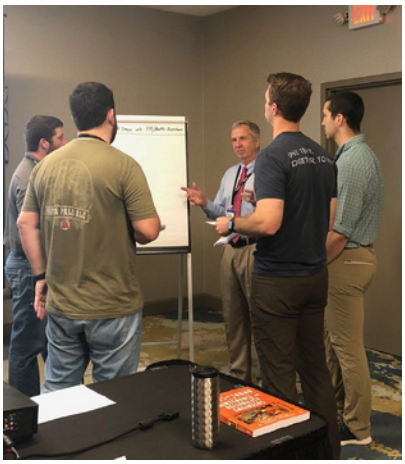
By Ricky Smith CMRP, CMRT, BSED - Trades and Industrial Education



No other area of industry has experienced the broad change in skill requirements brought on by new technology and increased attention to production efficiency than has maintenance. Today's maintenance professionals are often expected to perform tasks from a multitude of diverse craft areas encompassing electrical, mechanical, electronic, and even computerized systems requiring a broad base of knowledge and skill. Despite these evolving requirements, schools at all levels and many apprenticeship programs continue to graduate participants who are proficient in one skill at best forcing industry to develop internal solutions for modern maintenance challenges.

The consensus is that today's industries must have maintenance workers who are proficient in multiple skills if they are to compete effectively and efficiently in the emerging global marketplace. Whether dealing with head count freezes, an inadequate labor pool, or an undertrained labor pool, the days of single-craft maintenance organizations have largely been relegated to the past. Another contributing factor in many areas of the US is the low unemployment rate particularly for skilled workers. These factors have created an employee market in which companies must compete for fewer

qualified personnel. A smart response is to train existing personnel to perform in the skill areas needed. A properly designed, developed, and implemented skills training program, whether through a local learning institution, an external vender, or an internal training department, is one of the most cost-effective solutions available. The combination of escalating requirements and shrinking resources makes multicraft skills training a hot topic.

Unfortunately, the skill level of many companies' existing maintenance staff is well below acceptable industry standards even in their primary craft areas. Data gathered through assessing the skill level of thousands of maintenance craftsmen in the US and Canada shows that 80% of those evaluated scored less than 50% proficiency in the basic technical skills needed to perform their jobs. And this proficiency gap only grows wider as companies modernize and existing employees retire.

How Is a Multicraft Training Program Different?

When designing any skills training program, it is essential to accurately identify the necessary skills, the requisite skill levels, and the current training of the individuals who will be expected to perform them. What constitutes a good program? First, the training must be focused on the correct skills to give results as quickly as possible while also addressing the plant's long-term business goals.

Through needs assessment, job task analysis, and skills assessment, accurate training requirements can be identified to avoid training for activity rather than improvement. Second, the company and all its personnel must be 100% committed to the program. The companies that have been the most successful have demonstrated both financial commitment and patience from their highest echelons of management on down. Well-conceived training programs can certainly help companies save money, increase productivity, and improve employee morale. Yet there are reasonable concerns that any

training program may be successful only from a training perspective and not actually result in the changes needed in the plant. Only skill improvements that are properly identified, utilized, and encouraged will effect change. Once an individual is trained in the right activities, he must be provided with the time and tools to perform and perfect this new skill, be held accountable for his actions, and be recognized for following through. Without total commitment, these key elements often do not occur, and the program is judged a failure.

There are two general types of multiskilled training programs. In the first model, the cross training occurs between two distinct fields. For example, an electrician may be trained in some mechanical tasks, or a mechanic may be trained in some instrumentation tasks or any combination that makes sense. In the second model, new skills are added within the employee's current discipline making him more versatile.

Designing the Program

Regardless of the model chosen, a systematic approach to training identification, design, and development is the best insurance that genuine business needs are being addressed. It is also the step most companies ignore going straight to purchasing and implementing "canned" training instead. The analysis phase, while often viewed as an expense, is the single best investment a company can make in ensuring the desired outcomes are achieved. A comprehensive analysis phase typically includes three components: needs analysis, job task analysis, and skills assessments.

