3M Transcript for the following interview: Terry Gorman – Ep 64 Head Protection

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This is the 3M Science of Safety podcast presented by 3M Australia and New Zealand Personal Safety Division. This is a podcast that is curious about the signs and systems of all things work, health and safety, that keep workers safe and protect their health.
I'm Mark Reggers, an occupational hygienist who likes to ask questions why, how, and please explain.
Whether you are a safety professional, occupational hygienist, someone with any level of WHS responsibility in the workplace, maybe you are a user of safety products or maybe you are a bit of a safety nerd who finds this stuff really interesting, then this is a podcast for you.

(R) I had a very interesting chat with Terry Gorman. It went for a fairly long time, so this is part 1 of my chat where we talk and focus on head protection, next week's episode we do talk about eye and face protection. But here is part 1 of the chat on head protection.
Welcome back, Terry.

(G) Hiya, Mark. How are you?

(R) You've become our most regular guest. Glad to have you back again, as always, but for those who may not have listened to any of the previous episodes we have

done together, can you please introduce yourself, who are you and what do you do?

(G) Yes, I'm an occupational hygienist and I work for … well, for the last 20 years with 3M in the field of personal protective equipment and all testing and trials and Australian Standards associated with many of those.

(R) So, we are talking about head, eye and face protection, being types of PPE, but where does PPE sit in the hierarchy of controls and why does it live where it lives in that space?

(G) PPE is listed at the bottom of hierarchy of controls because it involves people and people are a variable, let's say.

(R) That's a nice way of describing people, they're variable.

(G) Yes, they certainly are and that variability, different approaches, different people, different view on things can create issues to deal with and it becomes a large commitment to take up PPE and use it properly and do all the things needed to provide the protection that you expect.

(R) So, PPE's down the bottom, so we're going to start off talking about head protection. From a hierarchy of control point of view, how can workplaces reduce the risk or severity of things falling in the first place, which goes in the higher control side of things? Before relying on the worker to put a hardhat on, how do we stop things falling in the first place?

(G) Yes, clearly, preventing things falling is the best approach but easier said than done in the real world. Let's say a varying environment like a construction site where things are moving from day-to-day or hour to hour, even, it becomes problematic. There are certain things that can be done. There's a whole lot of options these days in terms of tethering, so tools and equipment can be tethered to the worker so that he's got his screwdriver and his spanner and hammer and whatever else on his belt. He can use them. If they slip, they get caught on the lanyard or appropriate security and do not fall down and cause a problem. There's

also use of installed systems like platforms or nets or that sort of thing to provide people with a covering and prevent those things from falling through. But again, in a flexible environment, it's often hard to keep them in the right place at the right time, consistently, day-to-day. So, it's not a simple issue. Clearly, it's an ongoing one and people have to pay attention to it.

(R) I'd say with a lot of hazards and situations, there's going to be certain controls from the whole hierarchy of controls rather than just one and then full reliance on that. That's not different from a falling object and head protection point of view. So, I'd say most people would be familiar with what a hardhat is, or what a hardhat looks like. They've probably seen them on construction sites as they're driving around or seen it in movies and it's to stop things falling on people's heads and protecting them. How does it do that? I mean, I know it looks like a plastic shell but there must be surely more to that. And is there a weight limit that is only suitable, because I'm sure a piano, if you think about Looney Tunes and a piano falling on Wile E Coyote there must be a limit? Is there a limit to weights that people can wear hardhats for?

(G) There's certainly limits to the protection that it can provide. Clearly, there's no safe way for a piano to fall on anybody.

(R) That's not a real-world example, but I hope I've set the picture and scene for most people who have seen Looney Tunes.

(G) Sure, yeah, there's that sort of picture and then there's the picture of a metal rod or a screwdriver or something with a point that's falling. Again, that's where you've got a lot of force in a small area that is going to create a significant hazard to anybody below that. So, there's no magic cut off because the impact of the dropped object is going to vary depending on its size, its density, the contact area, all those things. But clearly, if there is a chance of anything falling, as many workplaces have, there's a blanket rule; you must wear your helmet. It at least gives you protection to a level. It will help you with the lower end of the scale. The giant stuff is obviously a whole different process.

(R) So, how does the hardhat do that? What are the features or what are the things that standards from a manufacturing point of view must have in a hardhat to perform at those lower levels?

(G) So, there's a whole range of performance issues that are tested under the standard, but basically, you're looking at, in terms of the response of the helmet, it will take the hit. It will deform to some extent. The helmet will bend. The helmet will crack. Again, it depends on the scale of the impact and the size, all those things. The head harness plays a crucial part. It takes that load and spreads it across the skull rather than in one place. It provides a way of spreading that force evenly across the skull. Again, to a point, it will provide protection by doing that. Clearly, at some level, it's still going to be problematic to protect you from a significant weight. But it will give you a level of protection.

