



Achieving more through automation: Episode 9

Asif [00:00:00] Welcome to The Art of the Impossible, a podcast for the design and manufacturing industry that explores how you can leverage technology processes and people to make the impossible possible. I'm Asif Moghal, senior industry manager at Autodesk, and each week I'll be joined by two experts from the design and manufacturing world to discuss their perspectives on the challenges our industry faces and share what they're doing to overcome them. From smart products, mass customization, digitization, supply chain resilience and the convergence of once diverse industries. This podcast is for anyone that runs the design and manufacturing business who's interested in making things possible. You can subscribe by following us on Apple, Spotify or via your favorite platform.

Asif [00:00:54] Welcome to the podcast. Now, if you mentioned the word automation to a manufacturing business, you'll almost certainly end up having a conversation about industrial robots, productivity and how certain economies seem to be way ahead of the investment curve in those arenas. What you also have is a conversation about the comparatively high costs of automation for an SME and the ever present concerns about jobs. But whatever your view is, I think automation has a key role to play in the digital transformation of our industry. But our adoption globally perhaps isn't where it needs to be. So, are we taking too narrow a view on the topic of automation? And how can we overcome some of the concerns and even possible myths that are associated with it? So to help us explore this topic, I'm delighted to welcome Jocelyn Cole, Goods Lift General Manager for Penny Hydraulics and Dr Simon Leigh, Head of the Digital and Materials Technology Laboratory at the University of Warwick. Welcome to you both.

Jocelyn [00:01:58] Hello.

Simon [00:01:58] Good morning.

Asif [00:01:59] So, Joss, perhaps you could start off by telling us a little bit about Penny Hydraulics and kind of what did you do in your role?

Jocelyn [00:02:05] Yeah, absolutely. So Penny Hydraulics - we're an SME we were founded in 1978 and we predominantly manufacture lifting equipment in various sectors, so vehicle mounted equipment. The area that I look after is [00:02:26] inaudible [0.0s] lifts in buildings and we also develop all based on manual handling but across the nuclear sector as well. So, we are a family owned company by the Penny's. So it was originally established by John Penny Senior. And we have a very good ethos of going into different sectors when things get tough. So it was originally a mining manufacturing and refurbishment of mining equipment. And when John Penny Senior saw different areas and different developments into the [00:03:06] inaudible [0.0s] sector, getting equipment that we just reengineered for the mines, then getting them onto the vehicles. So he saw that as an opportunity and developed a range of cranes and things like that have really developed organically. So it's a company that always say yes to opportunities when they spot them. So a lot of our products have come from spotting what somebody is doing as a problem, and we do it as one solution and then roll into a product so they Goods Lift that I manage, that was just from getting beer

barrels in and out of a cellar that rolled into this full product range that's now sort of a multimillion turnover department within our business. So it's, we're always looking for opportunities and working alongside universities, Autodesk. We really like to get involved in what's moving forward.

Asif [00:04:11] Thanks Joss, welcome. Simon, could you tell us a little bit about your work within Warwick, please?

Simon [00:04:17] Yes, I have a few different roles at Warwick, the main one being that I teach engineering design so, it's a core first year topic, but also then into things like third and fourth year students doing M.Eng. Projects. We're a general school of engineering. So in the first year and a half, all the students get a general engineering education, which means they get taught mechanical civil electronic systems so they get that kind of broad understanding of engineering as a topic. I also do research, so the Digital Materials Technology Laboratories is my research lab, where we do research across kind of the digital to manufacturing boundary, so developing new kind of simulation and design processes, but also taking that then into the realm of manufacturing. So in things like [00:05:04] inaudible [0.0s] manufacturing and then developing new materials for that to really take in the whole manufacturing thing as a whole piece. And then finally, I head up our engineering build space, which is a large, I guess, creative maker space in the department. So we've got everything from hand tools all the way through to 5 Axis CNC, water jet and large 3D printers and all the students can come in and get their hands on, and kind of build those skills across kind of the manual to a digital manufacturing processes.

Asif [00:05:31] Thank you. So welcome to you both. Now let's get stuck in straight away. So, Simon, I'm going to stay with you. Now, if I were to have a go at defining this term automation, and that's the topic of today, I would kind of say it's that it's like the science of performing a task with little or no human intervention. And that really feels like such a boring, demotivating definition. And it also feels like we're laser focusing on applying that definition to the production environment. So from your point of view, in your perspective and all the work that you do, do you have a kind of a broader and hopefully more motivating definition of that term that you could share?

