Designing Safe Machinery

Live Panel Discussion

Peter Dunphy, SafeWork NSW
Dr Liz Bluff, Australian National University
Wes Wilkinson, Work Systems Technology

Andrew Dettmer:

Thank you all for joining us today, both our in-theatre audience and those joining us online. My name's Andrew Dettmer. I'm the National President of the Australian Manufacturing Workers' Union and a Safe Work Australia Member.

Firstly, I would like to acknowledge the traditional custodians of the land on which we meet, the Ngunnawal People. I acknowledge and respect their continuing culture and the contribution they make to the life of this city and to this region and I pay my respects to their elders, both past and present.

Today's discussion explores the crucial action area from the Australian Strategy – Healthy and Safe By Design and how it applies to the safe design of machinery. Healthy and Safe By Design means that hazards and risks are eliminated or minimised at the design phase, that is before they enter the workplace.

Before I introduce today's speakers, I want to share with you a real story.

A casual Factory Hand was helping out at a plant that makes cardboard boxes. On this particular day he had moved into a tight space between a printer, the slotter and stacker machine and the out-take conveyor. It is understood that he was trying to remove some jammed cardboard pieces. His clothing became caught on a roller spinning at over 60 revolutions per minute and he was dragged over the top. Another worker heard him scream, located and pushed the emergency stop button and ran to help him. He remained trapped in the machine for over 45 minutes. Ambulance officers tried to keep him alive while the fire brigade worked to free him. He was eventually freed and rushed to hospital but he died the following day. His death was completely preventable.

The subsequent WorkSafe and Coroner's report found no hazard identification had been undertaken before the plant was commissioned, the emergency stops were not properly labelled, the company had not provided adequate information nor training regarding the machine's safe use and the level of its supervision was inadequate. Across Australia all works health and safety laws require designers and manufacturers to ensure so far as is reasonably practicable that machinery is designed and manufactured to be without risks to health and safety and to provide adequate and up to date information about the machinery. Yet the story I've just told you and data from Safe Work Australia tells us that the poor designed machinery continues to kill and injure workers.

A recent Safe Work Australia report reveals 188 work-related deaths were possibly caused by the unsafe design of machinery between 2006 and 2011. Our research also tells us that involving experienced workers in the design and testing process before machinery enters the workplace results in better work health and safety outcomes for workers. We should and we must do better.

So I am delighted that today our speakers will discuss this important topic. Our first panel member is the Executive Director of the Work Health and Safety Division with SafeWork New South Wales. Peter Dunphy has over 25 years' experience in public health and work health and safety and is currently completing a doctorate of Public Health with the University of New South Wales. Welcome Peter.

Our second panel member, Wes Wilkinson is the Principal of Work Systems Technology. He is a qualified Mechanical Engineer, Risk Manager and Human Factors Specialist. He is a certified practising professional and has 30 years' experience in industries such as agriculture, manufacturing and the legal and commerce sectors. Wes provides specialist consultancy services for the design and manufacture of machinery and is regularly called as an expert witness in major work health and safety prosecutions. Welcome Wes.

Our third panel member, Dr Liz Bluff is a Research Fellow with the National Research Centre for Occupational Health and Safety Regulation with the Australian National University. Liz has over 30 years' experience in research, policy, legislation and management of work health and safety. She authored *Safe Design and Construction of Machinery in Regulation, Practice and Performance* and co-authored *Work Health and Safety Law and Policy*. Welcome Liz.

Last but not least, let me introduce my old friend, today's Facilitator Bryan Russell. He's the former Executive Director of SafeWork South Australia and of course a Member of Safe Work Australia and played a key role in the introduction of national work health and safety legislation and national uniform mine safety laws and explosives legislation.

Welcome Bryan and please join me in welcoming our speakers.

(Audience Applause)

Thank you and I'll now hand over to Bryan to start today's discussion.

Bryan Russell:

Thank you Andrew and thank you everyone for joining us in the audience today and for those joining online. For those who are joining online I invite you to tweet any comments or questions that you may have in the course of discussion. You can do that through our live chat facility or through the #virtualWHS. Just on that I'll add that at the end of today's broadcast we will be providing an additional period of time where the speakers stay behind to answer any additional questions online that we didn't resolve through the course of discussion today.

I would like to take just a moment to reflect on some of the introductory comments that Andrew made and regrettably the tragic story that Andrew told us about today is all too common. The fact that we have almost 200 deaths over a five year period related to unsafe machinery and poorly designed machinery is alarming. For that reason the elimination and minimisation of hazards at the design stage is a priority in the Australian Work Health and Safety Strategy. In that sense Safe Work Australia Members are united in their efforts to elevate safety in design as a national action area and that underscores the discussion that we're having here today. People often bandy about expressions about safe design and safe machinery but they're not really sure at times what that means. What I would like to do today is to explore that a little bit further and I'll start off with you Peter as a regulator. What's your understanding of safe design and safe machinery?

