

## Progressive Management Systems - Machine Guarding Assessments

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Many involved in industry are blissfully unaware of the potential penalties that they are at risk of receiving if they contribute to an accident even in an indirect way (currently in QLD, up to two years jail and/or \$60,000 max. fine for individuals or \$300,000 for companies). This contribution may be as a result of not understanding their responsibilities in providing a safe work place or equipment. There are numerous standards that apply to safeguarding of machinery such as the AS4024 2014 series. More standards exist to cover many specific situations (such as AS4024.3001 – Materials forming and shearing, AS4024.3301 – Robots, AS4024.3101 - Milling machines, AS 1473 – Woodworking machinery, AS 1893 – Guillotines, AS 1755 – Conveyors, AS 1319 – Safety signs). Some of the specific standards do not in themselves fully cover all aspects of design of safeguarding systems. Even if one feels they have followed the relevant standard there may well be another standard with even more rigid requirements that the designer/organisation is not even aware of.

The *WHS Act 2011* and *Regulations 2011* place obligations on Persons Conducting a Business or Undertaking (PCBU) to ensure as far as is reasonably practicable the health and safety of the person, each of the person's workers and any other persons is not affected by the conduct of the business or undertaking.

Ensuring health and safety includes the following:

- Providing and maintaining a safe and healthy work environment;
- Providing and maintaining safe plant and structures;
- Ensuring the safe use, handling and storage of plant, structures and substances;
- Provide adequate facilities for the welfare at work of workers in carrying out work on behalf of the business or undertaking, including ensuring access to those facilities;
- Provide any information, training, instruction, or supervision that is necessary to protect all persons from risks to their health and safety arising from work carried out on behalf of the business or undertaking; and
- Ensure that the health of workers and the conditions at the workplace are monitored for the purpose of preventing illness or injury of workers arising from the conduct of the business or undertaking.

The Queensland Work Health and Safety Act 2011 states (this is the same with Workcover and other state regulatory bodies):

*“(3) If a code of practice states a way of managing exposure to a risk, a person discharges the person's workplace health and safety obligation for exposure to the risk only by—*  
*(a) adopting and following a stated way that manages exposure to the risk; or*  
*(b) doing all of the following—*  
*(i) adopting and following another way that gives the same level of protection against the risk;*  
*(ii) taking reasonable precautions;*  
*(iii) exercising proper diligence.”*

The safest way to discharge one's obligation is to be able to demonstrate that the organisation has followed a recognised standard. The organisation may choose another method of safeguarding without reference to the standards; however this is fraught with danger, as the onus will be on the organisation to prove its effectiveness. It is too late to wait until an investigation is undertaken as a result of an injury to find out that your safeguarding is not adequate. A formal, documented audit of the machinery should be undertaken to establish the level of safeguarding required. This should be recorded as evidence of how the safeguarding level was established. AS4024-1 (2006 Series) provides guidance to perform a Risk Assessment.

A purchaser of equipment must be sure that the equipment they are purchasing, whether new or second hand is used in a manner that meets compliance with the relevant standards. A further complication is where the end user is purchasing equipment from multiple vendors that they are installing into a single installation. All the components of the system must interact efficiently and safely. No individual component can degrade the level of guarding that applies to another component or to the overall system.

There are several control measures to consider when managing a risk:

1. Eliminate the risk
2. Minimise the risk
3. Where neither of the above is possible use administrative controls and appropriate personal protective equipment.

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Commonly minimising the risk is most appropriate. Three strategies that can be applied, often in conjunction with each other, to minimise the risk are:

1. Fixed/Interlocked Mechanical barriers.
2. Safety monitoring devices (light curtains, gate switches etc).
3. Automation of the process to remove or limit operator interaction with the moving or dangerous part of the process.

Safety monitoring devices will almost always have to be used in conjunction with mechanical barriers to provide adequate protection. There are many different safety devices that can be used. The complexity and cost of the devices depend on the category of the machine being protected. AS4024.1501 2014 Safety of machinery and the Performance Levels of AS4024.1503 2014 Safety of machinery provide guidance.

Both mechanical guarding and safety monitoring devices alone are compliant costs. They do not assist in improving the output efficiency of the process and therefore have limited direct payback. Automation, whilst only a safety option when used in conjunction with the other two options, does provide the potential of improvement in the process and therefore can provide potential for payback.

### **Machine Safety Standards**

#### **Introduction**

All machines designed in Australia need to conform to the machinery safety standard AS4024 2014 series. Many engineers know about this standard and use it when designing large and complex machines. However, in many parts of Australia it is common for smaller machines to be designed by electricians, fitters and boilermakers. While they are perfectly capable of doing this, they are often unaware of the machinery safety standard and how it directly relates to them. The following covers some of the important aspects of this standard, and has a particular focus on the electrical design.

If as part of your job you design, assist with design or connect power to machines of any size (such as conveyors, pumps etc) and are unaware of this standard you should read on.

#### **Liability**

Remember that you are liable if an accident occurs on a machine that was not designed properly. In Australia you can no longer use the legal defence of being ignorant of a standard's existence. The fines can be severe, and in many states can involve a period of incarceration.

#### **AS4024 2014 series**

This standard outlines the aspects that any machine should have to be considered safe. It is one of the largest standards and covers many aspects, such as machine guarding, signage, pollution controls and even operator training. These standards apply to all machines made or used in Australia, from a simple irrigation pump to a multimillion dollar iron ore reclaimer.

The newest version of this standard was introduced in 2006. With the update some important changes were made, particularly in connection with the control circuit. These changes were made to bring us more in line with European standards.