(R) So, you've referred to falling objects. Are there other types of hazards that hardhats maybe suitable for providing protection as well?

(G) Yes, there's the electrical test. They test the resistance of the helmet. So, it is tested in contact with a 650-volt source to make sure or prove that the head will remain insulated from that connection. So, somebody sticking their head in a wiring cupboard or some …

(R) Transformer.

(G) Transformer area or something, they've got again a level of protection. You can obviously still find the wrong places and the wrong areas where that won't be enough. But it's a step in that direction. The other thing helmets can do is give you protection in a hot environment to radiant heat. So, hot work places, furnaces, molten metal, places where there's lots of radiant heat, the helmet can provide a level of protection against that to that heat and even bushfires where many people get out there fighting bushfires. They've got a helmet that can take a reasonable exposure to heat. We continually find people who melt helmets, so I know people

will push the limits on the performance of all this gear, but there is certainly a level of performance there in terms of what the standard can require.

(R) You just mentioned a number of different working environments. Are all hardhats the same or are there different types of hardhats that workplaces should be aware of when it comes to selecting and looking at these types of products?

(G) Under the Australian Standard 1801, there's three different types. There's a type one, which is industrial safety. That's, if you like, the normal helmet you'll see on a construction site or in a workplace where helmets are used. Type twos are for high temperature workplaces, so that's where you're in those workplaces like foundries, molten metal baths, furnaces …

(R) High level of radiant heat potentially, anywhere it's hot.

(G) Yep. You can get a helmet that gives you a higher level of performance of those heat levels. And the type three helmet, which is for bushfire fighting. So, it's rated specifically for work in that area to give protection to the guys on the lines, if you like.

(R) So, what tests to which these hardhats have to actually pass? You've mentioned dropped objects, a little bit of electricity, radiant heat. High level stuff, what are some of these tests that a hardhat gets put through to give us confidence it's going to do its job.

(G) Yeah, sure, so there's the electrical resistance test. That's to that 650-volt standard as required. So, it tests that the helmet is going to provide that level of protection. There is some impact testing. So, we get a weight hitting the helmet and the transfer of the energy is measured and it has to be appropriate for the test. We measure the penetration, so we hit the helmet, if you like, with a spear or a spear-shaped object let's call it, under certain conditions, and it's got to take that hit without breaking or allowing penetration of that product. We test the stiffness of the helmet, let's say the crushability. If you took a helmet and squeezed it between your hands, that stiffness is another one of the tests. We can test the

ignition, so make sure that your helmet does not support a flame, does not become a fire hazard on your head in a situation where it was exposed to a flame. And then, there are tests for the heat performance that we talked about for the hot end type helmets and bushfire helmets, to make sure they can take any exposure to a certain amount of heat. As I said, it doesn't mean they're invulnerable or impervious to heat to the nth degree, but to a level, they will perform.

(R) Also, seen in the past, for some of these tests they actually put the hardhat in a fridge or heat it up so it's not … trying to get those different work environments where it's colder and hotter and how does it perform in that range of environments.

(G) Yeah, so that stiffness test we talked about is done hot, cold and wet, to make an assessment of the material that that helmets made from and what effect the temperature would make on the performance of the helmet. So, they do take again, within limits, some as an account of the working temperature or the ambient temperatures for that product.

(R) So, you've gone through some of those performance requirements and depending on your workplace, you would look at see whether that's suitable for your workplace, but what other things should workplaces be looking at when selecting hardhat protection? What else should they be considering?

(G) Well, there's other features that can come into play. You can get ventilated helmets, ones that have a number of openings along the top. That is to improve the airflow, let's say, let the heat out of your head and out of the helmet and keep it a little bit cooler. It's a step in the right direction. Again, it's not air conditioning, but it's better than having a fully enclosed helmet. Some workplaces require that, but others do not, and the ventilation option is there. There's different styles, different shapes. They might have some advantage. Some have gutters. Some don't. It depends if there's water or external potential for exposure to rain. You can use the gutter to keep that dripping down your neck and down your nose, those exposures. We can look at things like the colours or let's say the conspicuity. You can look at colours for daytime safety, bright colours, catch your eye. People will see you.

Night time, we can be looking at reflective type tapes to highlight the helmet, reflecting headlights from a vehicle, again, providing visibility to the workers and the drivers around them to make sure they're easily visible.