Peter Dunphy:

Well Bryan, I think as regulators we can often have lofty ideals but I think it can be explained really quite simply that for us really safe design is about thinking ahead. It's really about thinking through the whole lifecycle of the plant that you're dealing with, thinking about the sorts of things that can injure you along the way of use of that plant and really then going through a harm prevention process of really ensuring that you identify what the hazards are that arise out of the lifecycle of the plant and then ensuring that you either eliminate those or control those and that you also ensure that you risk communicate, so that you provide appropriate information around the actual item of plant, whether that be safe operating procedures or whether that can be in terms of training. I guess from a regulatory perspective that's how we

see it. I don't know Liz from an academic perspective whether the literature characterises it any differently to that but certainly that's how we certainly see it. Yes.

Bryan Russell:

Liz do you?

Liz Bluff:

Certainly. Yes I think that Peter's highlighted some important principles with that and I think one of the main things that works well in terms of improving safety at the design stage is for those who are involved in designing and manufacturing to be very conscious of the different ways in which machinery can be hazardous. That might seem like a fairly obvious point but for a lot of people safety of machinery starts and finishes with mechanical hazards and the issue of guarding but there are a lot of other ways in which machinery can be hazardous. So it can be hazardous in terms of different aspects of the structure or the power sources that are used that raise safety issues. There may be ergonomic issues related to the working positions and postures of people or perhaps the design of controls which might be poor so that they're hard to interpret. There can be problems of noise, vibration, substances that are used in or produced by machinery and there can also be issues related to access. It's something that's really quite commonly overlooked is whether people can get easy access without slip, trip, fall problems onto or into where they have to be working with machinery.

So I guess the pitfall there is when people have a bit of a narrow focus on certain types of issues and don't properly recognise the range of problems that there can be with machinery.

Peter Dunphy:

And I think commissioning and decommissioning plants is a really important aspect too which often gets overlooked in terms of that, in terms of safe design.

Bryan Russell:

Thanks Peter and thanks Liz for that as well. Peter in terms of the laws how is safe design covered in the work health and safety laws and what are the legal duties that apply to people who are responsible?

Peter Dunphy:

Yeah. Well safe design is rarely picked up. It is really a cornerstone of our work health and safety legislation. So in terms of the primary duty holders of the person conducting the business or undertaking it is a critical component of their ensuring work health and safety and ensuring the safety of the workers. So the maintenance and ongoing provision of safe plant at the workplace is a really important aspect. It also follows on to the further duties which are in the work health and safety legislation and that sort of tracks through the lifecycle of whether it's the designer who has duties, whether it's the manufacturer, the importer, the supplier, someone who's in control of plant or whoever's installing or decommissioning the plant. So it's a really broad range of duties that are covered across there and it's a very comprehensive duty and a very important feature of our other than safety legislation.

Bryan Russell:

So the laws cover all aspects with respect to safety in design from the actual design process through to commissioning and the operation of the equipment itself?

Peter Dunphy:

Yeah. So it really is about trying to make sure that we do have consideration to safety in all aspects of the lifecycle of the item of plants, and it really is about ensuring that those are considered very much at the design phase but also during the life of the plant in terms of that and ensuring that all duty holders and I shouldn't forget other duty holders such as directors and workers and others also have duties under the legislation to ensure that they follow instructions, that there's due diligence in terms of directors, in terms of the plant at a workplace. So it's a very broad range in duties and again I guess the other point is that those duties are often shared too amongst different people whether it's the PCBU, the supplier, the manufacturer and the designer. So often they can be overlapped in terms of those duties. So it is really important in terms of the legislative framework that there is good coordination and cooperation amongst duty holders.

Bryan Russell:

Okay. Liz I might just come back to you in terms of what works well for designers and manufacturers in this space and you mentioned the range of issues that they need to consider. Would you like to expand on that a little?

Liz Bluff:

Well I guess the next step in that is recognising that there is that sort of range of different ways in which machinery can be hazardous is for those who are designing and manufacturing machinery to also be well informed about the different options that are available in terms of the control or risk control in order to address those different types of hazards. So I guess what we're trying to do is encourage people to actually eliminate hazards and/or integrate state of the art risk control measures. So really being familiar with what the different options might be is important to underpin that aspect of designing things to be safer in the first instance.

So I suppose another important point to sort of underline in all of this is that what we're trying to encourage is making machinery inherently safer and so that can be a bit of a pitfall if people tend to see machinery safety as being about providing warning signs or devices, whether it's flashing lights on machinery or beeps or something like that. That can be an important part as supplementary measures if you like for risk control to help further minimise risks but if you look at that they're not fundamentally dealing with the actual hazards of the machinery. They're still about trying to get people to work safely around the machinery while not actually controlling the fundamental hazards and so that point about making it inherently safer I think is a really fundamental one.

Peter Dunphy:

It's a really difficult thing to do though I think in old plant. One of the things regulators and I'm sure Wes you experience this too is that in terms of older plant there's always that issue about retrofitting and how do you make old plant inherently safe and whether retrofitting can actually do that. But yes.

Bryan Russell:

Actually we might come to you Wes on that point now and as a consultant designer for manufacturers can you tell us please a little about what you do in practice and why safety and design of machinery is really so important in workplaces?

