Safety Risk Assessment in Six Easy Steps

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.

Author

Malcom Dunbar
vice president safety and health,
Edw. C. Levy Co., Detroit, Mich., USA
mdunbar@edwclevy.net

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.

Every day we leave our families and the comfort of our homes to go to work with the expectation that the people, equipment, and systems we work with and the environments in which we work are safe. And, in most every case, that assumption is correct. But since we do not live in a perfect world, there are times when we are faced with hazards that transition into injury incidents, some of which are severe.

Steel industry statistics indicate there have been significant improvements over the decades in which safety performance has been measured. Injury rates are some of the lowest we have ever seen, but still hazards are present and injury incidents continue to happen.

Safety professionals work hard to capture the statistics and report these incidents as well as their causes, spend countless hours compiling trend data so everybody can see what was experienced, and provide suggestions and programs to prevent future events. This is the basic nature of safety work: understanding the past and working to control the future. But are we as safety professionals doing enough?

In many cases, we don't always know what we don't know until it is too late and an incident occurs that exposes a hazard.[3] It is a simple fact that every day workers are going to be exposed to hazards of various types and potential. Some of these hazards can cause injury, while others can be fatal. In order for our workplaces to be safe, we first have to identify these hazards and then devise a control (prevention) plan to eliminate or control the hazard to the point where there is no longer a potential for injury. This is where risk assessment comes into play. Risk assessment is the process that predicts the likelihood and severity of a possible injury incident.[2] When used properly, risk assessment can be a very powerful tool used in the identification of hazards and the application of hazard control techniques. Unfortunately, there are literally hundreds of risk assessment tools currently available and using them can be complicated and time-consuming, thus making them impractical for everyday work. Mention risk assessment to a safety professional and he or she likely has a story to tell about how they tried and found it impossible to use at their workplace. This is why the Six-Step Risk Assessment process was developed.

The Six-Step Risk Assessment Process is a very simple tool that can be easily taught and implemented at any level in an organization. Several organizations are now using this tool on the shop floor with a high degree of success.

The next section will highlight some basic terms pertaining to risk assessment.

Risk Assessment Terms

- Hazard — something that can hurt you.
- Likelihood — estimate of how probable it is to be injured by the hazard.
- Severity — estimate how bad the injury would be.
- Risk — a combination of likelihood (L) times severity (S) (Risk = L x S).

This risk assessment process is most effective when it is used with groups of people. The more people involved in the process, the better the outcome. But do not be afraid to use the tool with one or two people; it will be effective there as well.

Before doing a job or job task, the person(s) using the Six-Step Process should:

1. Identify the hazards.
2. Consider contributing factors.

3. Provide assessment of the risk.
4. Eliminate or control those hazards with the most risk.
5. Document the process.
6. Review and share with others.

The following sections provide a more detailed explanation of the process.

1. Identify the Hazard(s) — This step can be simply accomplished by such actions as:

- Walking around and doing an inspection.
- Talking with workers who do this job, as they generally know where the hazards are located.
- Reviewing a work instruction or job breakdown safety analysis (JBSA) or similar safety document. These generally do a very good job of listing the hazards.
- Reading an Occupational Safety and Health Administration (OSHA) regulation. All regulations are written because people (usually many people) have experienced hazards resulting in death.
- Reviewing an operating manual.
- Reading safety data sheets (SDS).
- Looking at past injury, property damage or near-miss reports.

2. Consider Contributing Factors — This step involves looking at the hazards listed and thinking about whether just by their basic nature they may be more dangerous. This would include, but is not limited to:

- Previous injuries from doing this type of work.
- Working from a height.
- Presence of energy.
- Working near moving equipment.
- In or near a confined space.
- Something combustible or flammable.

3. Provide an Assessment of the Risk — Once the hazards are listed, assess the risk by providing a number for (1) each hazard based upon likelihood of an injury occurring and (2) if one hazard resulted in injury, the severity of the injury received.

Use the scales shown in Tables 1 and 2 to give each hazard a number.

4. Eliminate or Control Those Hazards With the Most Risk — Now determine the risk of each hazard by multiplying the likelihood value times the severity number (Risk = Likelihood x Severity).

This will generate a number for each hazard, which could be as low as 1 or as high as 25. Depending on the number, use the matrix shown in Fig. 1 to determine the amount of risk you are facing.

The number determines your next course of action. If the number is medium or high, take immediate action to reduce the risk before you perform the work. If the number is low or very low, be aware of the risk you about to take; this is considered residual risk. We live with risk every day of our lives; it is the high risk that we need to work to reduce.

Many organizations have what is called a STOP number, meaning if the risk number is over a certain value (16 seems to be the most common STOP number), then the work cannot be started until the hazards are eliminated or controlled. That is a company choice, as there are times when having a STOP number will drive poor decision making by the team doing the risk assessment, as they know once the number is in the red, more work will be required.

Table 1

Likelihood

Rating No.	Explanation
5	The injury is almost certain to happen
4	Likely to happen
3	Moderately likely to happen
2	Unlikely to happen
1	Rare, practically impossible to happen

Table 2

Severity

Rating No.	Explanation
5	Could kill, disable or cause serious damage. Fatal potential.
4	Could cause major injury or damage. Lost time.
3	Could cause moderate injury or damage. Recordable.
2	Possible minor injury or light damage. First aid.
1	Could not cause injury or damage.

