



WEBVTT – Equipment

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Raul Munoz: Welcome back to Mining in 10. I'm Raul Munoz at Marsh. And today we're talking about something that can bring a mine to a complete halt in a matter of minutes. Equipment breakdown. In this episode, we'll be exploring why maintenance isn't just an operational concern. It's a resilience imperative.

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Raul Munoz: And joining me today is Mark Tanaka, who is an expert and leads our national machinery and equipment team at Mars Risk. Welcome, Mark.

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Mark Tanaka: Thank you, Raul.

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Raul Munoz: So why don't we get started with this and let's set the scene on what we typically tend to see with equipment as an issue with this. So any misaligned component, any overloaded motor or circuit breaker.

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Raul Munoz: can trigger a production delay that can last months and sometimes even years.

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Raul Munoz: So let's dig in, no pun intended, and try to understand this a little bit better.

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Raul Munoz: So how would you describe Mark in the work that you do if you were to ask to describe the scale of equipment breakdown risk within mining today?

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Mark Tanaka: Well, thanks, Raul. As you know, I'm pretty passionate about the mining sector. It drives growth across every industry, so it's a big focal point, especially in avoiding those unplanned shutdowns.

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Mark Tanaka: Now, in terms of equipment breakdowns and risks, it's enormous. I think it's underappreciated outside of the engineering community. The process involves a lot of mineral extractions, a lot of high-intensity processing that go through a lot of stress, pressures, fluctuating loads, heavy frictions.

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Mark Tanaka: high temperatures across varying substances and materials.

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Mark Tanaka: All of this combines to really accelerate the wear and tear that the components and equipment feels and anticipates, especially given the predictive and condition-based monitoring programs out there. The equipment itself is very specialized.

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Mark Tanaka: It's very robust, but it's also susceptible to very severe damage if things really get out of hand. So when we're talking a ring gear failure on a grinding mill, which has long lead times, or the failure of a transformer, which could take that transformer out for a long period of time.

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Mark Tanaka: You simply can't afford to be unprepared. So having proper mitigation plans, strategies in place, that's really where the focal point should be.

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Raul Munoz: Yeah, and it's really interesting that we're talking about equipment, but there's a real human component and a talent dimension to it, isn't there? Finding, you know, qualified professionals, that understanding is becoming increasingly difficult, isn't it?

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Mark Tanaka: Absolutely. Labor shortage in mining, it's made us pretty hard. There's a lot of competing industries really taking the labor force out of there, which kind of carry across many industries. We're talking electricians, reliability engineers, NDT specialists, specialized mining engineers. These sites are very remote, hard to get to. It's hard to sometimes attract that talent that really wants to be off site in those areas, even on an operational side or contractor side.

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Mark Tanaka: So the combination of that high risk and limited workforce makes proactive maintenance culture more important than ever.

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Raul Munoz: Yeah, let's, I mean, it's, it's, it's interesting, but let's kind of maybe switch gears a little bit and, and talk about.

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Raul Munoz: maintenance, and specifically the maintenance framework. You know, from what the resilience guide talks about, it talks about two general foundational categories. Can you maybe walk us through and help us understand this a little bit better?

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Mark Tanaka: Of course. Of course. When we look at at risk, maintenance risk or maintenance programs, there's 2 kind of sides we look at, mechanical and electrical maintenance. On the mechanical side, we're dealing with rotating, pressurized, or integrity of equipment. We're looking at conveyors, mills, pumps, crushers.

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Mark Tanaka: And doing the regular tasks, like non-destructive examinations, vibration monitoring, alignment checks, lubrications, these all factor into it, and those are just a few of them.

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Mark Tanaka: The goal is here to catch these wearers before they break down, to really understand and get ahead of those losses. On the electrical side, similar. The systems are the lifebloods of the operations, and any incident can quickly turn into an unplanned shutdown. We started to focus on transformers, but we get down to motors, circuit breakers, batteries.

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Mark Tanaka: All of these extend across not just the equipment, but the overall electrical infrastructure. If any of these fails unexpectedly, you can lose an entire distribution line. It is imperative that the regular testing and inspections are carried out across mechanical and electrical systems.

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Raul Munoz: Yeah, it could be overwhelming to think about maintenance in the context of what some of these large operations do, but without getting into the specifics, not just yet anyway.

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Raul Munoz: Can we maybe understand a little bit some of the philosophies that you see some companies adopt? The resilience guy talks about three general.

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Raul Munoz: preventative, predictive and proactive. Can you maybe help us unpack what that actually means in the context of maintenance?