Wes Wilkinson:

Yes. I think Peter hit the nail on the head that it's basically from start to finish or cradle to grave. So I assist industry with safe design of machinery from inception to disposal effectively. Ensuring regulatory

compliance is one of the most critical steps but it's understanding that relationship and what is regulatory compliance from a manufacturer or employer's point of view. The interpretation of that differs from each business to the next one because the legislation really gears your control and your safe design of machinery to your process and the way that you're using it, your machinery, the way that you're applying it, installing it, operating it and so on. So I assist with the risk assessment process and that's something that we've had a lot of I suppose trouble with in the industry.

Simplistic risk assessment is commonly done on not complex plant but basic plant. But the more complex the machinery, the more complex the process, the more complex the risk assessment has to be because you have to capture all of these aspects of designing, operating, maintaining, cleaning, disposing, decommissioning and so on. If you don't get those captured in the risk assessment process you can't possibly move on to what is the most critical step which is your risk control design. I spend so much time in the risk control design area because that's where we get the paybacks.

If we can put in – and one of the things that people do in industry is they do the process of risk assessment very badly because they don't have the skill sets within their reference groups when they're trying to find that information on the process out, from task and so on and disposal, maintenance and so on. So they don't have the skill sets in there. People don't have that knowledge to know where to go with the process. So they see it as I think Liz mentioned before, a simplistic mechanical hazard and will deal with that as a mechanical hazard. But what should the risk control for that be? So they don't have the depth of knowledge to understand and explore the risk assessment process.

So in summary on more complex processes we don't do that risk assessment process particularly well. So that's where I usually get involved and start getting people thinking about "How do we go about this process to get something meaningful out of it?" and also you've got to think from the regulatory point of view "Can that document stand up in court?", "Have we done it thoroughly?" as I think the first example, the case of the fatality pulled out. Had that document been done? Well if it had been done was it done properly? Did it explore all the hazards and risks and task-related issues? I'd answer that no at this point because we need to probably inject a little bit of skill there. But then we look at risk control development and risk control development is where I get my job satisfaction because we're talking about trying to change a culture in industry from a lowest cost solution. A simplistic answer to trying to get people to almost – we're trying to change their culture, we're trying to twist their minds but we're trying to aim also for senior executive so that we can make that critical link between good design, better design of and safe design of machinery and the bottom line of the business. If we can get that relationship right and get those people – appeal to the entrepreneurs in the group, twist the minds of the CFOs from a dollar driven process to a return on investment and demonstrate that, then I think that's where we win but that's the areas or they're the areas that I work in and certainly the most rewarding is the risk control design area.

Bryan Russell:

Okay. Now Wes you mentioned some of the challenges faced by manufacturers and designers in this space and you've had a lot of experience in this. What are some of the unexpected benefits that you've derived from working directly with these people?

Wes Wilkinson:

The unexpected benefits – I mean I'll give a case study. I've worked in the timber industry quite a lot and it's a very difficult industry and it has the highest industry levy rates. It has woeful statistics, horrific injuries and it's pretty much on par with the meat industry as well. Now those two industries have done a lot of work in recent times to try and lift their game and I've worked with a hardwood timber mill and they took a different approach. The owner of that business was an entrepreneur or is an entrepreneur and he decided he was going to bring in some C&C controlled equipment from Europe. The trouble is it landed on the deck here and the risk controls weren't with it and what was there wasn't compliant with the Australian

Standard. So before that process could be put in place and become operational the systems had to be developed.

The good side of that is that the solutions that were developed became state of the art. That supplier adopted the risk controls, a zoning model, a specific risk control to very difficult problems of things like tracking the saws once you've installed the massive band saws to break the logs down. That process itself and I'll put you in the picture of that, if you're the supervisor you were expected to basically adjust this thing manually looking at it and if it went wrong you wore this massive band saw if it came off the guide wheels. So that was a risk that was totally unacceptable.

The solutions to that process of the zoning model which meant that no worker was in the same place and time – classic risk management theory – with the hazards so that you've separated your workers and your hazards, you've controlled it all remotely, no worker handles any part of the timber until such time as the process is at zero state whether control or power and then the operation of those controls was done from the control room. So the unexpected benefits in that was also the manufacturer adopting those as worldwide standards, OE standards for their equipment, solving the problem of their band saw tracking meaning that it was done from the control room after you'd installed the bands, not from within the process while it's running. The cost on return on investment which really appealed to the owner of the business was the fact that it cost between $15,000 and $20,000 roughly to put in the risk controls to track those saws and do it safely.

The payback on that when you're considering a timber mill of this kind costs in excess of probably $5,000 or $6,000 an hour to run which was a fairly typical figure. You look at that. We do a change every shift at least once. So saving 15 minutes and do some simple maths, depending on what shift structure they were running payback was between four and eight days to put in a process that then became state of the art world wide. If you think about that, that is a huge improvement and to see the rewards from that but other unexpected benefits of this employer running with this in an entrepreneurial way and basically honing in on that relationship because they could see that it was great for the bottom line of the business, they had significant discounts in their workers' comp insurance. Considering that they were at the worst industry rate, the industry was performing very badly their performance became so much better than industry that their reductions in premiums were in the millions. So they're the unexpected benefits and very rewarding unexpected benefits.

Bryan Russell:

Wes you touched on this in terms of talking about the bottom line.

Wes Wilkinson:

Yes.

