

Qualified People — It's a Safety Thing

Hazards are ever-present in the steel plant environment, and a heightened awareness and emphasis on safety is a necessary priority for our industry. This monthly column, coordinated by members of the AIST Safety & Health Technology Committee, focuses on procedures and practices to promote a safe working environment for everyone.

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Comments are welcome. If you have questions about this topic or other safety issues, please contact safetyfirst@aist.org. Please include your full name, company name, mailing address and email in all correspondence.

Whenever a safety incident happens in which someone is hurt or there is equipment damage, one of the first questions to be asked is was the person involved qualified to do the job. So the question then becomes, how do you know if a person is qualified to do a job, especially if it is a maintenance job? What criteria are used to establish whether a person is qualified?

For an operations person, the job is usually a little easier, in that the person would typically be doing a small group of repetitive tasks that are defined by a standard job procedure. For maintenance personnel, the requirement becomes much more challenging, as they are usually involved in hundreds of different tasks that are done on an infrequent basis. For either situation, there needs to be a clear definition of what it takes to become a qualified person. One cannot leave it to chance and hope for the best; that could jeopardize plant safety and reliability.

This article will discuss the approach one company recently took to address this issue. The focus will be on the maintenance jobs. The result is a method to ensure that the individual teammate is highly trained and qualified for his or her position in the company and continues to grow his/her skill sets and compensation.

In October 2014, this company was acquired by another company. The concepts discussed in this article were simply mapped over to the existing structure of the new company. This demonstrates

how these concepts can be applied to almost any corporate structure.

Background

Organization History

When this plant started up in the mid-1990s, there was a pay-for-knowledge system in place for maintenance teammates. This system consisted of four distinct maintenance skill levels: electrical, mechanical, 6G welding and high-voltage. There were two levels of pay. The first level was maintenance and was achieved by mastering one skill level. The second level was master maintenance and was achieved if an individual mastered two or more skill levels.

The criterion required for the electrical or mechanical skill level was to pass a standardized test that had been validated for the work required. There was no requirement for any demonstrated ability. For the 6G welding requirement, the criterion was to earn a 6G welding certificate to ASME standards. This required welding a pipe coupon that could pass an ASME standard bend test. This skill level required attending classroom training on welding and passing a demonstrated ability test. For the high-voltage requirement, the criterion was to attend a five-day safety training class on high-voltage systems and then perform a series of high-voltage switching functions on the 345-kV, 34.5-kV or 4.16-kV systems. An individual was required to complete a written test, which included writing a high-voltage switching procedure.

To summarize, this high-voltage skill level required classroom training, hands-on demonstrated ability and a written test.

Problems With the Original System

Initially, the pay-for-knowledge system served the company well. Since the equipment was all new and everyone was learning new things, the teammates were able to grow in their skill sets. The standardized tests established that they were qualified to perform electrical, mechanical, high-voltage or 6G welding maintenance work to service the various assets of the plant.

But over time, a couple factors began to develop. Some individuals were becoming too specialized in their skills and were working only on certain assets. When the asset expert was not available, additional downtime resulted because other teammates did not have the required skills to make the repairs. The maintenance teammates had largely become “silos experts” over time and specialized only in specific assets. Besides being a reliability issue, this created safety issues. When an asset needed maintenance, the person doing the work may not have been fully qualified to do the work.

The second problem that developed was with new hires. As the plant aged, new maintenance teammates were brought on board. The only requirement for new hires to achieve maintenance or master maintenance level was to pass the standardized electrical and/or mechanical tests. This meant that a new hire could start at master maintenance pay by passing both tests, and his or her pay rate would have been the same as another master maintenance teammate with 10 years or more of asset-specific experience in the plant. This created personnel problems, because the new hires had no asset-specific experience.

There were also some serious safety implications with the old system. People were being paid at a high rate and were expected to perform at a high rate. But in reality, they were not fully qualified for the equipment on which they were working; they were at risk, as were their fellow teammates working with them.