Needs Analysis

The initial step, needs analysis, examines the problem to first determine whether it is an equipment issue, a personnel/policy issue, a skills issue, or some other type of problem. Sometimes training is not the best answer. Gathering needs data up front allows for

informed decisions regarding the changes being desired or demanded and how to best address them.

Needs analysis provides three distinct and critical pieces of information by:

- Documenting present practices
- Identifying desired outcomes
- Providing cost justification for intervention

Needs analysis begins by examining today's practices, gathering comprehensive data on the equipment, personnel, policies, training, and other issues related to the problem area. It is the "big picture" look. That data is then compared to the desired performance outcome to determine the gap between where the company is now and where it wants to be. Next, it compares the costs of achieving that goal and its associated return on investment with the cost of continuing the existing program. If change is indicated, recommendations for a path forward are generated.

Too often, companies either skip the needs analysis step or get bogged down in it. Neither extreme is productive. Although the study can be as general or as detailed as the situation indicates, an in-depth, long-term study is rarely required. The main purpose of the needs analysis is to determine baselines from which to measure future interventions. That also provides solid justification for the program since it is based upon those measurable criteria and their associated returns. Training is often called upon to justify its existence and must be prepared to show how it benefits the organization. Perhaps learning a new process or skill saves time and money. Perhaps it lengthens the life cycle of the equipment or facility. Maybe it increases productivity. Needs analysis is a starting point for showing that training earns more than it costs.

Job Task Analysis

ELECTRICAL SKILLS ASSESSMENT SUBJECT MATRIX				
	SUBJECT	WRITTEN	PERFORMANCE	IDENTIFICATION
01	Fundamentals Of Elect	YES		
02	Motors	YES	YES	
03	Control Devices	YES	YES	YES
04	Programmable Logic Controllers	YES	YES	
05	Instrumentation	YES		
06	AC Drives	YES	YES	
07	DC Drives	YES		
08	Power Distribution	YES	YES	
09	Test Equipment	YES	YES	
10	Electrical Devices	YES		YES
11	Electrical Schematics	YES		

GENERAL SKILLS ASSESSMENT SUBJECT MATRIX				
	SUBJECT	WRITTEN	PERFORMANCE	IDENTIFICATION
01	Safety	YES		
02	Mathematics	YES		
03	Rigging	YES		

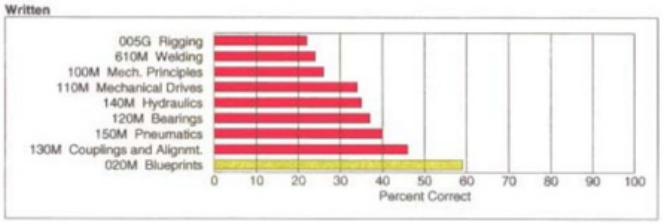
MECHANICAL SKILLS ASSESSMENT SUBJECT MATRIX				
	SUBJECT	WRITTEN	PERFORMANCE	IDENTIFICATION
01	Bearings	YES	YES	YES
02	Fasteners	YES		YES
03	Lubrication	YES		
04	Hydraulics	YES	YES	YES
05	Pneumatics	YES		
06	Mechanical Principles	YES		
07	Blueprint Reading	YES		
08	Mechanical Drives	YES	YES	YES
09	Torque		YES	
10	Benchwork		YES	
11	Welding	YES	YES	
12	Oxy - Acetylene		YES	
13	Piping	YES	YES	YES
14	Plumbing	YES	YES	
15	Coupling/Alignment	YES	YES	YES
16	Pumps	YES		

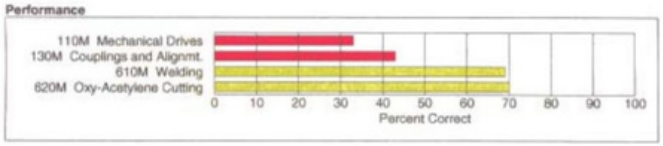
Job task analysis is the next step in developing a quality multi-craft program. This process is designed as an effective and efficient method to capture all current activities to determine the tasks, skills, and procedures that must be performed by both employees and management who wish to exhibit successful behavior. Management then has a tool for determining whether the workforce is performing as desired or has experienced some type of job distortion.