Bryan Russell:

And obviously in terms of incorporating those safety features it did represent an up-front cost.

Wes Wilkinson:

It did.

Bryan Russell:

To what extent is cost consideration an issue for manufacturers and designers in implementing those safety principles into their equipment?

Wes Wilkinson:

Cost is probably the major issue. It's probably my number one enemy in the sort of work I do because everything you do is going to cost money. You're dealing with CFOs and CEOs that don't want to spend money. We're trying to create a link between better, safer design machinery, better performance in OHS and the bottom line. Concreting that link in and getting acceptance of it and getting these guys to free wheel is where we need to be because that's the biggest challenge. The finance always gets in the way because we can save money there but they don't look at the holistic picture. They look simply at investment, bottom line, cost but they don't look at return on investment. So it's our challenge as professionals to be able to demonstrate that return on investment and do it in pretty much a – I mean I cut my teeth in the automotive industry when we had continuous improvement gurus like Deming and in manufacturing it's lovely because you've got all these process measurables you can draw on. Intelligent use of those measurables you can demonstrate that what we're doing improves the bottom line. You win the CEOs and the CFOs over. You've got the game there but that's the biggest challenge of all is the financial and getting that culture in place.

Bryan Russell:

Okay. I might come to you in a moment Liz about cost issue as well but as an extension of that Wes, can you tell me how does a manufacturer or designer market their product when as a consequence of the extra cost it's going to be at a higher cost than its competitor?

Wes Wilkinson:

Look I think we'd be crazy. In Australia's climate at the moment, our industrial climate, we need to market the abilities we have and our technology skills are superior and we need to market that. So if we've got manufacturers here designing equipment that is state of the art in terms of risk control that's giving us a positive benefit to the bottom line, we need to market that. We need to market it on regulatory compliance because if we're not doing that, I mean I'm trying to in my client base – regulatory compliance is mandatory. We've got to accept that. We must do it but I don't want to see very basic compliance. I want to see us going to a level where we select compliance at a point where it is a positive for the business, not just a have to do, minimal compliance because the minimal compliance will turn around and ambush you.

Bryan Russell:

Yep.

Wes Wilkinson:

So that's probably the key message.

Bryan Russell:

So it's also return on investment as well.

Wes Wilkinson:

Return on investment.

Bryan Russell:

Yeah.

Wes Wilkinson:

And demonstrating that. You can't just say "It's nice to have", because you won't get any response from the CFO on that.

Bryan Russell:

No.

Wes Wilkinson:

You've got to have a demonstrated result. You've got to be able to show them the tools that you're using to be able to demonstrate. We need to play on their turf in other words. We need to play in their language with dollars, numbers and all of that and demonstrate to them that what we're doing can actually demonstrate a result and that is probably the biggest challenge in doing the sort of work I do.

Peter Dunphy:

And I think getting it right up front does actually save money in the long term because the costs of recalls and retrofitting is very expensive. So to actually design something well and elegantly at the beginning of the process actually is a win-win situation for everybody.

Wes Wilkinson:

It certainly is and you don't want to be playing catch-ups and particularly if you've been found not compliant with the legislation and you're getting any further action as a result of that, whether it's simply notices of improvement or whatever, or prohibition, but any subsequent legal action out of that is very costly to a business and a fatality is a major cost to a business that can sometimes be terminal and we never want to go there. We don't want to injure people. We don't want to kill them at work. We want to design processes that are user friendly and actually work and are productive.

Bryan Russell:

Okay. Liz I might just come to you in terms of cost.

Liz Bluff:

Yes.

Bryan Russell:

Has your research found that cost considerations are an issue?

Liz Bluff:

Absolutely cost is an issue and actually I'm going to just deflect this a bit and pose a challenge for Peter…

(Laughter)

…because what the research actually suggests is that one of the biggest issue is companies like those that Wes deals with feeling "Okay. We're dealing with safety but that company over there that's doing the same sort of stuff, they're not dealing with safety. The regulator doesn't seem to be inspecting and enforcing with them." So we've got this unlevel playing field and actually there's some really rather sad examples of companies that had put themselves out to do safe design, had come up with some great safe design solutions and then found that they couldn't compete with other companies that were still producing the

same type of machinery but without the safety features that were effectively adding to the cost of it. So all of this for me raises the issue of how do we get a more consistent and I think networked approach to inspection and enforcement which would mean that as a regulator you're doing it strategically through supply chains and markets. So you're not just focusing on particular companies one at a time. Maybe when something terrible goes wrong because there's a fatality at the sort of company that Wes is dealing with, but let's take another example – food processing machinery, let's say.

If we could have strategies which are dealing with those that design, manufacture, supply, import, key customers as the end users of the system who are all being interacted with, as part of regulatory strategies then you get that impetus through supply chains and markets to help reinforce the importance of safe design, perhaps reinforce key messages about what the design solutions are that you're looking for and at the end of the day you've got a level playing field where people don't feel that they're going to be missing out because they are trying to deal with safety.

Bryan Russell:

Excellent. I think that that has obviously provided some fertile information for people who might have questions. So I might at this point in time see if there are any online questions that we have and also invite members of the audience to think about questions as well.