(R) Now, talking about the reflective tape and conspicuity side of things, if you're putting on an adhesive material, one of the things you'll see on worksites that people have stickers all over their hardhat and that's generally a no-no. Why is that the recommendation? What is a sticker doing to a hardhat?

(G) Well, the issue is that the material used in many hardhats can be affected by solvents or petroleum-based material. So, it, if you like, can dissolve the plastics used or weaken them, damage them if you like. So, potentially, if you used a lot of solvent on a helmet, you are going to affect the structure, weaken it and therefore, it will not protect you to the level that it should. Now, it's problematic whether these stickers are going to cause that effect. There's certainly some materials, there's some tapes like we just talked about, the conspicuity tapes that are solvent free. They will stick, but there's no solvent involved, so they're not going to degrade the helmet. Some stickers, cheap, nasty ones potentially could have some of that solvent, potentially could weaken the helmet. It's a bit of a grey area as to whether it would and whether it would be significant so it's not a black and white issue. Many workplaces have a local rule, you shall not put anything on the helmet. Other places are less concerned, and we've all seen helmets with a hundred stickers on it. So, the Standard is not black and white either. So, you just have to use I think a bit of common sense and look at the reality and make sure you've got a reasonable approach.

(R) I guess that would be similar with textas and other alterations, or anything that may potentially affect the hardhat in performing. That would be the same grey area that we want to have a level of confidence that it's not going to affect the shell, i.e. the performance, i.e. the protection of a worker.

(G) Yes, that would be exactly right. Some textas are very solvent based. The ones you can smell are very pungent, solvent odour. Look, if you put a dot on a dot on a

helmet with one of those, it's probably not going to make a measurable difference. If you write a book on your helmet with that, that may be another story. So again, it's hard to be black and white and there's no clear go, no-go.

(R) What about wearing beanies and caps under hardhats? That's another common question I've been asked in the past. How does that affect the performance of a hardhat and how should a workplace go down that path when you may have workers that may want to wear a beanie, especially in the winter months when it's a bit cold?

(G) Remembering that the helmet is sitting on a harness and the harness is sitting on your head. So, that's the concept. To protect you, it must fit. It must be on your head snugly and securely so it can take a hit if required. Wearing a nice soft beanie or a balaclava type product, whatever it might be underneath, it's going to get into that discussion. It would be crushed on your head if you did get a hit to some extent. If there's no rivets or metal components or anything in that way of that fit on your head and it's snug and secure, then there shouldn't be an issue. If there's anything that's going to cause a problem with that fit, then clearly, that's probably not a good idea to wear that.

(R) Hardhats, how long do they last? Is there care and maintenance tips? Is there a time period that these should be getting changed over? Like a lot of PPE that we've spoken about, these things don't last forever, especially if you don't look after them, so how do you look after them?

(G) Yeah sure. They certainly don't last forever. The Australian Standard gives guidelines on replacement. But again, they're not black and white. They're indicative. It says the average life of a helmet shell is three years. That's not to say you can't ruin it in way less than that and potentially it could last much longer than that. The use and the pattern of use is going to indicate or lead you to decide that helmets had enough after a certain period. So, continuous inspection of the helmet; has it got cracks? Has it got discolouration, defamation? Any issues on it would indicate to you, whatever the time is, maybe it's time to get a new helmet,

change it over. The shell might be sitting in your office in a cupboard 364 days a year. You wear it once a year. In three years' time it's not going to be a problem. You could continue to use it. So, there's a whole continuum there of different use and different use patterns. The thing the Standard does say though is to replace the head harness every two years of use. That's because the harness is a crucial flexible element in terms of that protection we talked about and it's being used consistently. It's going to wear and stretch and degrade at some rate so that the Standard is more specific on that and the two years indication should be followed.

(R) Are there any not-to-do things when it comes to head protection and hardhats? You've alluded to a couple there but are there any others that workplaces should be aware of or maybe their workers are doing, and they don't realise that it may be an issue to the hardhat? What should they be aware of?

(G) Well, do not modify or adjust or do anything let's say untoward, so no drilling of holes, no added extras onto the helmet in terms of extra gear that may affect the performance of the helmet. Those certainly come into play. We see some funny looking helmets in the real world. Keep it clean, so if it's getting covered in junk and rubbish for whatever reason, wash it down. Usually just warm water and detergent, normal detergent is enough to get the helmet back to a reasonable condition. Don't use abrasive or anything rough on the surface. Again, that will eventually degrade it and you'll have to replace it. So, pay attention to that.

(R) Solvent sprays I guess would be a no-no.