Figure 1

	1	2	3	4	5	Lik	
1	1	2	3	4	5		1 to 5: Very Low
2	2	4	6	8	10		6 to 10: Low
3	3	6	9	12	15		11 to 15: Medium
4	4	8	12	16	20		16 to 20: High
5	5	10	15	20	25		21 to 25: Critical
Sev							

Risk matrix.

When faced with a hazard which contains high risk, what is one to do? This is where the basic safety control model comes into play (Fig. 2).

This model works from the top down. One should always approach a hazard asking if it can be eliminated. Sometimes elimination also means transferring the job to somebody else (which, of course, does not eliminate the risk), giving it to others who may be more experienced and trained to handle the work. It can be very hard at times to simply eliminate a hazard, which is why you would move on to step two: engineering.

Engineering a control or barrier is what guarding is all about. If you can place a barrier between a worker and a person, then it protects that person from the hazard. Many times barrier guards are solid and substantial, but other times it can be physical space where the person is positioned out of the line of fire.

The next level of control is administrative. This control involves writing rules, procedures and giving instructions. It is not always a very effective control because people are imperfect and do not follow the rules all the time, so if this is the only control you can come up with, you should put in place a secondary control to ensure people adhere to the rules and the procedures. This would involve contact and observation programs as well as site inspections and audits.

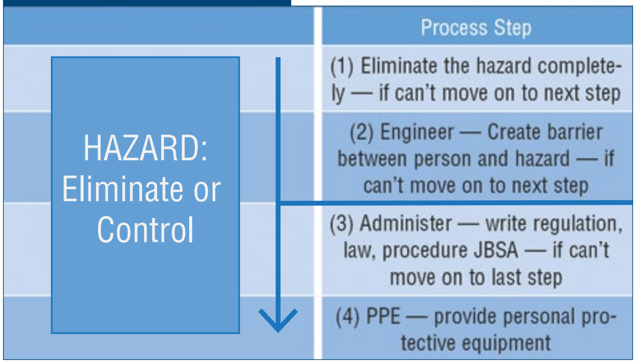
Finally and at the bottom of the list is personal protective equipment (PPE). This is the lowest level of control because of the same reason that administrative control does not always work: people are not perfect. So in addition to PPE controls, a company would also need to put into place other controls to ensure the PPE is being worn and is being maintained in a proper and clean manner.

The type of control used and its effectiveness will determine how many controls you need to put into place to control the hazard. Using administrative and PPE controls requires more measures be put into place, because all controls have weaknesses or holes. Their effectiveness (or ineffectiveness) will determine how many holes they have. Using just PPE with an administrative control involving contacts, audit and observations will probably result in failure and injuries. A visual representation of this concept is found in the commonly used Swiss Cheese Model (Fig. 3).

5. Document the Process — Many complex risk assessment tools use multi-page forms and documents to keep track of hazards, risk, controls, reassessment and other data. For this process, Edw. C. Levy Co. uses a simple one-page form which can easily be managed. (See the Appendix of the online edition of *Iron & Steel Technology* for an example Six-Step Risk Assessment Form.) A company can use its own assessment form as long as it is capturing the hazards, assessing the risk and putting in some controls.

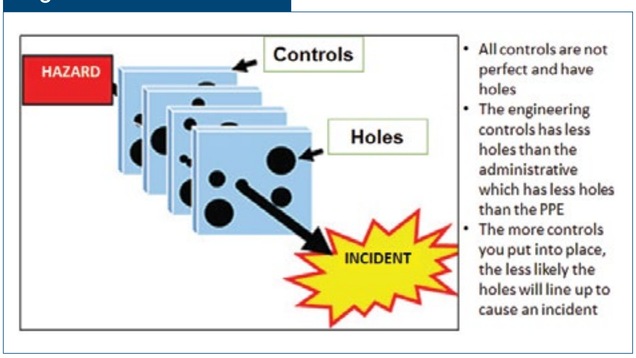
6. Review and Share With Others — The sixth and final step is all about communication. The risk assessment findings should obviously be discussed with the people about to do the job, but in addition it should be shared across the entire

Figure 2



A basic safety control model.

Figure 3



The Swiss Cheese Model of engineering controls.

organization. All risk assessment processes (including the Six-Step Assessment) are qualitative in nature, meaning it is all about how people view the situation. Thus, risk assessment done on the same job by different groups can lead to a broader base of knowledge and at times some very creative solutions to everyday problems. This is why risk assessments should be very visual and shared readily with everybody within the organization.

Conclusion

Many people believe that safety is all about common sense when in reality, safety is much more complex. It really involves the creativity that each person brings to the job and using the creative power of the group to identify hazards and provide solutions to eliminating or controlling hazards.

References

1. F. Bird, G. Germain and D. Clark, *Loss Control Leadership 3rd Edition,* Det Norske Veritas, Duluth, Ga., USA, 2007.
2. C. Ericson, *Hazard Analysis Techniques for System Safety,* Wiley, Fredericksburg, Va., USA, 2016.
3. C. Poe, *Principles of Risk Analysis,* CRC Press, Boca Raton, Fla., USA, 2012. ✦