

Hazard Identification and Risk Assessment

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.

A critical part of any safety and health program is the identification, assessment, elimination and/or the control of hazards in the workplace. It is impossible to eliminate all hazards, so the goal is to eliminate and/or control the hazards with critical and high potential and to reduce the rest of the hazards to the lowest reasonable risk level so as to protect workers from harm. This process is called *risk assessment*, and it is the evaluation of hazards to determine their potential to cause an accident.

When most people hear the term *risk assessment*, they immediately think of insurance and indemnification. In reality, risk assessment is something people do each and every day without giving it much thought. For example, when driving, we assess the condition and circumstances of the roadway and adjust our speed accordingly; or when caught in a rainstorm on the golf course, we assess the weather to determine if we play on or seek cover. These are simple and, for the most part, effective risk assessments applied by most everybody. However, little thought is given to assessing risk on the job, when in fact steelworkers are exposed to risk each and every time they do a job. Because of this, we should be more informed on various risk assessment techniques available to us and how they can be applied in our facilities.

Some risk assessments are very complex and are best used in formal situations for specific purposes. These would include tools like failure mode and effects analysis (FMEA) or management oversight

risk tree (MORT) analysis, Petri net analysis (PNA), fault tree analysis (FTA), and others.

The intent of this article is not to review these complex processes, as they require some amount of training and review to be effective. Instead, the goal here is to provide a basic six-step risk assessment process that can be put into place with a minimum of instruction and understanding.

This simple six-step process includes:

1. Identification of a hazard.
2. Identification of the associated risk.
3. Assessment of the risk, which includes:
 - The likelihood.
 - The severity.
 - Assigning a priority for correction.
4. Control of the risk, which includes:
 - Elimination.
 - Engineering a barrier.
 - Administration controls.
 - Personal protection equipment.
5. Documentation of the process.
6. Monitoring and review of the process.

Step 1: Identification of a Hazard

This is a process of examining the work area and the work to be completed for the purposes of identifying all of the hazards inherent to the job or present at the job site.

Several things can help identify hazards in the work area and job site:

- Walking around the workplace to inspect what is in the general area.
- Asking other employees what they think about anything they have noticed.
- Reviewing a work instruction or job safety analysis.
- Inspecting an operator's manual.
- Reviewing previous incident reports.
- Looking at a U.S. Occupational Safety and Health Administration (OSHA), Mine Safety and Health Administration (MSHA), or other regulatory book.

Here are several examples of hazards that may be found:

- Unguarded rotating, reciprocating and similar moving parts.
- Flammable liquids in the presence of ignition sources.
- Unlabeled containers of hazardous chemicals.
- Noise with the potential to damage hearing.
- Poorly designed tools having the potential to cause injury.
- Degraded and worn hand tools.
- Waste oil on the floor, causing a slipping hazard.

Workplace hazard identification, assessment and control are ongoing processes best conducted between those employees and management in control of the environment. It should be undertaken at various times, including:

- When stored energy may be encountered (electrical, hydraulic, kinetic, etc.).
- Working at heights over four feet.
- Working near or inside of a trench or confined space.
- On a work zone controlled area.
- If the job has never been performed previously.
- When a change in the workplace occurs.
- After an incident report, regardless of outcome (injury and non-injury).
- At regularly scheduled times appropriate to the workplace.

Step 2: Identify the Risk

Once a hazard has been identified, the risk associated with the hazard must be examined.

Before starting a risk assessment, it is useful to identify factors that may contribute to the risk. A review of

Figure 1

		Likelihood						
		M	M	H	C	C		
Severity	L	M	M	H	C	1	C: Critical	
	L	M	M	H	C	2	H: High	
	L	M	M	M	H	3	M: Medium	
	VL	L	M	M	M	4	L: Low	
	VL	VL	L	L	M	5	VL: Very Low	
		1	2	3	4	5		

Risk matrix.

regulations, previous injury reports, audits, inspections, and other areas can be used to judge whether the hazard being observed actually can or has caused an injury.

Step 3: Assess the Risk

It is then necessary to evaluate the likelihood of an injury occurring, along with an estimate of how severe the injury may be. Risk assessments therefore are based on two key factors:

- The likelihood that the injury (or illness) may actually occur. (Scale: 1 = rare, 2 = unlikely, 3 = moderate, 4 = likely, 5 = almost certain.)
- The severity of the injury (or illness) resulting from the hazard. (Scale: 1 = may be an injury, 2 = first aid is required, 3 = OSHA recordable injury, 4 = lost time will result, 5 = fatal.)

A simple matrix is used to provide guidance as to whether the risk is acceptable or needs to be addressed (Figure 1). Remember that not all risk can be eliminated.

Urgent action is required for risks assessed as critical or high. These actions may include instructions for immediate cessation of the work and/or isolation of the hazard until permanent measures can be implemented.

Documented control plans with responsibilities and completion dates need to be developed for moderate risks.

Step 4: Control the Risk

New work procedures will need to be developed in relation to the new control measures. A good plan of action often includes many pieces, such as:

- Quick attention to critical or high-risk hazards.
- Effective temporary solutions until permanent fixes can be applied.

Table 1

Risk Control Hierarchy		
	Process step	Effectiveness
Clearly state the hazard	1. Eliminate the hazard completely. If the hazard cannot be eliminated, move on to the next step.	100%
	2. Engineer: Create a barrier between the person and the hazard. If this cannot be done, move on to the next step.	70–90%
	3. Administer: Write regulation, law, procedures, etc. If this cannot be done, move on to the next step.	10–50%
	4. Provide personal protective equipment.	20%

- Long-term solutions to those risks judged to cause long-term illness.
- Long-term solutions to those risks with the worst consequences.
- Arrangement for training workers on the main risks that remain and how they are to be controlled.
- Regular checks to make sure that control measures remain in place and it is clear who will take what action and by when.

By assigning a “risk rating,” the work at hand can prioritize hazards with the highest potential to cause an injury so that they can be eliminated first (Table 1).

Step 5: Document the Process

Documenting the process helps to ensure that the identified risk control measures are implemented in the way they were intended. It will also assist in managing other hazards and risks that may be in some way similar to ones already identified.

Adequate record keeping of the risk management process should show that the process has been conducted properly. This information should include:

- Hazards identified.
- Assessment of the risks associated with those hazards.
- Decision on control measures to manage exposure to the risks.
- How and when the control measures are implemented.
- Evidence of monitoring and reviewing of the effectiveness of the controls.

Step 6: Monitor and Review

Whichever method of eliminating and/or controlling the hazard is used, it is essential that an evaluation of its impact on the use of the equipment, substance, system, or environment is carried out to ensure that the control does not contribute to the existing hazard or introduce a new hazard.

It is also essential that all people involved are informed about the changes and, when necessary, provided with the appropriate information, instruction, training and supervision to ensure that each worker is safe from injury and risk to health. It is also recommended that after a period of time, the area supervisor carry out a review of the system or control to determine its ongoing suitability.

Conclusion

Hazard identification and risk assessment and control are ongoing processes. Make sure to undertake a risk assessment and control process at the proper time and place so as to control the workplace, making it safe for all who enter. ♦