(G) No solvent sprays. We've already talked that solvents are bad, so spraying it deliberately with solvent is not a good thing. So, all of these things can come into play. UV exposure; we've all probably heard the story of the helmet on the parcel shelf of the car. The engineer gets his helmet, puts it out in the back of his car on the back shelf. It's getting bombarded with sunlight and UV for 12 hours a day, whatever, and that helmet will degrade very quickly in that scenario compared to one that's kept in a cupboard, in the boot, out of the sunlight in the dark where the UV is not happening. And again, that's another degrading factor that can happen

out in the real world. The more you're outside in the sun, getting exposure to UV, the sooner that helmet will be degrading and again, replacement on a regular basis.

(R) Another no-no that I've seen on different workplaces using hardhats is wheel chocks. That's usually not a suitable use for a hardhat. People carrying items between the head harness, maybe a cigarette lighter or something like that, between the shell and the hardhat there. And were using it as a seat, sit down for smoko and they'll sit on it and spin it around and try and do some breakdancing type stuff. So, there's a couple of the no-nos I've seen and have to educate workplaces that if you're going to do those things, the confidence of that bit of PPE performing when it needs to perform and protect the workers is probably not going to be there or going to be substantially reduced.

(G) Yeah, absolutely and we all know this is part of the problem with PPE. People do strange things and different things. So, yeah, all of those things definitely are part of the considerations, let's say. Make sure your gear is used as it's meant to be used, is the bottom line.

(R) So, I've seen on my travels Terry where you'll have a hardhat and you'll have a visor attached and may have earmuffs. How does that whole combination work? I assume they've got to meet the standards of each of those particular hazard categories for that to be suitable and used in workplaces?

(G) Yes, that's correct, Mark. The combination is tested, so you need to test the helmet to the helmet Standard, the visor to the eye-face protection Standard, the earmuffs would be tested for attenuation on a helmet in the appropriate configuration. So, yes, in short, the whole thing has to fit together and provide the same level of protection as they would separately if you like, to give the worker that level needed to do the job.

(R) For many workplaces, that would be a comfort benefit to a worker rather than have to put a pair of safety glasses on, then put a hardhat over the top. If you can have that one bit of equipment that has all those factors, that would make a huge

impact on the workers being able to wear it for longer periods and having this one piece of equipment.

(G) Yeah, sure, and you're not scrambling around trying to find all the pieces and put it all together. It makes it easier. You can include even in that sense, respiratory protection. There are systems that will do all of those things together. So, again, it's the case of the local rules and the local use and the local applications, but it's definitely worth investigation to see if there's a combination out there that can do what you need for your workers to get the more comfortable, safer workplace.

(R) Bump caps; where do they fall into the system as far as Australian Standards? I know I've worn them in the past. How do they compare or how are they used compared to hardhats?

(G) Yeah, so bump caps will not pass the Australian Standard for Industrial Safety Helmets. So, they're not strong enough, tough enough. They don't have the same testing regime to go through. In fact, there's no bump cap standards, it's really not used in many workplaces. Most places with helmet requirements would not allow you to wear a bump cap, quite properly. Those places where it comes in handy, and if it's allowed, is where you've just got that slight chance of bumping your head, literally, on a low ceiling or a low structure or somewhere with limited movement where you might just bump your head or slide your head on a surface. It's really at that ... not trivial but not much higher than that level.

(R) It's not designed to take the impact of a dropping item, I know I've seen in some aeronautical type environments, underneath low wings and going underneath there. But there's no standard in Australia, but I think other countries do have bump cap standards.

(G) Yeah, there's an EN, European Standard for bump caps, so yeah, look, if your site or your workplace requires an industrial safety helmet, then no bump caps allowed. If you've got a site where head protection is for those issues we've talked

about, the heat or the falling objects or whatever is not required, but you do have an opportunity, unfortunately, to bump your head on low structures, whatever it might be, then that's fine. That provides you with that let's say basic level of protection just from a head knock, quite different from some high-speed object whacking on the top of your head from a great height. So, it's a question of scale, really.

(R) Well that is part 1 of my chat with Terry Gorman talking about head protection. Next week we will continue that is speaking about eye and face protection. But you can get in contact with the show by sending an email to scienceofsafetyanz@mmm.com. You can also contact us via that email if you need any help in your workplace, when it comes to the appropriate selection of hardhats, safety glasses, face shields, all of those together, 3M are certainly here to help.

You can also visit our website, 3m.com.au/sospodcast which has a transcript of the conversation that Terry and I have just had as well as other resources and links to this episode as well as all the ones we have previously recorded in the past.

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And as Dr Suess said, "Today you are you, that is truer than true. There is no one alive that is youer than you" Thanks for listening and have a safe day.