We do have a question from Cathy online and the question is "There is some discussion about the need for designers to take a holistic approach when designing machinery. What does this mean and how can designers do this?" Wes I think this is one for you in terms of your experience working directly with manufacturers and designers. How do they take a holistic approach?

Wes Wilkinson:

Well the holistic approach is that you're not just looking at operating the plant because most people think that "Okay. It's while we're normally running the process," or the machinery or whatever it is that there's a problem and they look at that isolated area in their risk assessments. They don't look at maintaining. They don't look at cleaning. They don't look at decommissioning or commissioning. They don't look at installation. So holistically we mean we need to look at the whole picture of owning and operating that piece of machinery or process or whatever it is. I think that's basically what it's about. So it's broadening your vision, taking the tunnel vision off and looking at your risk assessment processes and being far more thorough and laterally thinking a little bit along the lines of that.

Bryan Russell:

Thank you. Peter I might just come to you on that and you touched on it earlier. Does the law establish a framework for a holistic approach?

Peter Dunphy:

Well it does. It certainly covers all of those things that Wes was talking about and it really does ensure that people need to – the designers do need to factor in every aspect of the life cycle of the item of plant and that's quite critical in terms of how they do that. So no it is. It's a really important element of design safety and ensuring that we actually do that.

Bryan Russell:

Liz from your research are we achieving that yet, that holistic approach?

Liz Bluff:

I would say not. I think actually to the extent that designers and manufacturers are addressing issues for those who install, maintain, clean, repair and so on, it tends to be a bit incidental to what they're doing for the sort of everyday operation. So if you've got good measures for the operation user of the machinery maybe they're going to flow on to other people as well but maybe not because you've got different things going on when you're maintaining and so on.

I think one of the big issues really is for designers and manufacturers to in a sense get their hands dirty in terms of really understanding or understanding the real nature of work and certainly that involves consultation with workers but it's even a step more than that because it can be quite hard to get people to actually have input as workers into discussions about safety especially at the design stage which raises I guess the issue of "Well how do you do that effectively?" Certainly those who do get to a better understanding I guess of what really goes on in work are those that trial with prototypes or models if it's not the sort of machinery that you can actually have the whole thing there for people to trial, people using models, simulations and all sorts of things to try and get workers with that sort of experience to tap into their experience and raise the genuine safety issues that need to be addressed.

Bryan Russell:

Thank you.

Peter Dunphy:

I think there's also a role there with regulators in bringing the parties together. I think where we've had our best successes has been where we've been able to get the designers, the manufacturers and the end users, whichever part of the lifecycle together to really understand what are the issues and what needs to be addressed. I think there is an important role for regulators to help build those networks and build those conversations because often where we see the problems it's where there isn't necessarily the needs of the end user as being really addressed in the design process.

Bryan Russell:

Okay. Thank you and thank you Cathy for that question. We have another online question. So we'll go to that now and this is from Terry. Terry asks "How do you address the competing objectives of aesthetics, practicability, cost and functionality during the manufacturing stage?" So in other words we've got these competing issues – making the machine look good, the aesthetics of the machine, the practicability, cost and functionality and balancing all of those up. In certain instances it may be that the manufacturer decides that functionality overrides some of the others. Wes, you have any experience with that, any views about that?

Wes Wilkinson:

It's a pet topic of mine.

Bryan Russell:

Excellent.

(Laughter)

Wes Wilkinson:

The problem we have is that – if we can put the question up again just so I can get the whole context of it? But we need to look at all of those aspects and I've basically got a copyrighted expression that when we're

looking for risk control for processes and that we're looking not just for an answer that excels in one area. We want to keep the finance people happy and they want to see the process as productive. Well that's great but at what cost? Because they're not looking at the real cost. They may be looking at just getting parts or getting things out of the end of the process. We've got to look at all aspects of that process and get a best possible compromise risk control solution for that item of machinery and by 'compromise' I mean our risk assessment is going to throw up all the different variables that make that process tick. We don't want to excel in some and fall down miserably in the plant safety or the risk control area. So we need to get that right. We need to get the user friendly part right, the ergonomics, the human factors side of it, the psychology of the relationship with the process – all of that right and we want to get that answer that's going to work. So I think that's the key to it is the best possible compromise risk control.

Bryan Russell:

Excellent. Thanks. Thanks very much Wes and thanks Terry for that question. It covers all aspects of safety in design. We have another question online and this question is from Kenneth and the question is "Can the panellists talk about some real life examples of great machinery design?" and "What does well designed machinery look like?" Liz I might just come to you on that?

Liz Bluff:

Okay.

Bryan Russell:

You've done a fair bit of research here and in terms of from your research have you seen some great machinery designs?

Liz Bluff:

For me the best examples are those ones that come out of an understanding of what the real nature of work is like. One that comes to mind is an example of – it's actually – well a hand-operated but reasonably large device that's used for finishing surfaces and the people who developed that actually came out of an industry where they used that kind of machinery. It's interesting I think how often those sorts of solutions actually come out of people with that real firsthand experience and the reason that it was good was that they understood exactly what it was like to be dealing with dusts which might be coming from all sorts of synthetic as well as timber materials. They knew what it was like to be straining with an item of machinery in terms of the physical strain and the potential for overuse and so basically came up with a design which was a device that was easy to manoeuvre and really effectively controlled the dust issues in terms of dust extraction, so – and there were some other things. But I guess the point there is really when you understand the real issues for people using it, it means so much more when you're coming up with the solutions.

