



## **02 How Industry 4.0 May Change The Mining and Resources Industry with Shane Summers TRANSCRIPTION**

**James:** Hello and welcome to Resourceful - Stories From The Site, proudly brought to you by Resources Unearthed. At Resources Unearthed we help executives, professionals and business owners in mining and resources to be successful both personally and professionally. We've created this podcast to help you in your employment or business and we'll be chatting to people who have a proven track record of success in the industry. Thanks for joining us.

I'm James Marshall from Resources Unearthed and welcome to today's episode of Resourceful. Today we're chatting with Shane Summers from FutureMine Solutions - a business focused on Industry 4.0 and the influence it will have on evolving mining and resources into a cleaner, more sustainable industry. Shane's message is clear: If you don't adapt to the new technology there's the potential to be left behind. He also emphasises the importance of recognising the limit to your knowledge and understanding when it's necessary to ask others for advice.

**Brett:** Hi my name is Brett Cribb - managing director and founder of Resources Unearthed and welcome to Resourceful - Stories From The Site. Today I'm joined by Shane Summers. Shane has a wealth of experience with technology and mining and has a keen interest in how it can be applied to the site. As a highly respected manager and executive I'm intrigued by what we can discover from Shane, especially surrounding the technology behind the Internet of Things and how this concept might be applied to your role. Today Shane and I'll explore some of his most memorable stories from the site. So wherever you are. Sit back, relax and enjoy this episode of Resourceful.

So welcome Shane. It's great to have you here with us today. To start with for the benefit of our listeners, can you give us a brief overview of your career.

**Shane:** I grew up in Rockhampton, Central Queensland. To fund my way through University I became an electrician - took on a trade. I did my apprenticeship during the day and University part-time and at night. Eventually graduated from both of those.

I worked for CAPELEC which was the Capricornia region electricity board at the time, now part of the Ergon statewide distribution company. I was the only single guy in the metering department and we looked after all of the high voltage metering and because I didn't have a young family, I got relegated to the West which meant everything from Blackwater to the Northern Territory border. One of the projects I was working on was commissioning metering for a new mine being built - The Gordonstone Mine near Emerald.



Over the course of a couple of weeks working with the mine engineers one of them mentioned, "Hey we're building a new mine. We're recruiting at the moment would you like to apply?"

That was 1991 and that was my entry into the mining industry and from there I've mainly followed coal - underground coal, but in the last five years or so I had a few forays into hard rock mining. So I joined Gordonstone initially as a tradesman.

I worked my way back up to an engineering position looking after the two long wall mining systems and got into automation of those at a time when automation was relatively immature in the coal mining industry and hampered somewhat by the need for intrinsically safe sensors that are a little unique and you can't borrow from other industries.

From there followed on the operator's side of coal mining until my family were school age and I was looking for an opportunity to go to a bigger city and I got an offer to join a company called DEUTSCHE Bergbau-Technik (DBT) a German mining equipment manufacturer which is now part of the Cat group. Over the last 30 odd years I've sort of bounced between the operating side and the supply side. On the supply side in both representing products from a technical and capital sales point of view, looked after large service centres - so repairs, overhauls, service engineers.

Now I found myself as a self-employed consultant servicing both sides of the mining industry. Generally helping them with introduction of new technologies to do a dirty job as cleanly, safely and as sustainably as possible. I guess like a lot of engineering people over the course of my career I've sort of drifted away from technology more into management, leadership, executives roles.

**Brett:** Can you tell us a bit more about how you progressed to where you are now and the skill sets that led you to that position?

**Shane:** I think one of the things that I have as an advantage is that those shifts from mining side to supply side and back again gives me a much greater awareness of commerciality than many engineers in the mining industry get. Having to prepare quotations for equipment with foreign exchange and warranty provisions and sort of things that a person who stays only in the mining environment may not be exposed to. Conversely in the mining environment, having to prepare budgets for maintenance, sustaining capital and the true cost of labor that you can only learn in a mining environment that a lot of suppliers don't necessarily understand. Shifting across that fence line has given me both a broad contact network of people internationally and also an awareness of both technical and commercial interactions.

