

- David Glanz: "Manufacturing's dead. Nothing's made in Australia anymore." It's a common refrain, but is it true? The car factories may have shut, and most clothing factories have gone too, but smart people are still doing great things at the cutting edge of technology.
- David Glanz: Hello, and welcome to this podcast, brought to you by the Australian Academy of Technology and Engineering. Today, we're talking to one of those smart operators, Dr. Erol Harvey. Erol is the founding CEO of an outfit called MiniFAB, in the Melbourne suburb of Scoresby. He's also just been awarded the Academy's prestigious Clunies Ross Award for Entrepreneur of the Year.
- David Glanz: MiniFAB's business is genuinely mini. It's about the application of microtechnology. I'm David Glanz, and let's talk about how small stuff can have a big impact.
- David Glanz: Erol, let's start at the beginning. What is microtechnology?
- Erol Harvey: Microtechnology is an engineering discipline, and it's, as it says, about making small things. It's also related to nanotechnology, which some people have heard about, too, Microtechnology tends to be about machining things, and making things smaller, more precise. Nanotechnology is often about growing things, what we call bottom up, so being precise, but from a construction point of view, as small atoms grow into bigger things and so on.
- Erol Harvey: Whereas in microtechnology, we often use conventional machining, but we push the limits of its precision and its resolution.
- David Glanz: So with nanotechnology, I wouldn't be able to see the machine, but with micro, presumably, if I squinted, I'll make it out.
- Erol Harvey: You can, although in the early days of micronanotechnology, there's a lot of fighting about where the boundary is from one to the other, and what number do you peg to that? It turned out not to be very useful, and in fact, the two merge and blur together.
- Erol Harvey: I think a better way to put it is, it's precision manufacturing, and it uses a whole bunch of techniques, like chemistry, biology, nanotechnologies, microtechnologies, precision engineering. The real secret is how you bring all that together, to create new kinds of products.
- David Glanz: Is MiniFAB and the work you've done is, is that, can we say at the forefront of this technology worldwide?
- Erol Harvey: Absolutely, so when we formed MiniFAB, and I was an academic at Swinburne University, at the time. We were doing research on microfabrication,

microengineering, microtechnology, and also how to incorporate biology into the mechanical devices that we were making. The reason for doing that is because, particularly medical diagnostics, are all about how you get the biological surface to work in a mechanical environment that somebody can handle, use, manipulate and so on. And that's what MiniFAB does.

Erol Harvey: We incorporate what are called biological assays into engineered devices, and turn them into new kinds of diagnostics.

David Glanz: I've seen that one of the things you produce is microfluidics. I assume that's the flow of liquids in a very small scale. Is that, am I right, in a common sense assumption?

Erol Harvey: Hmm. No, it is... it's must be a good name for it, and if it's easy to guess? Yeah, that is exactly what it is. So, a good example of a reason why you'd want to use a very small volume of fluid is, one of the diagnostics that we developed at MiniFAB measures teardrops. And we use the teardrop to come up with a diagnosis for a condition called dry eye, and obviously, there's not a lot of tear.

Erol Harvey: In fact, there's about 70 nanoliters is one teardrop, and using such a tiny volume, we have to do all the manipulation of that in a microfluidic device, and then do the measurements that can lead to a diagnosis.

David Glanz: So how would you apply a microfluidic advice to a teardrop, or the absence of a teardrop?

Erol Harvey: Yeah, that's the design tricks, and there's... the basic machining processes are things like injection molding, but a very precise level. We have tolerances in the device, which are in the hundreds of nanometers. The channels themselves are the width of a hare, so around 100 microns. But some of the tricks are the nanotechnologies of the surfaces, so that when you bring this device to the bottom of your eyelid, and just gently touch the bottom of the eyelid, that the surface properties of the materials draw the tear fluid into the device.

Erol Harvey: So there's no pumps or sucking devices, no syringes or anything like that. We use the material properties themselves to suck the teardrop up, and within a few seconds, you can take it away from the eyelid, and the rest of the test carries it on by itself.

David Glanz: Remarkable. I mentioned a couple of minutes ago that what most people see as manufacturing, so, bashing metal, bending metal, making fabric, and so on, has been in sharp decline. Perhaps not quite as bad as people think, but there's that common perception. If you were walking me around MiniFAB today, what would I see? I take it it's a completely different kind of manufacturing environment.

Erol Harvey: So we're in clean rooms, which are temperature-controlled. We have to gown up to get into there, not because we're protecting the workers, we're protecting the work pieces. Workers are probably dirty things, and we can't allow them to muck up our beautiful engineering.

Erol Harvey: Yeah, it's a different environment, but some of the tools which are in there are conventional tools. You would see, for example, a milling machine, which, many people would understand milling from years and years ago. We can use little bits, which are small enough to mill multiple holes through hairs. That's the kind of level of precision that microtechnologies are working at now.