Bryan Russell:

Okay and Wes you mentioned the timber industry?

Wes Wilkinson:

Yes. The example I was giving earlier is an example of intelligent design, very good design in the sense that okay, if anyone's ever been into a timber mill or traditional mill, you're hand feeding timber into machines and it's – things can go horribly wrong and people end up being severely injured as a result. This process by separating the hazards from the workers creates an environment that is very difficult to get injured if the hazards are in there and you're out here and if you want to go in there then the hazards are no longer there

because you've placed that zone in a controlled state or a whole power state if you're doing major maintenance work.

So that sort of design is very good but not only that, your interfaces with the process and the user-friendliness of those because if you've done your homework with your risk assessment with your user groups and you've got that interaction and got the dynamics going in that group you've developed an interface that's very friendly to them and performs well. It doesn't frustrate them. It doesn't drive them nuts because it breaks down every five minutes and you've got to fix it. They're the sorts of issues that you need to hone in on.

So a good design process will tick all the boxes as best as possible across the line and that's what great design is about, is getting something that works in all of those areas that your people can take ownership because they've had the involvement in the development of the process. It's quite amazing how that relationship snowballs. Once you've got those people accepting that they were part of the design of the process that actually works whereas it hasn't before, the sort of dynamics of that, getting that moving and getting that ownership is just the power that's in that relationship is amazing.

Bryan Russell:

Thank you Wes, ta. Peter I was just about to ask the regulator. Any views there about real life machines that work?

Peter Dunphy:

Yeah. Just picking up on Liz's point. I really like the idea of design thinking and I mean architects do it all the time. They prototype, they design, they do drawings for their clients and work through and eventually prototype into something that works. Our best example of something where we have worked with industry and worked with users and there are a good couple of examples in our Safe Design Program, whether it's been grain augers or bench place drivers or wood chippers where we've sat down with the industry and tried to work through what wasn't working and what needed to be working. That was an iterative process of working out some different trial and error about what would work better and more effectively in terms of that. So I think we can learn a lot from the architecture profession in terms of how they use that process of prototyping and continuous learning and working with clients to actually understand their needs and what you want to get out of the process.

Bryan Russell:

Okay. A theme of engagement on reading from this process as well which is important. I might now just ask our audience here if there are any questions you have of panel members? Yes?

Audience Member:

Yes. My question is does anyone have any comments on approaches for working through situations where there's really conflicting views about what constitutes safety and design because I'm thinking of an example for example in quad bikes it's been quite an issue of what is safe design of quad bikes?

Bryan Russell:

Okay. I might actually invite Peter respond to this and perhaps Liz from you as well from your experience. So Peter and the example of quad bikes has been mentioned and views about what actually constitutes safety and design?

Peter Dunphy:

Yeah. I think that's a great question because it's a really live issue in terms of quad bikes and for us I guess it is about getting down to again getting all of the parties together to try and work out a solution on what the issues are. So for quad bikes certainly part of the approach we've taken is to commission research. So really have an evidence based approach to try and really resolve some of the design issues and some of the concerns that we know users have in terms of quad bikes and then working with the industry to try and change perceptions and understanding I guess of what those issues are.

So for us it's been again a bit of an iterative process of working through, focusing on things going through from PPE right through to actually better stability of the quad bikes, better design and really pushing, trying to push the suppliers basically up the hierarchy of hazard controls to try and get them to think about "Well, it's not just about training and it's not just about helmets. It's not about how people use the equipment." You really need to design in elements that are going to make the equipment more stable and more safe to use. So we've certainly been using that as an approach and I think there's some really good learnings from that.

One of the things we've been pushing for I guess is the idea of having some better consumer safety information about the stability of different types of quad bikes so people have more choice about the safer options in terms of those or actually using other side-by-side equipment so what else is safer to use in terms of those. So there's a whole range of things that we're doing at the moment to look at that but it is a really good question because quad bikes is a really complex issue because it's not just a workplace issue. It's also a recreational issue. It's used in lots of other aspects. So it shows the complexity I think in plant and plant often covers not just workplaces. It covers across many other boundaries. So as a regulator it's a very complex space to navigate sometimes.

Bryan Russell:

Liz does that resonate with you in terms of your research?

Liz Bluff:

Yes it does and actually I was going to just say that I think you could sort of answer this question in two contexts in a way. One's this sort of wider regulatory context where it's been really important with the particular example that you've raised of the quad bikes for that to be underpinned by some really sound research as to what the technical issues are in terms of stability and all of those sorts of factors which then I think puts the regulator and others in a better position to actually advocate for what is safer design and there are some other good examples of that being done by regulators in the past.

In Victoria there was some really good research that was done around forklifts because everybody presumed as with quad bikes that the issues were all about the operators hooning around and not operating these things safely and it actually turned out that there were real serious issues that related to forklifts not actually having the braking capacity for the usual speeds that they were driven at, all sorts of issues around stability and tendency to tip over and things like that. So in that case there was a role there with the regulator being able to define some designed solutions and advocate for those solutions to be put in place.