Simon [00:06:11] Yeah, yes. I mean, as you say, that's the main definition is to kind of taking the human out of the piece, which is somewhat demoralizing, as you say. We shouldn't cut down to take that automation for automation sake viewpoint. But as you say, it can be much broader than just kind of the production environment. There are the workflows in terms of things like design that you can automate as well and actually take in automation as something you work alongside rather than replaces a human and actually augment to what you can do and kind of elevate to what you can do. I think that's a really important bit to focus on that it's not just this make things kind of better and faster. Actually, there's a there's a kind of step back we can take even more broadly.

Asif [00:06:51] So a much broader view than just production. And what I what I really liked about your definition there was we're bringing human beings back into the arena here, suggesting that automation can actually augment the way a human being might might do

their role, not replace them. So I feel a lot more motivated by that. So thank you. And so Joss, from the work you do, do you have any kind of examples of how you've applied that sort of automation and maybe to your specific job, your role with the company, where it's the automation and humans working kind of almost as a team?

Jocelyn [00:07:26] Yes, absolutely. So the main focus where we've introduced automation within our process is in the design automation, like Simon just alluded to. So when I first started at Penny Hydraulics, I was modeling off every individual lift of a customer's requirements essentially from scratch because we make all of the equipment bespoke, we had a very one - each individual project was a new project and we approached it as such every single time so every order I would put my design hat on and say, "Oh, how am I going to make this today?" And I'd design it from scratch. But that was very long-winded and not a very economical way to do it. It could take a long time to get quotes to customers and especially the manufacturing drawings could take days, if not weeks at a time. And it meant that on the shop floor they would get a different approach to how we would make something every single time. So I looked into how we could use design automation to improve that process. And through a tool within Autodesk, so using the iLogic, which was not very well known now. I know it's a lot more prevalent - we come across a lot more now but going back five years, it was not very prevalent in the workplace. But essentially using parameter-driven modeling, I could create the same model and produce quote drawings, manufacturing drawings in literally a tenth of the time that it was originally taking me with a much more standardized approach. And taking out the repetitive nature of my job made it much more interesting for me as well, because I can focus on being an engineer again rather than a draftsman redrawing the same thing over and over again. So for the company, turnover went up, productivity went up and we were exceeding customers' expectations. But also from myself, I wasn't worried about replacing my role. It actually made it a lot more interesting.

Asif [00:09:38] So it's a really great example, Joss. And what I like about your example is we haven't mentioned a robot yet. And so the sense I'm getting from you both is that automation is broader and we've stumbled upon this kind of aspect of it, design automation, and you're talking about taking the repetitive things that you used to do and automating them. So, you know, in your words, you could focus on being an engineer. And that's that's where the value you can add is. So Simon, I mean, you must in your work at Warwick, you must see other examples of this happening - any kind of specific examples of this type of design automation that you could that you're able to share?

Simon [00:10:17] Yeah, if I just pick up as well on that kind of statement around focus on being an engineer again. I think that's quite an important thing to to pause on. And actually, we could talk about all this design automation and certainly things optimize our designs. But what we don't really focus on is the fact that a lot of people don't really know how to define their problems that they've got. And actually this rebalances the focus onto them to really drill down and know what your problem is to be able to generate that kind of automated design. So if you're setting up some form of [00:10:48] topology [0.0s] optimization or design. You really need to fully understand all of the scenarios, your product, your components are going to have to exist in or in that in its context. So actually, you can't just

design for the load it's got to undergo, you need to [00:11:04]win [0.0s] optimization for maybe the assembly process or when you're trying to fix it, or when you're trying to repair it. So it really pushes our focus back on to be able to fully understand and define your problem. So actually taking it, you'd be able to devote the time to that rather than actually devote time to the kind of the monotonous, repetitive stuff, so as Jocelyn said. We see lots of examples of our students doing that. So with automation design, obviously generative design comes into that with how students design things like autonomous vehicles based upon generative design and design in the whole chassis using that. So we do quite a lot of that across all the years, in fact. We get even our first year students these days touching on generative design topology optimization to really start bringing that automatization, start bringing that automation into their thinking and their kind of their skills really early on in the process.

