

A primer on prevention through safe design

An effective means of preventing and controlling workplace injuries, illnesses and fatalities is to “design out” hazards and unsafe exposure from the workplace, writes John Daly

Safety in design (SID), as it is known in Australia, is early intervention in the design process, to remove or minimise hazards or risks that may arise throughout the lifecycle of a structure – from the initial design concept and construction, through to handover and use/occupation of the completed project. It's about identifying, assessing, controlling, and preferably, removing risks prior to implementation.

Safe design best practice begins at the conceptual phase when making decisions about:

- the design and its intended purpose
- materials to be used
- possible methods of construction, maintenance, operation, demolition and disposal
- what legislation, codes of practice and standards need to be considered and met.

Whose responsibility is it to ensure design safety?

Responsibility ultimately lies with the “designers”, however, it is important that this is a consultative process with the people who have the knowledge and expertise to share information, identify potential hazards, assess risk and make decisions about ways to minimise, or ideally eliminate those risks. This may involve clients, principal contractors, architects, engineers, landscape designers and interior designers, as well as workers and other end users (see Figure 1).

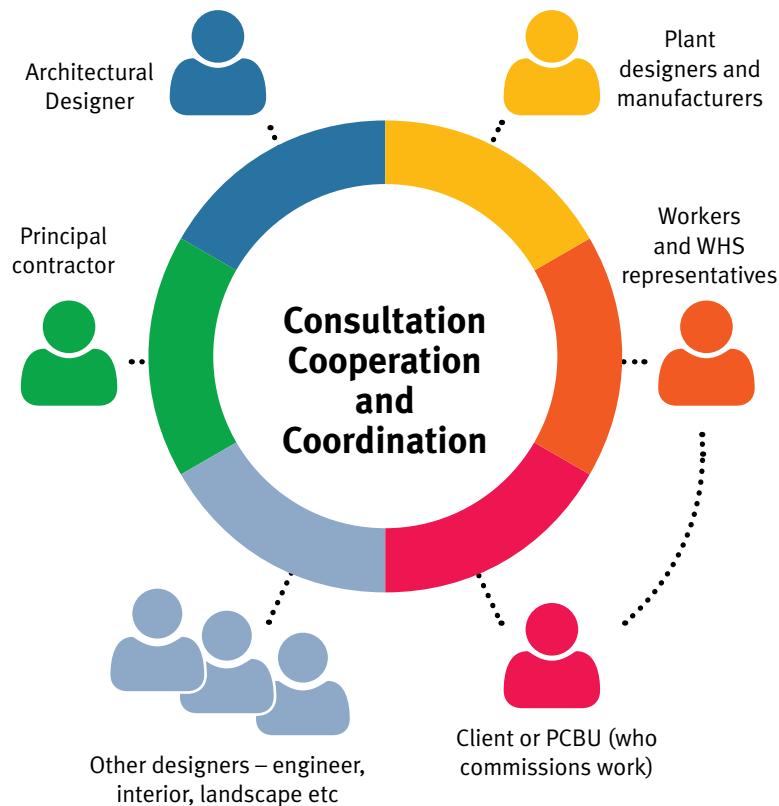


Figure 1

Designers are required by legislation to design structures to be safe throughout their life span. They must ensure, so far as is “reasonably practicable” – as defined in Section 18 of the *Workplace Health and Safety Act 2011* – that the structure is designed to be without risk to the health and safety of all people involved with that structure throughout its lifecycle. This includes the health and safety of those involved in the construction or manufacture, those using the structure for the purpose it was designed, those involved in the maintenance, cleaning or repair of the structure, and even those who are at or in the vicinity of the structure.

How well do most organisations fare when it comes to safety design?

By identifying potential health and safety hazards early in the design process, designers can make informed design decisions to eliminate or minimise potential risks to health and safety. The most effective way to prevent injury, illness or death is to control the risk at the source.