**Brett:** That's certainly a varied history and there's a lot of young professionals out there in this industry or business owners that are always keen to learn. Can you tell us a bit about a difficult or interesting time in your career and what advice you might give your younger self?



**Shane:** Definitely something all through your career to keep in mind is it's... Mining is a relatively small industry in terms of the pond of people. The fish in the pond. Just as I've done myself - others do move around so you need to treat everybody with respect and give everybody a voice because the person who is reporting to you today could be somebody you're reporting to tomorrow. If you're selling or looking after equipment they may be your client and vice versa. Definitely respect of people and even if you're not a networking person by nature, be conscious of the indirect network that you create that can become quite broad.

**Brett:** Yes I can certainly relate to the story about treating people with dignity and things like that. I certainly recall one of my early bosses telling me that he'd been given a really rough time by someone and that someone came back to him about three years later and wanted a job from him. Pays to look after people and treat them with the same respect you'd choose to have.

**Shane:** That's right. I guess it's much like the industry that you're in now Brett - the mining game particularly the recruiting or the selling of equipment or the like is very much driven by referral, and individuals who are hard to get along with are generally pretty well known around the industry. That doesn't always help them move around.

**Brett:** We touched on this Internet of Things topic and technology. Can you tell us a little bit more about what you've found over time through your career in that area and maybe explore on that a bit further about what you're doing now and what you're seeing now in the industry?

**Shane:** Mining is notoriously risk averse when it comes to technology. A lot of companies line up to be second. They want to see it in use somewhere and proven. If you compare mining with manufacturing - now manufacturing is a long way ahead of us in terms of robotics, automation and the application what I'll talk about shortly - interoperability of machines.

So in broad industry they're pursuing what's called Industry 4, or the fourth industrial revolution. The first was steam power, the second industrial revolution was electricity and mass production assembly lines - The Model T. Henry Ford story...The third industrial revolution came through the 60s and 70s in the form of computerisation - having individual machines that have the capability to operate automatically. What we're now calling the fourth industrial revolution or Industrial 4.0 as it has been coined, is those automatically operating machines talking together using artificial intelligence and machine learning capability to do things much more efficiently and at a higher rate than humans could direct them to do. And in a way that's more synergistic than they can do using their own individual programs. The Internet of Things is one of the many technologies that is required to breathe life into Industry 4.0.



**Brett:** Out there on sites now what are some examples of things that you see that could be done, or are being done...What's going on out there now?

**Shane:** Yeah I guess maybe to help answer that I'll step back a little. Around a decade ago the CSIRO with coal industry funding had a project called the LASC project. Landmark automation was the game and they wanted to largely automate the long wall mining systems to get people away from the hazards of dust, fly rock, roof falls and the like. That involved automating individual machines, embedding in them inertial navigation because underground you can't rely on G.P.S. because you can't see the satellites. It took around a decade for that to be developed and accepted by the industry but it still only meant individual machines controlling themselves.

What we're now seeing is a transition from that to what's called tele-remote where people can operate the machines remotely, to now what we're calling autonomous operation. In coal, it's lagging because of these issues of intrinsically safe sensors in a methane explosive environment. On the surface Rio Tinto, BHP and the like are already hitting the headlines with their driverless trucks, driverless trains. In the hard rock environment there's many that have autonomously operated LHD's carrying material from the face to the stope but they haven't yet fully automated the whole thing in terms of drilling, blasting, loading and that's where Industry 4.0 may take those mines.

**Brett:** I recall when I was working at Mount Isa that people like Jock Cunningham and Tom Shyu were working on these tele-remote operations of our loaders and developed them quite well obviously over time.

