

How to conduct plant and machinery safety risk assessments

Please note: This is a Vero Insurance sample template only.

Introduction

There are significant risks associated with using plant and severe injuries can result from the use of unsafe plant or machinery. A plant and machinery risk assessment can help you identify safety hazards, quantify the level of risk, determine whether existing risk controls are adequate, identify and apply the most effective risk control solutions and assign appropriate priorities for implementation.

The following is a step by step guide for conducting plant and machinery safety risk assessments.



Definitions

Plant includes items as diverse as lifts, cranes, computers, machinery, conveyors, forklifts, vehicles or power tools. Machinery usually refers to fixed plant that is operated by a machine operator.

Step 1: Establish a list of plant and machinery in your workplace

Consider mobile plant (forklifts, cranes etc.), fixed machinery and hand operated tools.

Step 2: Identify and list the potential hazards that could potentially cause harm to people for each machine

Typical plant and machinery hazards include:

- *Moving machine hazards:* including pinch points, drawing in or trapping points, crush points, cutting or shearing points, impact, stabbing or puncturing
- *Stored energy hazards:* sudden release of high pressure fluid (e.g. hydraulic oil or compressed air) release, elevated machine parts, falling objects
- *Burn hazards:* hot surfaces, open flames or corrosive chemicals, friction
- *Noise hazards:* high noise level for short exposure periods or low noise levels for prolonged exposure periods
- *Electrical hazards:* exposed live electrical conductors or equipment
- *Fall hazards:* elevated work platforms without proper barriers, slip/trip hazards from uneven walking surfaces
- *Ergonomic:* lifting heavy objects or machine parts
- *Asphyxiation:* due to gas leaks reducing oxygen levels, dust or working in confined spaces.

Consider the following sources when identifying potential plant and machinery hazards:

- observe and assess the operation of the equipment including operator and maintainer interactions
- seek information about hazards and control measures inherent in the machine from the original equipment manufacturer (OEM) or service agents
- consult with operators/maintainers
- take note of any installed equipment physical safety controls
- Identify the potential consequences: list potential consequences of a hazard event.

Note: refer to Appendix A (sample plant and machinery hazard checklist) to assist you in your hazard identification process.

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Step 3: Assess the risk

The level of risk is a function of the likelihood of a person exposed to a hazard becoming injured and the severity of that injury.

Step 3.1 First, determine the potential severity of the injury.

Consider the following range of potential injuries:

amputated limbs	cuts and lacerations	amputated limbs	crushed limbs, hands, fingers, torso etc.
eye injury /loss of sight	concussion/head injury	fractures	electric shock
burns or scalds	hearing loss	musculoskeletal disorders	death

Step 3.2: Next, assess the likelihood of a person exposed to each identified hazard becoming injured as a result. Consider the time duration of exposure to the hazard.

Step 3.3: Now assign a priority to implementing the appropriate risk controls to treat the risk.

Refer to Appendix B for a sample risk rating matrix for a guide on assessing the severity and likelihood of a person exposed to a plant or machinery hazard becoming injured and assigning a risk rating (or priority) score.

Step 4: Implement risk controls

First consider the following risk treatment options:

- *Elimination:* remove the machine or process
- *Substitution:* substitute the machine or process for a less hazardous alternative
- *Isolation:* separate the hazardous plant from people either by distance or physical barrier. (e.g. booth around the item or a concrete barrier to separate mobile plant from persons)
- *Physical controls:* employ physical risk controls to reduce the likelihood and/or possible consequences (e.g. guarding, presence sensing systems)
- *Procedural controls:* implement safe work practices, policies and procedures (e.g. safe work permit systems, pre-start checks, regular safety/hazard checklists, fatigue policy, safe work method statements, training programs)
- *Use personal protective equipment (PPE):* Suitable PPE, such as suitable breathing protection, hard hats, gloves, safety shoes, aprons and protective eyewear.

Next, implement one or a combination of risk controls to bring the residual risk to an acceptable level.