To remedy these problems, a series of roundtable discussions were held with all teammates to help identify the issues with the existing pay-for-knowledge system, and three top issues were identified:

1. Additional training was needed at all levels.
2. Individuals should be paid more for learning new skills.
3. A teammate should have to demonstrate abilities and not just pass a test in order to qualify for a position.

Both management and hourly teammates identified the same top three issues, so there was full support in the plant for changes to be made to the existing system.

Discussion

Vision

In reviewing the existing pay-for-knowledge system, it became clear that a complete re-engineering of the system would be necessary. There were several safety issues that had to be addressed when a person was deemed qualified for a job but in reality was not fully qualified. A new vision had to be developed. The company developed a new system with the following commitments:

1. People will be highly trained.
2. People will be highly qualified in their jobs.
3. Each person can advance in skills based on his or her own initiative.
4. Each person will be held accountable for tracking his or her own progress.

In the new system, there was a difference between being trained and being qualified. To be trained implied that a person attended a class or formal training program. To be qualified implied that there was a certificate of accomplishment to show the results of demonstrated ability. The end result was a significant increase in safety, because now a person would not only be trained in a classroom for the subject matter, but must also demonstrate his or her abilities to perform the job.

New Structure

The structure that was envisioned for the initial project had four levels with an optional fifth level. These levels were called:

1. Basic.
2. Specialist.
3. Senior.
4. Expert.
5. Project Leader.

After the acquisition, the new company structure had four levels with nine grades of pay, so it was a natural fit to map this concept over to the new company and eliminate the optional level.

The new company levels are listed below:

1. Entry.
 - Mechanical Grade 1 and 2.
 - Electrical Grade 1, 2 and 3.

2. Class III.
 - Mechanical Grade 3 and 4.
 - Electrical Grade 4 and 5.
3. Class II.
 - Mechanical Grade 5 and 6.
 - Electrical Grade 6 and 7.
4. Class I.
 - Mechanical Grade 7 and 8.
 - Electrical Grade 8 and 9.

Description of Each Level

Entry

Entry is the level for new hires into the company. The criteria to be at this level include passing the standardized electrical or mechanical test, along with other human resources hiring criteria. So what used to be the requirement to get maintenance or master maintenance pay would now be the requirements for entry-level pay. These tests were also redesigned for the new system and re-validated for the new requirements. Based on prior experience, there are a couple of pay grades available to a new hire. A teammate is eligible for a pay grade increase 90 days after the start date. Grade increases will be at the supervisor's discretion. Basis for the increase will include work performance, work ethic, completion of assigned tasks, attendance, safety and input from peers.

Class III

Class III is the second level to which all electrical and mechanical maintenance teammates in the plant can be trained. Upon completion of this level, an individual will possess a standardized set of electrical or mechanical skills common for all areas that can be applied to the various assets in the plant. In order to identify these skill sets, a series of interviews were conducted with electrical and mechanical teammates. Each person was asked to identify a list of various tasks that they do in a routine workday. More than 2,000 separate tasks were identified during this process. Each of these were analyzed and grouped into common areas. The end result was the listing below for each of the skill sets in which a maintenance person would be trained.

Electrical skill sets:

1. Analog and digital circuits.
2. Single- and three-phase AC and DC systems.
3. NFPA 70E.
4. Programmable logic controllers (PLCs).
5. Construction techniques.
6. Instrumentation.
7. Basic mechanical skills.

8. Print reading.
9. AC and DC motors.
10. Power distribution.
11. Test instruments.
12. Power supplies.
13. Pneumatic/hydraulic solenoid systems.
14. Basic rigging.

Mechanical skill sets:

1. 3G welding and torch operation.
2. Hydraulics.
3. Lubrication.
4. Mechanical maintenance techniques.
5. Basic pump and pipe systems.
6. Pneumatics.
7. Power transmission — gearing systems.
8. Print reading.
9. Basic rigging.
10. Shop machinery.
11. Measuring tools.