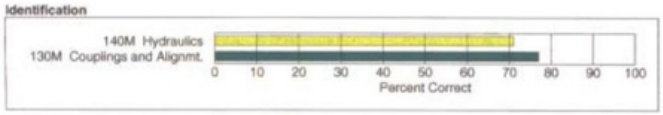
There are several accepted methodologies. For example, the analyst may choose to shadow a craftsperson, detailing observed performances and questioning him about other activities. That can be a time-consuming and costly process. Or a focus group of subject matter experts may be assembled to brainstorm all the tasks performed by their group, developing a duty and task list along with associated conditions and standards. Those tasks are then rated according to frequency, difficulty, and consequences, and the ratings used to identify critical tasks that should be targeted for training. A facilitator guides the discussion helping the group think about daily routines as well as periodic events.

Recently, the focus group approach has added a new dimension using a database as the brainstorming tool. Core duty areas and tasks are pre-assembled and used as the basis for discussion. Rather than writing from scratch, the group can edit. Do we do this task? Do we do it this way? Do we do something else instead? Using the database approach cuts analysis time dramatically and usually produces a more comprehensive document. A well-documented tasks analysis will serve as the foundation for all future decisions affecting job status including multi-skilling.

Skills and Knowledge Assessment







Test Subject	Written	Perf	ID	Avg	Training Level
005G Rigging	22 9*			22	Extensive
100M Mech. Principles	26 9*			26	Extensive
110M Mechanical Drives	34 9*	33 9*		34	Extensive
120M Bearings	37 9*			37	Extensive
150M Pneumatics	40 9*			40	Extensive
610M Welding	24 9*	69 9*		46	Extensive
140M Hydraulics	35 9*		71 9*	53	Moderate
130M Couplings and Alignmt.	46 9*	43 9*	77 9*	55	Moderate
020M Blueprints	59 9*			59	Moderate
620M Oxy-Acetylene Cutting		70 9*		70	Moderate
Overall	36	54	74	55	Moderate

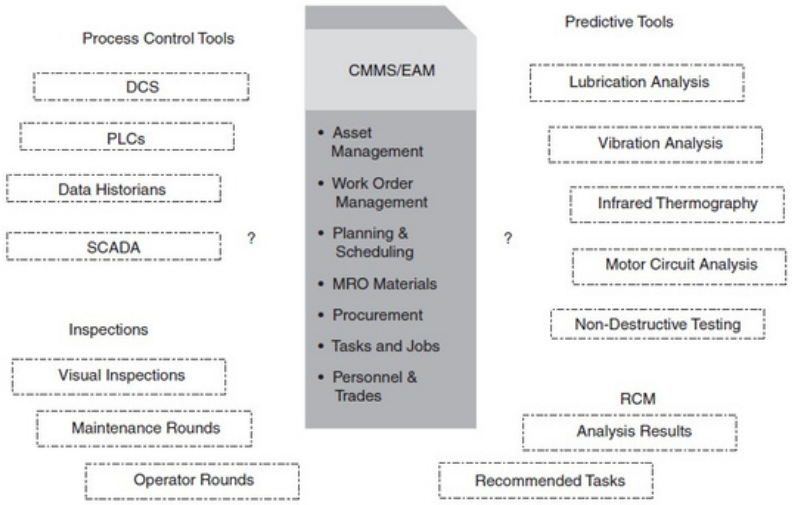
* Number of employees evaluated

The third component of the analysis phase is skills assessment. The maintenance skills assessment is a valuable tool in determining the strengths and weaknesses of a given group of employees to design a high-impact training program which targets and prioritizes those documented needs. Maintenance personnel have often found it difficult to upgrade their technical skills because much that is available is redundant or does not take their current skill level into consideration. The skills assessment is designed to eliminate those

problems by facilitating the construction of customized training paths either for individuals or the group based upon demonstrated currently existing knowledge and skills. In addition, when planning a multi-craft program, the skills assessment helps profile core aptitudes to indicate logical areas of crossover.