**Shane:** Yes that's right. One of the nirvana pursuits in the hard rock game is to be able to detect the mineralogy of the ore at the pick face or at the face, so that you're really only extracting the high value or the rich ore instead having to take a lot of material and then process it on the surface after you've carried it out of the mine. The Internet of Things - the ability to have a sensor embedded either in the cutting pick, or the drill tip or some other medium that we perhaps even haven't considered yet is I guess part of unlocking that one little niche area of mineral extraction.

**Brett:** Shane before we started today you were talking to me about an example around this change in the industry and what's changing and we were talking about in the coal mines going from diesel operated equipment to electric operated equipment can you tell us a bit more about that?

**Shane:** Yeah look it's a really exciting part of the overall technology spread because it brings together a lot of these elements. Hard rock is leading because again they have the advantage of not working in an explosive atmosphere, but certainly it's where coal is headed as well. A few years ago now the World Health Organisation declared diesel particulate matter a carcinogen, so it is believed in some sectors of the industry that in a decade or two we'll look back at diesels in the same way we look back at asbestos. That a lot of people are going to have health effects because of the very high



concentration of diesel exhaust fumes in an underground mining environment. You know, you go through a city tunnel and you can smell the increase in exhaust fumes, underground you're literally working in the exhaust pipe of a lot of machines and your eyes water and a lot of health effects even now.

The technology that's going into normal battery cars - electric cars, is rippling its way into heavy machinery and there's a number of cutting edge companies that are repackaging that technology to suit mining vehicles. Whether it be personnel carriers, LHD's for moving equipment and ore, right up to the heavy lift vehicles that carry 80 tonne pieces of equipment into the mine and assemble it. All of these things need charging stations, they typically have live data streaming from them so mine infrastructure has to fundamentally change in the same way as we'll see surface infrastructure change when we go from petrol cars to electric cars.

An interesting aspect of this is even mine planning right from the fundamentals of building a mine will change. Back in the 40s, 50s, 60s - even hard rock mines were typically in levels that were relatively flat connected by the shaft. People up until the 60s were largely man pushing the skips or they were using ponies or relatively uncomplicated machinery, so mines were in flat levels connected by shafts or declines. When we could go to more powerful diesel vehicles all of a sudden the mines are now working at grade. When we go to battery electric there is going to have to be some amount of regress back to more shallow gradients or more gradual declines in the mine because you're going to sap your batteries of their stored energy more quickly particularly if you're carrying ore uphill and running down empty.

As well as the engineering aspects of the machinery and the infrastructure to support battery electric vehicles in a mine there's also some advice that miners may need in the mine planning aspect. One of which is you almost have to mine backwards. The ideal situation is you're running up dip empty, picking up your ore and running down dip to a loading point. That way the gravitational energy will recharge the battery on the way down. Not always possible unless you're mining a mountain.

**Brett:** That's right.

**Shane:** But there's some of these aspects that will change the fundamentals of mine planning. The other really interesting aspect of it is the heat load as well as the diesel fumes won't be present in the atmosphere so the mine ventilation system can be ratcheted back.

Mine ventilation and refrigeration is one of the highest energy consumers in a mine. We put a lot of kilowatt hours in the form of electricity to ventilate and cool mines at the moment. Take away the diesel vehicles, that can reduce. So we're doing again that dirty job of mining in a cleaner, more sustainable way.



**Brett:** It would certainly been an interesting concept, designing a mine where you take your initial bit of ore and take it down the mine, and then have to get it back out again. So that'll produce some interesting challenges.

**Shane:** That's right. Whether it be back to shafts and copey winders or conveyors or even if we don't go to that extreme, just to subtly shift the mine and ultimately putting more electrical infrastructure and more digital technology to interconnect these machines.

**Brett:** What areas around the digital technology do you see as an extra benefit or something that people can use now, or what sort of things do you think?