Each of these skill sets was broken into five to 15 specific tasks and put on a checklist, which must be completed to show competency in that area. Also included in the task lists were several technical training classes associated with the skill set.

Additional skills beyond the technical ones were added to the checklist form. These included safety items like energy isolation, common skills such as mobile equipment operation, maintenance processes such as work orders, company culture items such as reviewing the mission statement, process excellence (lean management) projects such as implementing a 5S (sort, set in order, shine, standardize and sustain) organizational system, use of basic office-related computer software products, and Web-based training on technical and soft skills such as time management. All of these tasks were listed on a checklist form. The individual teammate must then track his/her progress and submit the checklist form to his or her supervisor for approval once the tasks are complete.

Upon completion of this level, a maintenance teammate would now possess enough technical skills to be able to support the work on the department's assets on the shift with minimal help from another teammate. The teammate would not yet be fully qualified on the assets but would possess the skill sets needed to work on them.

Class II

Class II is the third level to which all electrical and mechanical maintenance teammates can progress. At this level, a person would utilize the basic skills learned at Class II level and apply them to the assets for the department to which he or she is assigned. The tasks at

this level now become department-specific. Each maintenance job for the assets in the department was reviewed and chosen based on the use of the standard skill sets in Class II. Upon completion of this level, a teammate would be qualified to work on all of the assets in the department at least to a fundamental level of understanding. Therefore, in order to be fully qualified from a safety perspective to work in a department, a maintenance teammate must complete at least Class II level in his or her career path.

There are additional tasks for this level beyond the technical ones for asset maintenance. A person must choose two leadership skills from a list of 20 that must be maintained. A leadership skill is something that would be beyond normal responsibility and contribute to the betterment of the department. One example would be to write one maintenance procedure per quarter. As the program is built, there are hundreds of new procedures that need to be written. This leadership skill allows a person to help with the work needed to get these developed and in place.

Another requirement at this level was for a teammate to cross-train in operating positions. The teammate must learn how to use the human machine interface terminals to operate equipment to perform maintenance on a particular asset. For example, if a teammate needed to perform maintenance on a particular piece of equipment that needed to be positioned in a certain spot, he or she would be qualified to go into the control pulpit and make the necessary moves to put the equipment where it is needed without having to find an operator. They can

then lock out the equipment and perform the maintenance as needed. The goal is not to make the teammate an operator, but for that person to be qualified to know how to position a particular piece of equipment for maintenance work.