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Mark Tanaka: Of course. I mean, it really the different varying kind of philosophies we look at for maintenance. When you look at preventative, we're looking at a time-based approach. So we're following OEM guidelines, industry standards. We're doing the routine oil changes, filter replacements, structural inspections. It's the baseline. But there's limitations to what we're looking at there. We're not really looking into the future. We're looking at what's occurring in the moment.

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Mark Tanaka: And reactively, sometimes.

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Mark Tanaka: So when you go one level up, we're looking at that predictive maintenance, which goes a step further. It uses real-time data, vibration sensing, temperatures, profiling, oil analysis, thermographic scans. This really helps us detect some of the early warning signs before a failure occurs. Through these inspections and specialized analysis, it helps us identify the patterns that a human inspection might miss.

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Mark Tanaka: For example, if your gears are showing early signs of wear, we really want to know at the beginning. We don't want to know that day that it breaks down that we have a failure imminent.

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Mark Tanaka: When we take the next step above that, we're looking at a proactive maintenance or a condition-based monitoring maintenance.

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Mark Tanaka: Sometimes referred to as reliability centered maintenance. It's the most sophisticated level we're looking at. It doesn't just take the analysis from the day of. It looks at proactively looking at the trends that we see across the equipment we look at. We're looking at the health of the overall piece of equipment. We're looking at why did this actually occur and how does my operation.

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Mark Tanaka: really feed into that, those, those changing maintenance requirements and then, and the changing failure modes.

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Mark Tanaka: So it takes a little more of a detailed maintenance focus program with a very specialized reliability engineering team, but doesn't just apply to the equipment. It looks at the overall process and the overall system, like your entire production from material in to final product out.

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Raul Munoz: That sounds like you know the true North Star of what maintenance should be and we'll talk a little bit about later. I have a couple of questions on that but let's maybe talk a little bit more about some of our some of our clients favorite topic spares.

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Raul Munoz: this is an area where financial logic sometimes gets a little counterintuitive. Can you maybe help us understand, you know, that whole concept, and why is it... why is it counterintuitive sometimes?

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Mark Tanaka: Of course. To spare or not to spare, that's kind of the question that comes into place when we when we talk to our clients, and it's it's one of the focal points around around maintenance and mechanical breakdown that we we always wanna get around.

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Mark Tanaka: Operations never want to buy a \$2 million, \$3 million ring gear for a mill if they don't think it's ever going to fail. However, the question shouldn't be whether it's going to fail. It's what's the impact that's going to happen when it does fail. We're not looking at an everyday event. We're looking at a very bad day. The cost of this forced shutdown could be in the millions, could be in the hundreds of millions when we're talking of the gold prices where they're at now.

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Mark Tanaka: and where where we expect these kind of operations to move forward.

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Mark Tanaka: So when you look at the actual cost of having a \$2 million spare in your warehouse or a \$100 million loss that could potentially have been mitigated, it's kind of those discussions we want to have with our clients and the operational teams.

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Raul Munoz: Yeah, when you lay it that way, it's a no brainer, right? It's a simple answer or relatively simple answer to understand. So we've talked about the foundational philosophies around maintenance.

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Raul Munoz: You just talked about spares. The guide also talks about different strategies and how to strengthen equipment maintenance. Could you help us walk through those?

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Mark Tanaka: Sure, of course. I mean, there's many ways of looking at this. But when we look at it, we look at first understanding, understanding where we're positioned. So embracing a comprehensive risk-based approach from day one.

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Mark Tanaka: conducting a thorough analysis of what our critical equipment is, mapping out every component, understanding the financial impact of each of these failure modes, it's just a starting point. That's the first pillar of where we're looking at. It gives us a very big picture of where our exposures lie.

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Mark Tanaka: When we move up along that next step, the second pillar we're looking at is the health monitoring of the equipment. So what's the real-time information telling us? What are our sensors, our oil analysis, our vibration, our condition-based monitoring programs? What is it telling us about our piece of equipment and components there? So we gather data to anticipate these failures.

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Mark Tanaka: why they're happening, and getting ahead of them, preventively addressing those before a failure does occur.

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Mark Tanaka: When we look at the third level, it's how do we really get that data and how do we get not just the online vibration monitoring, but it's the non-destructive testing. It's core to this whole philosophy and strategy of maintenance. We need to understand what the human eye can't see and what we can use with the most up-to-date technologies like ultrasonic testing, magnetic particle testing, phased array techniques.

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Mark Tanaka: But to really look under the surface at a microscopic level to understand when these failures are imminently going to occur, and also predict them on a trending basis, or...