**Shane:** One of the areas that will bring some benefit is vehicle cueing. The LHD's or shuttle cars in a coal mine or whatever will be called to the loading point on demand. Whereas now - you particularly see it in open cuts - you'll have two or three trucks queued behind the shovel or the excavator. It sort of reflects back...

I've seen some studies on the causes of traffic jams. It's basically wave theory. There is a really interesting experiment. They had something like a dozen cars driving in a circle. Their only instruction was drive at fixed speed and a fixed distance from the car in front of you. But human error being what it is people's mind wanders. Before long, even though that was an endless loop, which in theory should go forever, there were traffic jams to the point where some cars were stopping and there were big gaps on the other side of the circle. People can do a lot of things that machines can't but repetitive type instructions they're lousy at because they've got a conscience, they've got a mind and they don't stick to the job at hand. Whereas the technology that's being developed or currently exists, can do those things and allow the people to go and do things that an active mind is better at.

**Brett:** What's your most memorable or funniest story from the site?

**Shane:** Yeah it's probably not memorable for all the right reasons. Not long after I went from being a tradesman to a staff member at the mine and of course this was the mid 90s; the CFMEU was at one of its strongest periods. The mine I was at had two long mining systems but only typically operated one at a time and I was commissioning the newly installed long wall system. The shearer on that long wall - the machine that cuts the coal, had at that stage a relatively modern automation system, in that it had speed control during the cutting and it would automatically change direction back and forward and move the ranging arms. However you had to manually set these tags on the face by driving the shearer to a point, pushing some buttons to say - here's a point where you change speed up or down. And I took some time to get a tradesman. Three or four days went by and they wouldn't



release a tradesman to do that task and I thought well, "Six months ago I used to do this job. Even though I'm staff, I still have those skills. I'm going to do that."

I was in the process of configuring the shearer by driving it, which staff weren't really allowed to do and some coal fell down and I had to start the cutter drum to brush the coal aside. Of course one of my ex-union colleagues who was still in CFMEU took umbrage to the fact that I was cutting coal. So anyway the boys went out - it was a Friday, I should've known better - 48 hours stoppage they had the weekend off.

**Brett:** Sounds familiar.

**Shane:** Yeah. So that was I guess a lesson that sometimes you have to work within the restrictions even if you think they are unfounded. The workplace has a mind of its own.

Ironically we had an American general manager who patted me on the back and said, "Well done son. We need more of that," but we had an Australian mine manager - the statutory manager who said, "That wasn't your job." I was scolded for that and I had a 48 hour suspension as well. So I got the weekend off.

**Brett:** How good was that. Well you had the weekend off so that's great. Not really the way you wanted to have it.

**Shane:** I guess that sort of meshes in with the conversation we've had, that even though that was at the stage of time or development, an automated machine was still quite cumbersome to configure it. Whereas now you can reconfigure the shearer on a long wall using what's called a state table where you set up all the parameters, download it by the fibre optic cable into the mine, Wi-Fi onto the shearer which can be cutting and it'll change its configuration and start changing its speeds, the position of the cutter drums and the extraction of the coal.

**Brett:** Shane the name of your new business is FutureMine Solutions. Can you tell us a bit about some of those future mine solutions that you see?

**Shane:** The Industry 4.0 technologies that we've talked about while they're creeping into mining their dominantly in surface mining - particularly the iron ore sector in Western Australia and other overseas markets and some of the hard rock mines particularly some of the underground gold mines and deeper mines.

Those technologies...A lot of mining companies, mining personnel and suppliers are struggling with what is required to introduce those. It starts from designing the mine as we've discussed, through to



how you specify equipment to ensure that it will be interoperable, that the machines will talk to each other through a common platform, common protocol. Then there's all the backbone infrastructure. You go to battery electric vehicles, you need charging stations and high voltage connections to those charging stations. So our business is around helping people with that transition. Helping companies whether they be the mine operator or the equipment supplier.