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APPENDIX: A

Sample plant and machinery hazard checklist

Risk of injuries from: (plant name)			
	Yes	No	N/A	Comment
Entanglement Can a person's hair, clothing, gloves, necktie, jewellery, cleaning brush or rag etc. become entangled in moving parts of the plant and machinery?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Friction/abrasion Can a person be exposed to frequent rubbing movement upon their skin from the plant and machinery?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cutting, stabbing, puncturing, striking Can a person be cut, stabbed or punctured due to: <ul style="list-style-type: none"> • sharp or flying objects? • contact with moving parts? • disintegrating plant, parts of the plant or work pieces? • ejected work pieces? • the mobility of the plant? • uncontrolled or unexpected movement of the plant? • other factors not mentioned? 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Electrical Can a person be injured by electrical shock or burnt due to: <ul style="list-style-type: none"> • the plant contacting live electrical conductors? • the plant working near electrical conductors? • overload of electrical circuits? • damaged or poorly maintained electrical leads and cables? • damaged electrical switches? • water near electrical equipment? • lack of isolation procedures? • other factors not mentioned? 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Shearing Can a person's body parts be sheared between two parts of the plant, or between a part of the plant and a work piece or structure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
High pressure fluid Can a person encounter fluid under high pressure, due to failure or misuse?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Crushing Can a person be crushed due to: <ul style="list-style-type: none"> • material falling off the plant? • uncontrolled or unexpected movement of the plant? • lack of capacity for the plant to be slowed, stopped or immobilized? • the plant tipping or rolling over? • parts of the plant collapsing? • encountering moving parts of the plant during testing, inspection, operation, maintenance, cleaning or repair? • being thrown off or under plant? • being trapped between the plant and materials or fixed structures? 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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<ul style="list-style-type: none"> • other factors not mentioned? 				
<p>Explosion</p> <p>Can a person be injured by explosion of gases, vapours, liquids, dusts or other substances, triggered by the operation of the plant or by material handled by the plant?</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p>Slipping, tripping</p> <p>Can a person using or near slip, trip or fall due to:</p> <ul style="list-style-type: none"> • uneven or slippery work surfaces? • poor housekeeping, e.g. offcuts, cables, hoses obstructing walkways, spills not cleaned up? • obstacles being placed nearby? • other factors not mentioned? 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p>Falling</p> <p>Can a person fall from a height due to:</p> <ul style="list-style-type: none"> • lack of a proper work platform? • lack of proper stairs or ladders? • lack of guardrails or other suitable edge protection? • unprotected holes, penetrations or gaps? • poor floor or walking surfaces, such as the lack of a slip-resistant surface? • steep walking surfaces? • collapse of the supporting structure? • other factors not mentioned? 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p>Ergonomic</p> <p>Can a person be injured due to:</p> <ul style="list-style-type: none"> • poorly designed seating? • poorly designed operator controls? • high forces? • repetitive movements? • awkward body posture or the need for excessive effort? • vibration? • other factors not mentioned? 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p>Other hazards</p> <p>Can a person be injured due to:</p> <ul style="list-style-type: none"> • noise? • inadequate or poorly placed lighting? • entry into any confined spaces of the plant? • failure to select plant that is suitable for its intended use? • contact with hot or cold parts of plant? • exposure to hazardous chemicals, radiation or other emissions released by the plant? • lack of operator competency? • other factors not mentioned? 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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APPENDIX: B

Risk rating matrix

Consequences (C)	Likelihood (L)				
	Rare	Unlikely	Possible	Very Likely	Certain to Occur
Catastrophic	moderate	moderate	high	critical	critical
Major	Low	moderate	moderate	high	critical
Moderate	Low	moderate	moderate	moderate	high
Minor	very low	low	moderate	moderate	moderate
Insignificant	very low	very low	low	low	moderate

Consequences and likelihood table

Consequences (C)	How Severely Could Someone be Hurt?
Catastrophic	Death or permanent disability
Major	Serious injury, hospital treatment required
Moderate	Injury requiring medical treatment and some lost time
Minor	Minor injury, first aid only required
Insignificant	Injuries requiring no treatment or first aid
Likelihood (L)	How Likely are the Consequences?
Certain to Occur	Expected to occur in most circumstances
Very Likely	Will probably occur in most circumstances
Possible	Might occur occasionally
Unlikely	Could happen some time
Rare	May happen only in exceptional circumstances

Risk level/priority rating definitions

Risk Level Rating	Required Action
Critical	Immediate action needed. Access to the hazard should be restricted until the risk can be lowered to an acceptable level. Short term action may be required to lower the risk level and then medium and long term plans to control the risk to as low as reasonably practicable using the Hierarchy of Controls.
High	Action needed quickly (within 1-2 days). The task should not proceed unless the risk is assessed and control options selected based on the Hierarchy of Controls.
Moderate	Action required this week to eliminate or minimise the risk using the Hierarchy of Controls.
Low	Action required within a reasonable timeframe (2-4 weeks) to eliminate or minimise the risk using the Hierarchy of Controls.
Very Low	Risk to be eliminated or lowered when possible using the Hierarchy of Controls.

References:

- Safe work Australia, Work safe Victoria, Work safe Queensland, Work safe New South Wales, WHS Legislation and Standards.

The information contained in this Checklist is general in nature only and does not take into account your specific risks and hazards, nor does it imply insurance coverage. No representation or warranty, express or implied, is made as to the completeness of this Checklist and you should consider whether it adequately covers all of your hazards and risks. AAI Limited ABN 48 005 297 807, trading as Vero Insurance ("Vero") does not accept any legal responsibility or liability for negligence or otherwise to you or anyone else who seeks to rely on this Checklist. This includes, without limitation, loss arising from a possible failure of the Checklist to incorporate any applicable Australian Standards or identify any regulatory or statutory requirements or other risks or hazards beyond those mentioned in the Checklist.