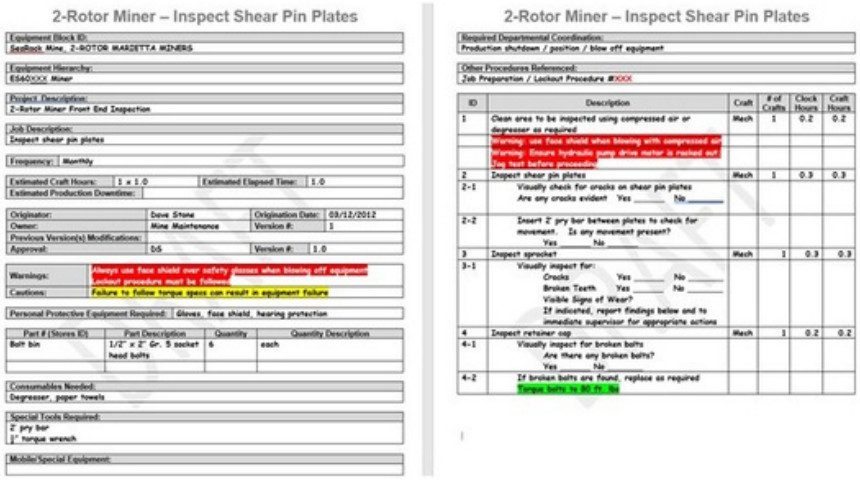
When the skills assessment is used in conjunction with needs and job task analyses, gap analysis can be performed to determine what skills are needed to perform the job effectively as well as what skills the workforce presently has. The overall analysis process also ensures that the resultant training is EEOC compliant.

Computerized Maintenance Management Systems



The real impact of multiskilled training, however, is realized through the effectiveness of day-to-day implementation which can only happen if the new practices and processes are assimilated into day-to-day activity. One method of assuring this integration is through the site computerized maintenance management system (CMMS). A fully optimized CMMS houses the preventive, predictive, and corrective tasks along with their associated standards as utilized by the facility. Also, tasks that were identified as critical during the analysis phase should reside within this system.

The procedures developed for the CMMS should reflect best practices and the training on the related critical tasks should match. Only through such an alignment of practice and training will the program succeed.



2-Rotor Miner – Inspect Shear Pin Plates

Equipment Block ID:
SagBack Mine, 2-ROTOR MARIETTA MINERS

Equipment Hierarchy:
ES40XXX Miner

Project Description:
2-Rotor Miner Front End Inspection

Job Description:
Inspect shear pin plates

Frequency: Monthly

Estimated Craft Hours:	1 x 1.0	Estimated Elapsed Time:	1.0
Estimated Production Downtime:			

Originator:	Dave Stone	Origination Date:	03/12/2012
Owner:	Mine Maintenance	Version #:	1
Previous Version(s) Modifications:			
Approval:	DS	Version #:	1.0

Warnings:	Always use face shield over safety glasses when blowing off equipment Lockout procedure must be followed
Cautions:	Failure to follow torque specs can result in equipment failure

Personal Protective Equipment Required: Gloves, face shield, hearing protection

Part # (Stores ID)	Part Description	Quantity	Quantity Description
Bolt bin	1/2" x 2" Gr. 5 socket head bolts	6	each

Consumables Needed:
Degreaser, paper towels

Special Tools Required:
2' pry bar
½" torque wrench

Mobile/Special Equipment:

2-Rotor Miner – Inspect Shear Pin Plates

Required Departmental Coordination:
Production shutdown / position / blow off equipment