But the other context I wanted to just raise because I guess these differences of opinion about what's safe, they come about for individual companies as well in the context of one-off particular designs and the research that I've done certainly suggests that those issues are better resolved when you involve teams of people basically in that process of recognising hazards and deciding what you're going to do about them. So bringing people from different perspectives again but in the workplace context similar to what you're trying to do I guess in a regulatory context as well.

Bryan Russell:

Yes. Thanks Liz. Any further questions from the audience? There's a question here?

Audience Member:

Thanks. Thanks. You've talked about this a bit already but with cost. But does regulation tend to drive safe work design or is safe work design a commercial imperative particularly for the designer's reputation?

Bryan Russell:

Thank you for that question. I think that any of the panel members could probably have a view on this. So does regulation drive safe design or is safe design a commercial issue? Peter?

Peter Dunphy:

I think just relying on legislation isn't enough. I think what designers need to do is really be focusing on harm prevention because we know you can comply with standards but still have unsafe safety issues in terms of the plant that you're producing. So for us it's – and certainly I know as regulators we can check that people are complying with the standards but often there are other issues that need to be addressed in terms of ensuring harm prevention. So I would always be advocating for duty holders to be looking at the harm prevention, "What's going to cause harm?", "What am I doing about that?" and "How am I controlling that?" and not thinking so much about "Have I ticked all the boxes in terms of the statutory obligations?" because that doesn't necessarily lead to safe design ultimately. So for me it's really about an emphasis on the harm prevention.

Bryan Russell:

Okay. Wes, your experience?

Wes Wilkinson:

The regulatory framework sets basically the standard or the basic minimum compliance level but it's up to the person who is the duty holder to actually explore that and work out where their solution to the problem sits. That's probably the bit we don't do well as I touched on before. But it certainly is a commercial imperative because if we're going to do it properly we've got to sell the benefits of doing it properly back again. As far as I'm concerned it is absolutely critical that we get that relationship in there because we're going to get it right if we can prove that it works.

Bryan Russell:

Okay. Liz does your research show that the regulatory requirements prevail or do commercial instincts drive the manufacturer?

Liz Bluff:

I think the research suggests that the commercial instincts are drivers but regulation and I use that in the sense of both the law and the inspection and enforcement is part of the mix in terms of factors that motivate organisations to address health and safety issues. I'm inclined to say that regulation in that sense is – yes it's a driver but it doesn't – it doesn't give people all that they're looking for in terms of capacity, so understanding what it is that they actually need to do. That's where other aspects of the wider regulatory influences come into play and in particular things like the technical standards for the safety of machinery which are not formally legal standards. They're certainly referenced in codes of practice but they have a momentum in a way that for example Health and Safety Act, regulations type of thing don't. So the technical standards are an important part of that momentum for driving health and safety improvements.

Bryan Russell:

Thank you.

Peter Dunphy:

One of the things I liked about your research Liz was that idea that community of practice is almost as important as the regulation and if you can connect people then they learn from each other and that's really I think an important role for us all to be facilitating that and ensuring that happens.

Wes Wilkinson:

The networking side of that as well.

Peter Dunphy:

Is really critical, yes.

Bryan Russell:

So the communication is becoming a powerful instrument in this space.

Liz Bluff:

Yes.

Bryan Russell:

Now I have one more question online and I'd like to take that question now. This is from Leo. Leo runs a small business. How can he get help to ensure that the machinery he puts into the workplace is safe? Now this is a most relevant question because we've been talking about the information and communication process. Here we have a small business person. He wants to make sure that what he puts into the workplace is safe. How does he go about making sure that that's the case? Wes?

Wes Wilkinson:

If I can address that, look I mean it's the duty on any small business operator or any employer that they need to get appropriate expertise to assist them with what they're doing. This is not a commercial plug but certainly they need to seek technical advice to be able to assist them to make sure that they've got the machinery in their workplace safe and that's where the duty is. So it's really their responsibility to engage someone or talk to the regulator who can quite often provide advice and assistance or guidance in those directions, certainly bring them up to speed with what their responsibilities are and that's sort of a great starting point for them probably. But bringing in that resource is probably the most important thing to that business.

Bryan Russell:

So Peter contacting the regulator will assist in providing information about what the legal requirements are?

Peter Dunphy:

That's absolutely right and we have great sympathy for small business operators and how they access that information. We actually operate in a global economy and people are often buying things from overseas, buying them from trade shows and all sorts of things internationally and often standards which are told to

be – are said to be equivalent are not always equivalent. So that certainly is worth checking if people are buying major purchases certainly checking it out with the regulator and we're certainly willing to help. We do see people get into trouble where they think they've done the right thing and bought something but it may not be compliant with Australian standards or Australian requirements.

So it's really important I think to do the homework, yes.

Bryan Russell:

Thank you. Just on that point I'd like to ask is the legal framework adequate for dealing with safe design of machinery?

