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How often have you had to perform maintenance on equipment in an awkward position, without adequate light, with tools that are not well suited to the job? How often could these problems have been easily corrected if equipment designers better understood how maintenance tasks were performed?

Risk assessment is coming to maintenance work. It is no longer satisfactory to simply comply with OSHA regulations. Several industries have passed or are working on standards that require risk assessments. The new lockout/tagout standard ANSI Z244.1 also requires risk assessment.

Yet the biggest driver of risk assessments is not the threat of noncompliance but productivity improvements and cost efficiencies. Companies that are performing risk assessments are identifying more hazards and better risk reduction solutions that result in less downtime for repairs, lower costs, and higher productivity.

Maintenance work takes place in all industries usually by skilled trades with specialized training and experience in equipment and facility repair. These activities involve very special sets of circumstances. Unlike operators' duties, maintenance tasks are rarely repetitive. Frequently, maintenance involves a great deal of troubleshooting and problem solving skills. These tasks often require observation and testing of equipment in operation in order to effectively diagnose problems.

Maintenance is both common to all industries yet unique unto itself. The complexity of maintenance tasks and hazards make risk reduction challenging. For any given equipment maintenance problem, the tasks could require specialized skills from a broad array of areas (electrical, mechanical, computer diagnostics, or testing).

The hazards maintenance personnel face are equally complex. Often the skill set needed and hazards potentially encountered cannot be fully appreciated until the tasks are underway, thus making risk assessment an ongoing process while working the maintenance problem.

Maintenance personnel also face time pressures to complete the repair and get the equipment

back on line. These external pressures can influence a person's willingness to accept known higher risks, or prevent identification or evaluation of less obvious hazards and risks. Consequently, time pressures are a practical limitation for maintenance risk assessment.

Yet maintenance workers are often seriously injured at far greater rates relative to other operations. This high incident rate is due partly to the high-risk nature of the work. Data on maintenance injuries are scarce and can only support analyses after personnel have been injured.

More proactive means to identify hazards and assess risks before injuries occur are needed. Yet without a better understanding of the needs, constraints, and opportunities for maintenance applications, proactive risk assessment will likely remain a theoretical rather than a practical process in maintenance work.

Maintenance risk assessment is significant enough that a study was conducted to examine in more detail the factors influencing risks and risk assessment in maintenance work. Everyone involved in maintenance safety has impressions, thoughts, and ideas concerning the root cause(s) of maintenance injuries and potential solutions to improve maintenance safety.

Often the differing and sometimes conflicting opinions point to differing sources (poor work practices vs poor equipment design) and very different remedies (being careful vs new equipment and designs). Without a better understanding of the underlying problems and data to support that understanding, significant advancement cannot be expected. The project results and findings are included in Risk Assessment for Maintenance Work, a book published by design safety engineering, inc.

One of the key results of the study is data that support the following conclusion: The primary needs for maintenance safety include better equipment and facility designs, and improved training. The results should be used to influence engineers and their designs, the emphasis that maintenance concerns receive during design development, and management's decisions regarding resource allocations. An Executive Summary of the study results can be found at www.designsafe.com.

Ready or not, risk assessment is coming to maintenance work. **MT**

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