I guess I can harness my contact network as part of that. So just this week I was talking to a French equipment manufacturer looking to enter Australia and wanting to understand the technologies that are important to Australian miners. It can also mean working with the established German companies or the new start Chinese companies. China has such a huge mining industry that Australians sometimes are quite arrogant about Chinese technology. But you know we've got 20 odd long walls and they've got over a thousand just in the coal sector, let alone metals and others.

An example also is the Rio copper mine in in Mongolia. It's a huge mine, it employs 3000 people. The largest producer of underground copper in the world. There's a lot we can learn from our Asian neighbours. I guess our company is to act as a conduit for some of those transfers of information or just the integration of the existing technologies that may be at the mine but aren't being used efficiently or effectively.

**Brett:** To explore that a little bit more in terms of the Australian industry where do you see us in terms of the world?

**Shane:** We're leaders in in certain pockets that I guess appropriately, commercial competitiveness means sometimes that isn't shared, and you combine that with the technology phobia that exists in some quarters of the industry and you know there are some laggards in terms of adopting these technologies. I guess there's some bias around what we have is sort of working, so don't dare shake it up because we don't want to go backwards. Shareholders won't be happy, employees will feel threatened.

A recent example in the media is the use of high levels of automation in remote mines is seen to be impacting potentially the Indigenous community who once would have taken some of those jobs. So there's a lot of stakeholders here. Our business can't afford to address all of them. We largely focus on that technology integration and helping people specify, select, install and integrate the right technologies to move closer to the Industry 4.0 approach to mining.

**Brett:** I've certainly seen in my business career that if you don't adopt technology and move with it and try and improve it, then you're going to be left behind.



**Shane:** Yeah for sure and I guess an analogy would be if you weren't using modern database type accounting packages where you can dial into your clients and forecast money markets to help people make good financial decisions... It would be difficult if you read the Fin Review and told somebody what you read. It just wouldn't work.

**Brett:** Shane going back to your young self again, what are the things you'd say to some of our listeners about what you've experienced in the financial life if you like, and what sort of tips could you give them in that area?

**Shane:** Similar to the technology area - let your wisdom take over your ego. Know when to ask advice, know when you're at the limit of your knowledge or understanding of something, surround yourself with good people and find a mentor or two.

On the financial side specifically I think in retrospect I was just fortunate with timing, but at times I've made a lot of money in business and then lost a lot of money through investing that inappropriately, because I was following my nose but didn't have the complete picture. If I had of asked the right people who could have given me some good advice at the time, I might be in a bit better position today. The other aspect of that is if you're fortunate enough to have done well whether it be through your income or hard saving, is the value of insurance. I've definitely benefited from having good insurance advice just in the last couple of years myself.

**Brett:** It's certainly something that I found time and time again over time. Certainly good advice is going to assist you and certainly in my career as an young engineer, I benefited greatly from that using a financial adviser who happen to be my uncle at the time. That's a different story. It's finding the right people to assist you at the time and to make better decisions and you can then evaluate whether they're reasonable. But getting that advice to get some more information and educate yourself.

**Shane:** I think it's in Australian cultural thing that we all want to DIY. We can do everything ourselves. I think again, understanding your limitations.

**Brett:** I'd probably make a comment that having been an engineer myself for a long period of time that us as engineers we're very good at thinking that we can look after ourselves. I guess it's the way we're educated.

**Shane:** That's right.

**Brett:** Thanks so much for joining us today and for giving our listeners some insight into that technology in the mining and resources industry. For those listening if you'd like to speak to Shane



about future proofing the tech in your business, you're more than welcome to connect with Shane on LinkedIn and you'll see that information on our podcast series page. Thank you.

**Shane:** Thank you Brett.

**James:** Thanks for listening to this episode of Resourceful - Stories From The Site. We'll be back in a month with more tips and insight from our other industry leaders.

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