Occupational Health and Safety: Risk Assessment and Reduction

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This is concluding article of a series of five on risk and safety that appeared last year. Having covered specific examples, we will address analyzing and mitigating risks.

We'll begin with a basic idea: the safety triangle — also called Bird's Triangle, Heinrich's Triangle or the Loss

Control Triangle.

The safety triangle is basically a ratio that says for every 300 incidents or near misses, 29 will result in a minor injury, such as lost time injuries or first aid cases, while out of every 29 such injuries, one will result in a major injury, such as a fatality, loss of a limb or serious damage to property.

Therefore, we need to concentrate on avoiding or controlling the incidents or near misses and take preventative actions to prevent them from occurring again.

Here are a few definitions:

NEAR MISS: An unplanned event that did not result in injury, illness or damage but had the potential to do so. Only a fortunate break in the chain of events prevented it happening.

INCIDENT: An occurrence of seemingly minor importance that could potentially lead to serious consequences such as illness, injury or damage. Many use near miss and incident interchangeably.

INJURY: An incident or near miss gone wrong! There are two main categories of injuries that we can define:

OCCUPATIONAL INJURIES: An injury or incident that takes place at a defined date and time: At 1:45 p.m. on Friday, Feb. 24, 2017, I fell off the boat, was struck by the propeller and lost my arm.

OCCUPATIONAL DISEASES: An injury that develops over a period of time due to bad habits, often work related. Examples would be hearing loss due to working in noisy environments, such as compressors, or back injuries due to wrong posture when picking up heavy objects, such as cylinders.

SO HOW DO WE KNOW WHAT WE ARE DOING WRONG? AND HOW CAN WE FIX IT?

To start, we need to perform what in the industry is called a hazard identification and risk assessment (HIRA). We take an in-depth look at the way people operate and do their tasks, and we then do an analysis of possible risks and what we can do to eliminate or minimize these risks to prevent injuries. There are various ways to do a risk assessment, but often we use a risk matrix where we look at certain criteria.

The example below is provided to give an indication how the risks are perceived.

Remember that no two persons perceive the potential of a risk the same. For instance, if I were involved in a motor vehicle collision and sustained a minor whiplash, my perception would be that I will associate a motor vehicle accident with a painful reminder. If another person was involved in a collision and suffered serious trauma, the perception would be that an accident is a serious occurrence, and the risk would be perceived as much greater.

1. RISK ASSESSMENT METHODOLOGY

Here is a sample. The risk assessment is done in three steps:

1. The current risk is calculated by multiplying assigned numeric values of possible "severity" by the "probability" to obtain a numeric "risk value."
2. If this risk value is medium or high, certain measures will need to be put in place to reduce the risk value.
3. The risk is then re-evaluated using these new measures to find a "revised risk value."

The revised risk value is then used to make a decision whether additional measures need to be taken or whether the risk is now acceptable and work can continue.

1.1 VALUES

Severity		Probability	
5	Fatality	5	Almost certain or inevitable
4	Permanent to slight disability	4	Probable
3	≥ 14 days off duty with full recovery	3	Improbable
2	3 days or less off duty with full recovery ≤ 14 days	2	Less than even chance
1	First aid or medical attention	1	Highly improbable

1.2 RISK VALUE PROFILES

Calculated Risk	Color Grading	Actions
1 to 10	Green	• Low Risk • Work can continue without any safety measures put in place. • All work will be done according to recognized standard. • Safety registers and checklists are to be completed before starting any activities. • All Standard Operating Procedures (Safe Work Procedures) must be followed. • Supervision to be provided.
11 to 15	Orange	• Medium Risk • All actions listed under Low Risk must be taken. • Additional safety measures should be considered and implemented before starting work. • All workers to be advised of the measures to be put in place and what hazards exist.
16 to 25	Red	• High Risk • All actions listed under Medium Risk must be taken. • Should any additional measure be put in place and the revised risk still remains very high, stringent supervision is required.

1.3 RISK MATRIX

Severity \ Probability	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

1.4 EXAMPLE

Task	Hazard	Severity	Probability	Total Risk	With measures in place				
					Measures Taken	Severity	Probability	Total Revised Risk	Acceptable Yes / No
Example: Fill cylinders	Possible loss of hearing due to excessive noise form compressor	4	4	16	Personal Protective Equipment (PPE): Use hearing protection Follow Safe Working Procedures for working with compressors	4	2	8	Yes

- The initial risk is very high. The severity is 4 and the probability is 4, giving a total of 16.
- Once the person is using the proper hearing protection, the safe working procedure for working with compressors has been drafted, employees are trained, and procedures implemented, the severity of permanent hearing loss remains, but the probability is reduced to 2, reducing the total risk to an acceptable level.
- **NOTE**: Remember, the onus is on the person doing the risk assessment (an appointed risk assessor) to prove that all reasonable actions have been taken.

2. RISK REDUCTION

Risk reduction can be done in any one or a combination of ways:

1 Eliminate the risk exposure (Technical)

Although not always possible, the first option that you should consider is terminating or removing the risk exposure. For example, can we provide an alternative for using the compressor so that the operator is not required to stand next to it during cascade and cylinder filling? Perhaps we can place a wall between the compressor and the operators. If we cannot do this and no other similar solution is feasible, we need to look at alternative measures to reduce the risk.

2 Mitigate the risk exposure (Operational)

If the risks cannot be eliminated, mitigation implies reducing the risks to a level that would be acceptable, such as by reducing the frequency of exposure.

3 Personal protective devices

If we are not able to eliminate or mitigate the risks, we may need to look at the introduction of personal protective equipment (PPE), such as earmuffs or similar solution to reduce the risk to an acceptable level.

4 Low Risks

Some risks may fall in the category of "negligible" — low enough or acceptable enough not to justify any further action to reduce the risk and are therefore tolerated.

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