Peter Dunphy:

Look I think the legislative framework we've got is the best you can have in terms of addressing it. We've got very much a prevention approach to our legislation. It really is performance based. It's really designed about trying to get the right outcomes. So you can't be too prescriptive because we know that internationally social environments change and technology is changing. You can't anticipate every change in terms of plant. So the framework we've got is good. I think it is effective in terms of having the right controls but it's more about – really about making sure people are aware of those controls. I think as Liz was talking before people don't necessarily always refer to the legislation. So it's raising awareness not so much about the legislation but about what's important in terms of what people need to do to design safely.

Bryan Russell:

Okay, yep. Liz in the context of what Peter's just told us about the legislation and the legal framework what do you think needs to be done now to improve the outcomes in safe design of machinery?

Liz Bluff:

Look from the research that I have done people who design and manufacture machinery have a strong preference for I guess what I'd call hands-on learning in the sense of getting practical opportunities to actually find out how to actually do safety in a sense. So you can provide information in a written form about safety but actually what people are looking for is how do you do it in practise? That leads me to think that there would be great value in I think regulators banding together with education providers, professional industry associations and looking at providing programs which are structured around those practical opportunities. So what does it actually mean in practice to be recognising hazards? How do you go about doing that? What are the practical ways for actually making sound decisions about how you control risks? How do you do your testing and examination of machinery that you're expected to do? How do you effectively involve workers?

So these are all very practical, hands-on type things and I think there'd be great value in looking at how we can provide programs that help build capacity and build those sorts of knowledge and skills.

Bryan Russell:

Okay. Thank you Liz. I'd like to now again ask our audience here if there are any further questions that you might have? No? Yes, one question here.

Audience Member:

How important is it to know who you're designing for, know their shape, their size, given a lot of machinery is about people having to control difficult and complex environments? How do we know that we're designing for Australians?

Bryan Russell:

Okay. Wes I might refer this one to you and this is a question about how do you cater for all of those hazards and that includes the hazards of catering for differences in individuals?

Wes Wilkinson:

I'll put my ergonomist's hat on for that one. We need to when we're designing interfaces for people, we need to design those interfaces for the people which means we need to take into consideration the variation in stature, physical size etc. in our workforce. Unfortunately in Australia our databases are not where they probably should be but there's a major project within the human factors society to work on getting us a database of the Australian population. But an ergonomist knows how to interpret the databases that are available and there's various software packages that are available that assist you in designing for people but it is critical that we design interfaces for the range of user groups and I'll give you an example from a shift manufacturing organisation.

They were operating assembly machines and on the day shift the guy that operated it was about six foot four and on the night shift the lady that operated it was about four foot two and she's basically working up here and he's working down there. So there was a total mismatch in the design of those workstations.

So if you appreciate that both of them were within perhaps 95% of our expected user population, if we know those limits, we know where the boundaries are, we can design to cater for that and we can put in appropriate risk controls like adjustable floors, adjustable processes to be able to get those interfaces to the correct height and get those working relationships because it's a three-dimensional model. It may not be just height. It may be reach. It can be any way that we relate with people. Vision - if we're talking control room environments and that sort of stuff you've got to design for focal lengths and for information and interpretation of that information. So a professional ergonomist is someone that can assist you in that area in terms of getting that information and making that relationship work for you.

Bryan Russell:

Thank you. Ta. Any further questions? No. No further questions. We start to come to the conclusion of the discussion and for that I'd actually like to refer to the panellists about a particular take-away message. So in other words we're dealing with a very key issue with respect to safety and design and design of machinery and I'd like to ask each of the panel members what their take-away message is for you. When you go away from here and think about safety and design what is it you should be thinking about? So Peter from a regulator's perspective what's a key take-away message with respect to safety and design?

Peter Dunphy:

Yeah. Well for me it is about that thinking early and really trying to anticipate all of the types of hazards that will arise throughout the lifecycle of the product. So really making sure at the front end that we get that right so people and users at the back end are not being injured in the process.

Bryan Russell:

Okay and Liz?

Liz Bluff:

I think for me it is that fundamental message about we're trying to make machinery inherently safer and at the end of the day we'll only achieve that when we do recognise the full range of ways in which the machinery could be hazardous and take steps to address that range of hazards.

Bryan Russell:

And Wes?

Wes Wilkinson:

Look my take-away message would be that injury and illness from work is unacceptable and we need to target the decision makers. We need to convert their thinking and we need to achieve a culture of not having to do it but a culture of wanting to do it right and that's I think the fundamental message I'd like to put through.

Bryan Russell:

Cheers. Thank you and clearly safety and design is a fundamental issue. It is embedded within the Australian Work Health and Safety Strategy. It's an identified action area and what I would like to think is that today we've had a vital discussion on some of the issues of concern with regards to safety and design but more importantly on how we achieve positive outcomes that are going to drive safety for people operating machinery and equipment. We've got key messages here and I think if I could sum it up in terms of saying that some of those key messages relate to communication, information and engagement, what we need to do is to work actively with one another as regulators, as researchers and as practitioners within this space to ensure that we look at the front end process to ensure that the hazards are eliminated or minimised at the design stage. That's what this is all about. That's what this discussion has been about.

I would like you to put your hands together and thank our panel members – Peter, Liz, Wes.

(Audience Applause)

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