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Mark Tanaka: or a pre-analytics kind of basis to understand where we should be focusing more inspections or more mitigation plans to address what failures could occur. So NDT is a pillar of that, and it's one of the areas we should focus a lot on. It's invaluable, and we can't just see it with our physical eye.

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Mark Tanaka: But really, when you take all of that together, the final pillar of this is sparing.

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Mark Tanaka: It's how do we manage our critical spares?

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Mark Tanaka: It's not just understanding, oh, I can go buy a spare from an OEM or a supplier and it's going to be here in a couple months. That couple months, as we talked about earlier, is likely going to be in the hundreds of millions of dollars. So the fourth pillar and the fourth strategy of this is really managing our critical spares, understanding what we have, understanding what our limitations are, having workarounds, having rerouting of process lines. It's really understanding what we're going to do.

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Mark Tanaka: those when those failures occur and walking through all the steps to make sure that we're well positioned to eliminate that and have well-built contingency plans.

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Raul Munoz: Yeah, I mean what what you're describing is is really a journey, right? It's it's a step by step understanding and and and you know much like the old saying Rome wasn't built in a day. I'm sure that a lot of these programs take take time and a lot of work and a lot of effort to to get them to a point where you have a properly integrated machinery breakdown.

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Raul Munoz: Program.

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Raul Munoz: Can you maybe help us bring this to life with something like a real life example that you've been involved with?

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Mark Tanaka: Yeah, of course. I mean, we're all familiar that we know that the focus on operations is throughput and operations and production. So sometimes this comes as a secondary view. But when we look at this philosophy and the strategy, we put it into a risk-based business continuity plan. Over at Marsh, we look at a program called Machinery Breakdown Contingency Planning, where we do a deep dive into all the machinery items at that site.

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Mark Tanaka: This program helps our clients do a deep dive across not just the asset, but the components that make up that asset. So we're not talking of just the big ticket items like ring gears, transformers, motors. We're including all the components several steps down, including bearings, shafts, VFD, circuit breakers, all those ancillary equipments that really feed into the overall system.

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Mark Tanaka: So our process starts with understanding the components, like our first pillar. We understand the assets, understand the financial impact, and understand the operations. We take that information. We review it on an active and passive mitigation strategies. We understand what the spares they have, what workarounds they have, what redundancies they have.

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Mark Tanaka: But we speak at all the levels of their teams, so maintenance, operations, warehousing, finances.

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Mark Tanaka: We want to ensure that all levels of the operations are speaking the same language. And then through that next step of our review, we look at the maintenance plans and mitigation strategies that each of those divisions have put into place. All of this is summarized into a big overall operational impact assessment to say where our biggest bottlenecks, where our biggest loss is going to occur if we do have a failure in these areas. From all of this data, we tabulate all of this.

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Mark Tanaka: kind of pick out priorities, priority one, two, and threes, and understand where we should potentially put some more financial efforts into, or planning and maintenance strategies into reducing that. So all of this builds a big framework that our clients can use.

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Mark Tanaka: to first get ahead of their risks, but also address them in a financially sustainable way. So these are ever-evolving programs, but the key here is really consistency, is making sure that we're looking at things the same way from all levels of their operations.

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Raul Munoz: Yeah, you said that again. You were obviously one of the authors of the Resilience Guide, and that's how you closed the chapter. Could you maybe explain a little bit what you mean by that? Consistency is key?

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Mark Tanaka: I mean, consistency, it speaks for itself. So, I mean, all strategies are great, but if they're done in different ways or different lights, they're not going to be... they're not going to hold that same weight. So the idea is that we were consistent with these strategies, preventative routines, predictive analytics, NDT programs, a consistent sparing framework across the operations.

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Mark Tanaka: They all work to make our programs and our operations more rigorous, more healthy, and much more sustainable in the long run.

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Mark Tanaka: So the organizations that lose resilience are often not the ones with bad strategies. They're the ones that execute well for two years and then let standards slip. So the idea is to build a framework. So this is consistent across the operation and has longevity to make sure that operations continue to stay resilient and continue to stay profitable.

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Raul Munoz: Hmm, okay.

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Raul Munoz: Well, Mark, thank you very much for your very valuable perspective.

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Raul Munoz: guide, as we know, can be downloaded on marsh.com. Really appreciate your input today. We can read more on that in the guide.

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Raul Munoz: In our next episode, we'll discuss climate and sustainability risk, a threat that can be as devastating as operational and equipment hazards. So thank you for joining us and thank you again, Mark.

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Mark Tanaka: Thanks for having me, Raul. Appreci.

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