Safety should be considered throughout the design process. Research shows that there is greater scope to remove foreseeable hazards if health and safety is considered from the commencement of the design process, according to RMIT University's Centre for Construction Work Health and Safety Research *Safety in Design* 2014 report. Prevention is the most effective and

affordable way to improve the safety of workers and requires the least effort compared with making changes at later stages.

Internationally, these principles of SID are relatively well known, with an ever-increasing body of knowledge and expertise adding to this. In Australia, recent changes to WHS legislation has attempted to better clarify existing obligations for clients, designers, principal contractors and other duty holders.

With respect to safe design in construction, the legislation in the UK (Construction (Design and Management) Regulations 2015 (CDM)) has quite specific requirements for duty holders. A broad range of guidance materials supports this. While Australia's harmonised legislation has some aspects of the UK requirements, the major difference is the UK requirement for the appointment of a CDM co-ordinator for certain projects. Their role is specifically to advise and assist the client to meet their duties. This requirement, it could be argued, adds a level of control that the Australian approach lacks. In my experience, while companies are becoming more aware of the need to integrate safety in the design process, many have a limited understanding of SID requirements – particularly in how to meet their obligations under the legislation in a practical way.

For example, the oil and gas industry, as a high-risk environment with potential risk to the

**Figure 2**

larger community, has a history of adopting SID principles and methodology; so too the airline and rail transport sectors.

In many of the major incident investigations I have observed over the last 10 years, there still appears to be a tendency to focus on lower order, administrative controls. Constantly, the first response tends to be training or retraining, updated procedures, and more or different personal protective equipment.

The true aspiration for SID is to actually minimise or eliminate the risk from the start. This tendency to implement administration controls runs contrary to the philosophical mantra consistently espoused by WHS professionals, academics and government agencies. We hear constantly about adopting a “hierarchy of control” and focusing on “above-the-line controls”, but how many companies really invest in or drive elimination, or design this as part of the product or project design planning?

Common challenges for designers

Firstly, many organisations lack clearly defined systematic processes, which can be applied throughout the lifecycle of a structure. Due to the nature of the dynamic and iterative design environment, there is difficulty in applying a linear health and safety risk management process. Anecdotal evidence suggests that where designers and stakeholders do have methodologies or

processes, these tend not to be consistently adopted in a robust manner.

The second challenge is clear ownership. There is often ambiguity about who is the “owner” of SID due to the complex nature of many projects, and the right people are not being engaged during the consultation phase to identify the potential SID hazards or solutions.

Many designers lack the knowledge and experience relating to construction in general, or health and safety specifically, so it isn’t a strong focus. There’s a lack of experience and knowledge for stakeholders to challenge the design structure.

The key to the SID process is involving the right people with good knowledge of the issues. RMIT University’s research found that design controls were more likely to be used when constructors were involved at the design stage.

The biggest mistake many designers make is assuming they do not need to do anything in relation to their duties under the WHS legislation. The reality is that designers in all states and territories have a legal duty to design structures, so far as is reasonably practicable, that are without risk to health and safety when they are used as, or at, a workplace.

Finally, these challenges are compounded by the inconsistencies of approach across regulatory boundaries. While attempts have been made to align this, and there is an intent by regulatory authorities to clarify and provide guidance to the industry, inconsistencies remain. It is not unusual for different statute requirements to be sometimes contradictory and lacking in practical detail.

Benefits of safe design

It has been well documented that devoting efforts to planning stages up-front has significant benefits. Eliminating hazards at the design or planning stage is often easier and more cost-effective than making changes later when the hazards become real risks in the workplace.

Safe design can result in many benefits (Figure 2), as summarised in Safe Work Australia’s *Code of Practice 2012*. These can include:

- a safer workplace
- reduction of injury, illness or death through prevention
- improved usability of structures
- improved productivity and reduced costs
- reduced costs over the lifecycle of a structure
- innovation, in that safe design can demand new thinking to produce low-hazard construction materials as well as resolve hazards that occur in the construction phase and in end use.