#### **Control Circuit**

One of the most important parts of the machine design is the control circuit. The way the control circuit is designed determines the safety of the machine. For example, are the limit switches wired normally open or normally closed? There are strict rules to be followed to determine what level of safety is required, and in turn how the control circuit is designed.

#### **Summary**

Adhering to the machinery safety standards is a very complex part of a machine's design. However, it is also a very important part of the design that cannot be forgotten about. You cannot rely solely on following the rules of AS3000 to wire up a machine.

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When considering the safeguarding of machinery and processes it is important to ensure that the person or organisation charged with the responsibility of implementing the safety system is aware of the relevant standards and solutions.

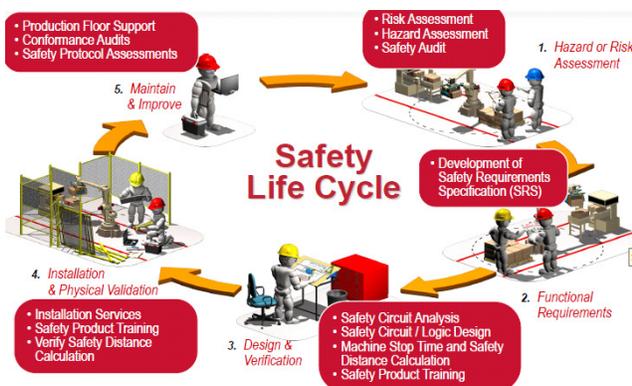
To allow organisations to comply with these requirements and to ensure the safety of persons employed at a workplace Peter Lehrke from Progressive Management Systems assists organisations to comply with the legislative requirements.

The steps in the process as defined as AS4024.1 that is completed are:

- 1 **Prepare a Risk Analysis and Guarding Recommendations (RA)** for the items of equipment will place the priority in order of considered risk.
- 2 **Design of Guarding** Discuss the conclusions and recommendations with relevant company staff etc and review the proposed system and prepare any implementation plans drawings to ensure that they comply with the requirements of the Act, Regulations, Code of Practice for Plant, AS3000, AS4024.2014 and other identified standard.
- 3 **On completion of the implementation of the system** and guarding complete a Validation or "on site test and commission" to review and test to ensure the system meets the Act and associated requirements.

**Progressive Management Systems - Peter Lehrke** is a Production Engineer by profession and has qualified as a WHSO - 1109 for manufacturing. Peter Lehrke worked completing guarding assessments in the engineering, mass manufacturing, rigid and polyurethane foam, Engineering, metal industries, sheet metal and finishing industries in positions such as Production Manager, Production Engineer, Engineering Manager, Special Projects Manager and Quality Manager and recently attended the first TUV Nord CMSE (Certified Machine Safety Expert) course in Australia. **Peter Lehrke** is also recommended for preparation of Guarding Risk Assessments.

Clients include Arnotts, Alphapharm, Amcor, Woolworths Brismeat, Bundaberg Distilling (Diaego), Boral, Australian Country Choice, Carter Holt Harvey, Laminex, Integro Foods, Schweppes Beverages, Queensland Cotton, One Steel, Graicorp, OK Tedi Mining (PNG), Amusement Parts such as Sea World, Wet and Wild and Warner Brothers Movie World plus Dreamworld, NHP and Inaco.



Conformity Audits	Hazard / Guarding Assessment	Safety Assessment / Audit	Team-Based Risk Assessment
<b>Modular Assessments</b> Provides a scalable solution to help save \$	<b>Identifies Primary Hazards</b> Identifies guarding/hazards for immediate plant actions	<b>Assessment &amp; Estimate</b> <b>Most common</b> – provides report & estimates to develop safety plans	<b>Detailed Risk Assessment</b> In-depth analysis required for critical or special machines
<b>For Multiple machines</b> Provides customers with a method of categorizing & prioritizing machines. Conformity audits that analyse guarding, LOTO, e-stops and circuit analysis and provides a list of complying & non-complying machines to be assessed.	<ul style="list-style-type: none"> <li>One Page Report identifying hazards and "Risk-in" rating only</li> <li>Does not include:                             <ul style="list-style-type: none"> <li>Risk Out rating</li> <li>Cost estimation</li> <li>Pictures</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Assessment led by RA Consultant, limited customer involvement</li> <li>Report per standard                             <ul style="list-style-type: none"> <li>Identification of primary hazards/tasks</li> <li>List non-compliance issues</li> <li>Risk In / Risk Out Rating</li> <li>Mitigation Guarding and Controls recommendations</li> <li>Prioritized recommendations for safety improvements</li> <li>Photograph of critical identified hazards (based on customer approval)</li> <li>Cost estimate per machine</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Team-based assessment led by RA Consultant for all machine life phases</li> <li>Report per standards                             <ul style="list-style-type: none"> <li>Identification of primary hazards/tasks</li> <li>List non-compliance issues</li> <li>Risk In / Risk Out Rating</li> <li>Mitigation Guarding and Controls recommendations</li> <li>Prioritized recommendations for safety improvements</li> <li>Photograph of critical identified hazards (based on customer approval)</li> <li>Cost estimate per machine</li> </ul> </li> <li>Mitigation Drawing                             <ul style="list-style-type: none"> <li>Includes ergonomics review (slip, trip, and fall hazards)</li> </ul> </li> </ul>
A Conformity Audit is a new assessment that is scalable and can help save time & money!			

Proposals can be arranged based on the items, groups of equipment and locations.



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