Other Procedures Referenced:
Job Preparation / Lockout Procedure #XXX

ID	Description	Craft	# of Crafts	Clock Hours	Craft Hours
1	Clean area to be inspected using compressed air or degreaser as required Warning: use face shield when blowing with compressed air Warning: Ensure hydraulic pump drive motor is racked out/tag test before proceeding	Mech	1	0.2	0.2
2	Inspect shear pin plates	Mech	1	0.3	0.3
2-1	Visually check for cracks on shear pin plates Are any cracks evident Yes _____ No _____				
2-2	Insert 2' pry bar between plates to check for movement. Is any movement present? Yes _____ No _____				
3	Inspect sprocket	Mech	1	0.3	0.3
3-1	Visually inspect for: Cracks Yes _____ No _____ Broken Teeth Yes _____ No _____ Visible Signs of Wear? If indicated, report findings below and to immediate supervisor for appropriate actions				
4	Inspect retainer cap	Mech	1	0.2	0.2
4-1	Visually inspect for broken bolts Are there any broken bolts? Yes No				
4-2	If broken bolts are found, replace as required Torque bolts to 80 ft lbs				

Conclusion

Training, like maintenance, has often existed in a reactive state only addressing needs when it is too late to do an effective job. Reactive responses attack perceived problems rather than root causes. Before designing any skills program, it is essential to identify the business need, the local strengths/limitations, and the desired outcome. A quality multiskilled training program enables a company to do more with fewer, more highly trained people which in turn creates a positive effect on the bottom line.

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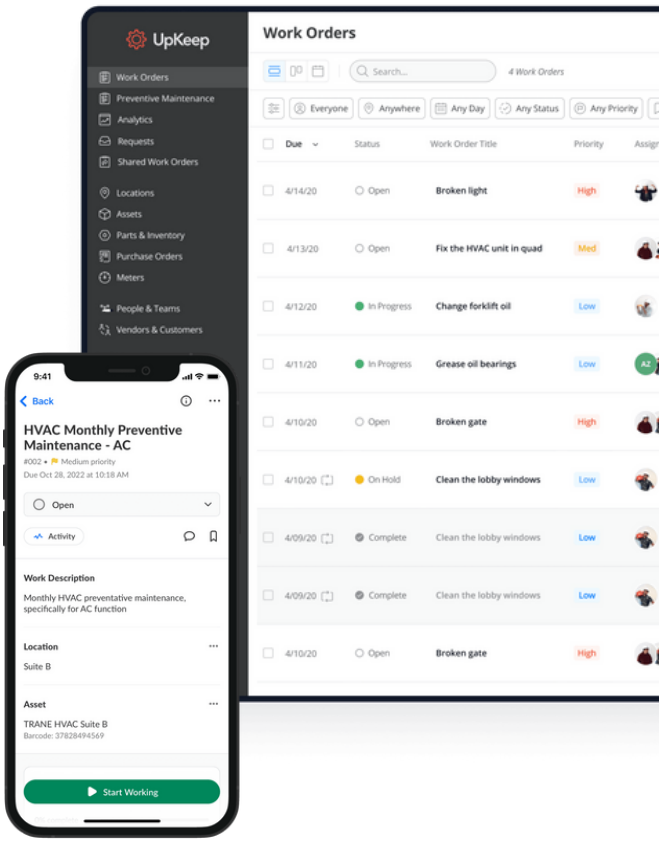

Our Products

UpKeep

Mobile-first maintenance management and collaboration across all location, assets, and teams

With nearly 340 different machines in our work environment, it's an impossible task to manually assign and track PM's. With UpKeep we can schedule regular maintenance without overlapping tasks with other critical jobs."

★★★★★ **Paul D, Health and Safety Coordinator**

An end-to-end solution for remote condition-based monitoring

Connected and secure IoT sensors for real-time remote condition asset monitoring

edge by UpKeep

DATAHUB UpKeep

Integrated & Centralized Data Ecosystem for World Class Asset Operations

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The Maintenance Community Coalition was founded on the belief that working together will benefit everyone within our community

Committed to helping each other thrive in our individual professional journeys by sharing resources and expertise, granting scholarships, hosting events, and unlocking knowledge – always at no cost.

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