

# Risk Assessment for Maintenance

*Author – Ricky Smith*

Is any level of risk acceptable in the workplace? Can all risk be eliminated? What level of risk is acceptable? All very interesting questions – how would you answer them? **The US Army requires a risk assessment to be performed before any mission. The objective of the risk assessment is to identify risk and put counter measures in place to reduce or eliminate known risk to an acceptable level.**

OSHA, ISO and ANSI guidelines/standards that address workplace hazards are all based on the premise that *zero risk in the workplace does not exist*. Risk reduction is the only way to make the workplace safer. How should a maintenance organization approach reducing risk while optimizing the maintenance function? Arbitrary decisions concerning risk reduction can only lead to mistakes and accidents. As in the performance of maintenance, having the right tool is essential to doing the job correctly and efficiently. The purpose of this article is to provide the right tool to minimize risk in your workplace.

The *identification* and the *analysis* of risk and making *rational decisions* based on the known risk (Risk Assessment Process) is the best preventive tool a maintenance work force can use. The risk assessment will allow a company to maximize the effectiveness of its safety program and thus reduce accidents. The risk assessment process should be formalized and consistent in order to reduce accidents that could cause injuries, death, machine damage and longer equipment stoppage. One must learn in maintenance that, just as our primary work objective is to minimize equipment downtime, our primary work environment objective must continually be one of risk reduction. In any task there are risks and thus the reduction and minimization of these risks will make all work tasks safer and more successful.

***“The risk is – not performing a risk assessment”***

***(The Preventive Management Tool)”***

In order to perform a risk assessment:

1. Identify the risk
2. Analyze the risk
  - a. Define potential hazard
  - b. Rate (score) the likelihood and severity of the hazard
  - c. Identify risk reduction/mitigation measures
3. Implement risk reduction/mitigation measures
4. Tabulate total risk factor score.

Only after the risk has been reduced or eliminated can a maintenance person proceed to perform the task with a known, acceptable level of risk. The Sample Risk Assessment Worksheet shown below will assist in the explanation of this process.

***Risk Assessment Worksheet***

A Risk Assessment Worksheet should be used for all maintenance tasks. What is known in maintenance is that a maintenance organization, in order to be successful, must have defined processes and thus this worksheet is one of the important processes that must be utilized in order to be successful. What makes this process so important is that lives are at risk if we do not follow it.

Note: The score noted on the far right has three numbers to score each risk after risk reduction actions are implemented. Once the assessment is completed then all scores are added and compared with the Task Risk Scale at the bottom of the chart.

**(WARNING – Sample Only:** This worksheet is designed to provide a maintenance person with the understanding of the risk assessment process and should not be used for any determination of risk or safety criteria)

## Risk Assessment Worksheet

**Task - Replace 100hp Electric Motor**

**Date - 10/19/02**

**Name of Person Performing Risk Assessment - Ricky Smith**

Risk	Potential Safety	Risk Reduction Action	Score
Lifting Chain Break - single chain lift	Death, injury, equipment damage, loss equipment run time	Inspect latches to insure (replace are marked) and you are lifting chains lifting the chain	0
Lifting Shackle does not have center pin and thus a grade 8 bolt will be used	Death, injury, equipment damage, loss equipment run time		2
One maintenance person and one unskilled person changing the		Identify another person skilled and trained in rigging and hoisting	0
Boom Truck (truck) - Has been load tested within the last 6 months	Equipment damage, loss equipment run time	None Needed	2

**SCORE TOTAL = 4**

**RISK = HIGH / DANGER**

**Scoring:** (The score for a risk is only determined after the risk reduction actions are implemented)

0 = No risk

1 = Moderate risk

2 = High risk (Any risk evaluated as 2 must be addressed immediately)

Total Task Risk: add all scores from each risk and match to the Final Score Scale

**Final Score Scale**

Minimal Risk = 1

Moderate Risk = 2 to 3 (Review with higher management before task begins)

High Risk/Danger = 4 and higher (Task will not begin until risk reduced to acceptable level as defined by management)

In order to provide consistent risk analysis, guidelines for scoring should be established and followed. The scoring matrix below is a simple method for achieving consistency. Judgment calls will always be involved in analyzing risk; the goal is to minimize the subjective part of analysis and maximize the objective analysis elements. In the scoring matrix, subjectivity is involved in selecting the probability of occurring and assigning the level of hazard severity. These elements of analysis however, are usually straightforward and therefore readily agreed on.

SCORING MATRIX			
Probability of Occurring	Hazard Severity		
	Grave/Serious	Moderate	Minor
Very Likely	High/Dangerous = 2	High/Dangerous = 2	Moderate = 1
Likely	High/Dangerous = 2	Moderate = 1	Low = 0
Unlikely	Moderate = 1	Moderate = 1	Low = 0
Remote	Low = 0	Low = 0	Low = 0

### Some Risk Definitions

In identifying, analyzing and mitigating risk factors you will probably encounter terminology that is unfamiliar to you. Following are a few of the more common terms used in risk assessment along with their definitions.

- ⇒ Risk Mitigation (Reduction) Action – that action taken to reduce or eliminate the hazard’s probability of occurring and the hazard’s severity.
- ⇒ Acceptable Risk – that hazard whose likelihood of occurring is unlikely or remote and whose severity is minor or moderate respectively.
- ⇒ Residual Risk – that level of risk that remains after risk mitigation action has been implemented. It is extremely important that the nature of the residual risk be communicated in order to avoid the assumption that all risk has been eliminated.
- ⇒ Safety Hierarchy – the priority of preferred mitigation actions used to reduce risk.

In descending order they are:

- Physical control measures such as guarding the hazard or using protective devices to prevent access/exposure to the hazard
- Engineered control measures that still rely upon human intervention for effective use. These safeguards can be reliable in the right kind safety culture but their effectiveness depends largely upon behavior. Examples are shields or other movable barriers that do not fully protect and devices which can be adjusted
- Administrative control measures are those with no physical restraints such as warning signs, training and personal protective equipment

## **Conclusion**

As established from the worksheet and scoring matrix above, if one can identify and quantify the known risks in performing a specific task, then an organization can reduce the risk of accidents occurring to an acceptable level. The risk assessment process can be used for large, complex tasks as well as small, quickly completed tasks; risk assessment should be performed on all tasks. A simple laminated risk assessment card can be used by maintenance supervisors and maintenance personnel for emergency and just-in-time tasks. All maintenance organization staff have a responsibility for safety. They should also be vigilant for risks that haven't been previously identified or associated with a particular task. A maintenance planner should use the risk assessment process for all jobs planned. A copy of the Risk Assessment Worksheet should be a part of the job plan package given to maintenance technicians.

**Written by Ricky Smith with Life Cycle Engineering, Inc., [Ricky.Smith@LCE/](mailto:Ricky.Smith@LCE/), 843-744-7110, [www.LCE.com](http://www.LCE.com)**