The move to a more sustainable future, and the growing concerns of the impacts of poor design on communities and individuals, will see even more focus on SID going forward. Examples of opportunities arising from greater focus on SID include areas such as materials utilisation – consideration of emissions or volatile organic compounds – energy efficiency, construction and

Summary of duties of all parties

 Designer	 Client	 Principal Contractor
<ul style="list-style-type: none"> Consider safety throughout lifecycle as workplace. 	<ul style="list-style-type: none"> Consider safety throughout lifecycle as workplace. 	Required for a construction project where the value of the construction work is \$250,000 or more.
<ul style="list-style-type: none"> Consult with client, workers, principal contractor and other duty holders. 	<ul style="list-style-type: none"> Consult with designer, workers, principal contractor and other duty holders. 	<ul style="list-style-type: none"> Ensure construction work is managed in a way that eliminates or minimises risk to health and safety.
<ul style="list-style-type: none"> Consider people in vicinity. 	<ul style="list-style-type: none"> Consider people in vicinity. 	<ul style="list-style-type: none"> Consult with other duty holders.
<ul style="list-style-type: none"> Undertake research, testing and analysis. 	<ul style="list-style-type: none"> Provide information to designer. 	<ul style="list-style-type: none"> Manage risks associated with the construction work.
<ul style="list-style-type: none"> Provide safe design report on construction hazards to client. 	<ul style="list-style-type: none"> Provide information to principal contractor on safety including designer's safe design report. 	<ul style="list-style-type: none"> Secure the workplace.
<ul style="list-style-type: none"> Provide safe design information on lifecycle to anyone issued with the design and on request. 		<ul style="list-style-type: none"> Comply with all SWMS for high-risk work.

Figure 3

maintenance costs, community engagement and reduced downtime.

The focus on customer satisfaction is also paramount, which is why integration of safety (in design), environment and quality management systems holds great promise for driving SID support with management, and customers.

Advice for safety professionals

SID operates on the premise that early intervention to remove or reduce hazards or risks is the most beneficial approach. Health and safety professionals should be engaged as early on in the lifecycle as possible in the consultation process, particularly during the pre-concept or initial concept development phase. The key considerations for WHS professionals? Understand your duties; develop processes; implement systems and training; and seek advice early.

Clearly, it is in the interest of all stakeholders to obtain quality input from WHS professionals at an early stage of design. It is important that designers have advice from a range of sources, but it is critical they understand and identify the nature of hazards at all stages of the project, and have good understanding of the risk assessment process.

And finally, in adopting design controls to remove or mitigate the risk, they need to ensure this meets the required standards. The role of safety professionals is to advise and support stakeholders at all phases of a design's lifecycle. The role and expertise of safety professionals must be well defined – are they experts of risk

management processes and WHS legislative obligations, or do they have specific knowledge and experience in technical aspects as well?

While there are clear statute obligations for people involved in designing structures (Figure 3), a safety professional should ensure:

- safety in design is part of an organisation's culture, and leadership supports SID principles and concepts
- safety in design is integrated into an organisation's management systems
- organisations have access to the capabilities and skills required to implement SID
- assurance processes monitor, assess and continually improve SID performance.

If there was one simple piece of advice to offer, that would be: ensure people are *engaged* to ask the hard questions early. Too many times it is left until it is much too late – and this, we know only too well, can have both human and commercial consequences. ■

Figures courtesy of "Safe Design Australia eBook, Barrett S., (2015) Safe Design in Practice: for designers of structures", Edn 2.

John Daly is an international safe design expert and HSE professional, and owner/director of Safe Design Australia which has published the Safe Design in Practice eBook for designers, architects and engineers. The free resource can be downloaded at www.safedesignaustralia.com.au. For more information, email info@safedesignaustralia.com.au