David Glanz: That is awe inspiring stuff, and I should say to the listeners, neither of us have many hairs to be drilled, so... yes, if only. MiniFAB's been a big exporting success. What does it take to break into an export market?

Erol Harvey: We started MiniFAB as an export business, right at the get go. The sort of business we're in is extremely specialized, and it was clear that there was never a big enough market in Australia alone. And this is one of the advantages of having been an academic. Good research is also international, and excellent academics benefit from this wonderful network of international colleagues. So it wasn't hard to start attending the right shows, get into the right conversations overseas, hearing businesses overseas, which needed our kind of services.

Erol Harvey: And so, yeah, it was export-oriented, right from the get go. I guess that's something that I would point out to any startup in Australia is, you should go international, as soon as you can. Don't try and become a success in Australia, and then think about perhaps going overseas. It's not until you test your business structure, your business offering, in the white heat of international competition, that you truly know whether you've got something unique. And I think the sooner you do that, the more likely you are to come up with a success model.

David Glanz: Now, you've been an academic. As you mentioned, you were a professor at Swinburne University. You're currently working on projects with the Bionic Institute, which is part of the University of Melbourne. And, of course, you've been a highly successful entrepreneur and business person. So you've seen both sides. People often say that there is a tension, although, report a tension between academia and industry. You've had a foot in both camps. What advice would you give to either an academic or an industry person, thinking of collaborating around sophisticated research and manufacturing?

Erol Harvey: It's a lot of fun. Go for it is the main thing, and don't hold back. No, you're right. It's sometimes called the black space between academia and research used to be, something that not a lot of people were working in. I think that's changing. So I think we're starting to see more and more academics with a fairly

sophisticated view of how to work with industry. I think we often find industry with not a very sophisticated view of how to work with academia.

Erol Harvey: And so, there's an education process that's needed on both sides. You mentioned that the Bionics Institute was spun out from the University of Melbourne, and I think the institute's a really interesting model, because it is an independent institute, where you will find researchers here doing state of the art research publishing in topnotch journals. But simultaneously, there'll be clinicians here. We're right next to a hospital, and you'll have patients coming through the Institute, and that really focuses the minds of the researchers, when you can see the patients that you're working with, the clinicians you're working with the patients in your labs.

Erol Harvey: And I think, one of the things that we should encourage more in engineering research and science research is that sort of perforation of the boundaries. It'd be lovely to see more industry inside the labs of researchers, and the other way around, more researchers in the labs of industry.

David Glanz: What advice would you give to somebody with, they think, a great idea, whether it's come out of their academic research, or just popped into their head while they're in the bath one day? What's the first step you take to be an entrepreneur?

Erol Harvey: You want to, you have to want to commercialize. And why would you commercialize? Because it's the best way to turn your idea into something that'll have impact. There are other ways to get your idea into practical use, but in a commercial setting is probably easier than many of the others. These days, there are lots and lots of incubators around in Australia. There's lots of mentors around. There are competitions for people to put together business plans, to meet other people who maybe add the skill sets that they haven't got.

Erol Harvey: The best thing to do would be to start to get connected with some of those incubators. Some people say it's the start-up scene. Apparently it's a scene now, so that means that it's something tangible. But it's, look, it's a really exciting time, and so, there should be a lot of opportunities to find the kinds of help that you need to get an entrepreneurial process going.

David Glanz: I believe you've helped set up one of those incubators, in a sense, spun out of them the MiniFAB operation. Is that correct?

Erol Harvey: Yes. We started the STC, the Small Technology Cluster, a long time ago, 12 years ago or something. Partly because the building that MiniFAB was in had a lot of space, that we didn't need at the time, and it was great to encourage other start-ups to come and join us. Most of what STC has done has now spun out to an incubator called The Actuator, which is really exciting. Buzz Palmer is leading

that. He was the CEO of STC, and there's some venture capital funding behind The Actuator.

Erol Harvey: They have MedTech's got talent, which is a competition for medical entrepreneurs. There's courses and boot camps they run, and it's a really exciting environment. It's a great time to think about starting to become entrepreneurial in this area.

David Glanz: Lastly, you're a, I hope, a very proud fellow at the Australian Academy of Technology and Engineering. What did winning the Clunies Ross Award mean to you?

Erol Harvey: The cohort of previous winners of the Clunies Ross Award are absolutely amazing people, and I guess I'm always blown at the depth of talent, and some of the fellows in Australia, and what they've been able to achieve. I never thought I'd be one of them. I'm immensely proud to have been recognized as one, and a little humbled, as well, because there are some stellar people in the Clunies Ross Award portfolio.

David Glanz: Tremendous. Well, thank you, Erol, very much for your time, and for sharing your thoughts with us.

Erol Harvey: A great pleasure.