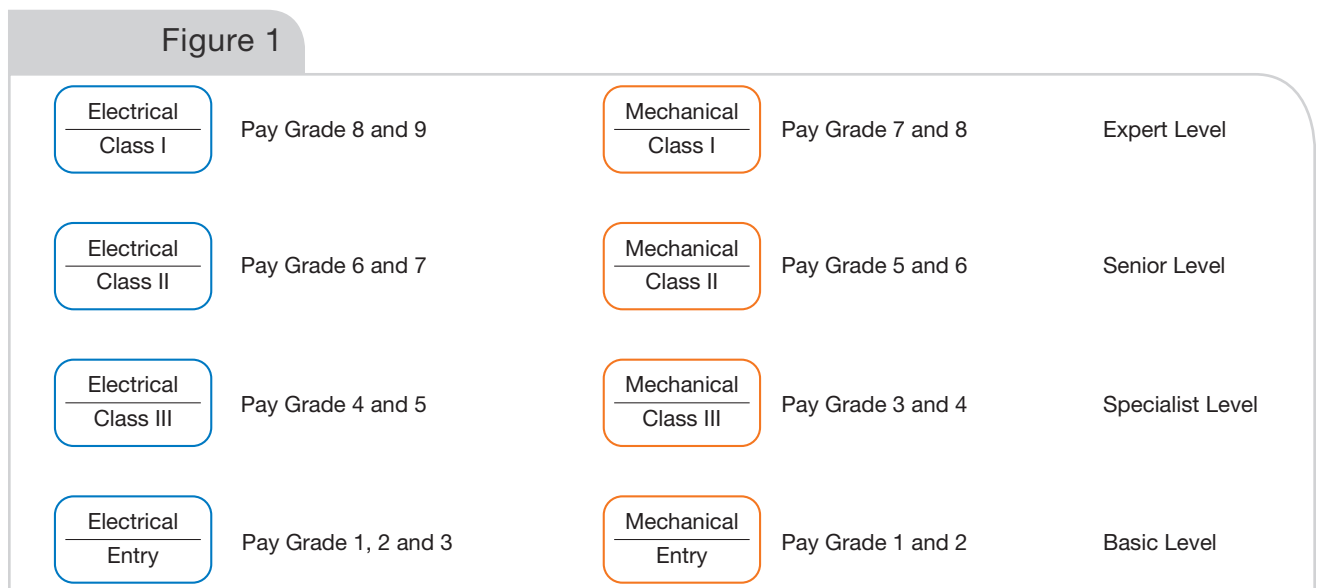
To account for the high-voltage level that was in the original system, identical requirements from the old system were added to the electrical Class II level. The old high-voltage program required that a person be qualified as an electrical maintenance person for six months before he or she could begin the program. To become Class II level, there is a minimum requirement of six months at Class III level, so the high-voltage program was a natural fit at Class II level.

Class I

Class I is the fourth level to which all electrical and mechanical teammates can progress. At this level, a person is viewed as the “go-to” person in the department. When a difficult technical issue arises with an asset, this person will be the one who is called to assist. He/she will take on high-level training and perform the difficult technical tasks needed to support the department.

There is an old axiom in training that says: “If you really want to learn something, teach it.” One of the skill sets added to this level is that the person must teach a yearly technical class to those at the lower levels. They in effect become a department trainer for a particular skill area. This requires that they attend advanced training

Figure 1



An overview of the company’s new maintenance organization chart.

classes in the technical subject matter. Several expert-level positions in the initial system were chosen. These are PLC expert, drives expert, mechanical expert and hydraulics expert. These skill set requirements were mapped over into the Class I mechanical and electrical positions.

Overview of the Structure

To see how all of this fits together, see Figure 1 for an overview of the new maintenance organization chart.

A person who passes the standardized entrance test for electrical or mechanical maintenance will start at the bottom level at Entry. He or she will then progress upward to Class III, Class II and Class I as new skills are learned. The various pay grades are also noted in the diagram.

Conclusion

The Occupational Safety and Health Administration (OSHA) and NFPA 70E give a very clear definition for what it takes to become a qualified electrical person and perform in a safe manner. Unfortunately, OSHA does not give a similar definition for mechanical and operations people. Each company must establish its own criteria on how to define a qualified worker. The new skills-based system outlined in this paper allows for a structure that will define a qualified worker based on cognitive ability, classroom training and demonstrated ability. It also provides a method in which to document this training on a checklist form for the individual's training records.

Being a qualified person is truly a safety thing; each job is unique and must have a definable set of skill sets in order for a person to become qualified. ♦



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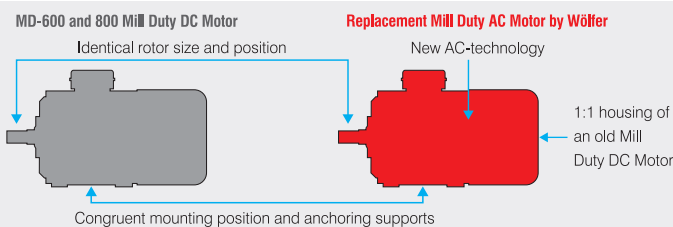
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