Asif [00:12:00] Great example. Thank you. So, Joss, I think we've touched on how the term automation is much bigger than just production, and I'm really pleased about that personally. You both seem to have this this kind of broad perspective already. And Simon, from what you were saying, your students seem to have naturally come to you and have that sort of broad perspective developed through the curriculum that you offer. But if you think about the kind of leadership in SMEs, Joss, this is a question for you. Do you think enough leaders are taking this broader definition of automation and therefore are able to apply it to the business? Or do you think that people are you were saying, you mentioned the word and it's robots and sort of automated machine tools - what's your view on the perception of leadership out there?

Jocelyn [00:12:45] I would say I think we're probably in a very unique position that I work at - our directive board are very keen to get involved in anything along these lines. We can test out different theories, we can propose moving forward in different processes. But that's not the way sort of my colleagues in other industry, in other companies, they don't get that same feeling. And I - like you say - I think there is a bit of a barrier in the leadership where it's not seen as putting the time and effort into the project to get it going to get the automation is sometimes knocked back because it might take out day to day work at the time and not seeing that long game of how it will impact going forward. So I think there is definitely some work needed to promote how brilliant it is once it's up and running. As an example, when I first approached our board saying we needed to put some something together to improve the way I worked, they I'd spoken to our Autodesk provider and got some information on this. And I put a business case forwards about either they could provide us with a solution or we could learn how to do this ourselves. And our board were really supportive that actually we'll get- we want the knowledge in-house. When I've spoken to other people, they've said that that's not been the case when they've proposed similar things to their boards. They've either said, right well we will afford that much to buy that singular project in. But what are you missing when you do it that way is that in-house knowledge and being able to apply that in so many different areas. We've got that in-house knowledge from wanting to improve one design process and now we use that in all fractions across the business and it can be anything from - we took it from just wanting to design, to automate the drawings to now it automates the cutting list, the drilling list, we send the information to suppliers. And I know it's all coming from essential information from the

model rather than anybody typing things out again. That wouldn't have happened had we not learned that process in-house if we'd have outsourced it. And I think you need to be able to see a much broader spectrum of things that can happen out of getting that knowledge in-house.

Asif [00:15:19] So thanks Joss. So, Simon, what Joss is talking about, there is this really kind of broad, holistic definition of the term automation and perhaps even an understanding of the potential business impact beyond, you know, like a piece of capital equipment you need to buy. Do you think that's one of the reasons why the industry isn't really adopting automation faster?

Simon [00:15:40] Yeah, I guess it's a difficult tightrope to walk, isn't it? Because as an SME, you're always going to focus on - you need to get products out the door, you need to get products out the door quicker or reduce cost kind of to be able to take that step, take that step back and try to look across your whole business and look at how you can bring it in much more broadly is sometimes difficult. We have to acknowledge that. That when you're when you're kind of you've got that motivation to get out the door, sometimes you don't have the luxury of taking that step back and see where you can maybe bring automation much earlier on in your kind of your process or your value chain.

Jocelyn [00:16:16] Absolutely, Simon. And I think using the information in other areas of the business. But when you're trying to put your case together for the finances of that, it's also saying where we've made errors that actually would have been eradicated had this process not been having to be retyped several times or passed between different departments and not being able to utilize the same information. It's hard sometimes to say actually it's cost us X amount of pounds, but they're all the knock on effects of having the right information at the right time, which automation can provide.

Asif [00:16:55] Yes, thank you Joss. I'm picking up on what you've just said there. Could you give us some example, because it sounds like the management at Penny Hydraulics is in that category of quite broad thinking and kind of sort of has a vision, has a direction, and it wants to bring the whole company along with them. I can imagine that people listening to this podcast work at almost the opposite end of the scale, many of them might do. And they're probably thinking, oh, God, that's never going to work for my organization. Could you give us maybe one example of a challenge that you had as you went through that process with your board-

Jocelyn [00:17:29] In terms of getting a decision past them, do you mean?

Asif [00:17:32] Yes. Yeah. So in terms of you took it, you took a concept of, hey, we want to do X, we want to introduce automation to the business. And you must have had to present and pitch that to the board. I'm assuming it wasn't a complete walk in the park. I'm assuming there were some challenges. Can you give us an example of what are the objections or challenges that might have been raised and how you dealt with that?

Jocelyn [00:17:53] Probably the only point that it came to a bit of a crunch was where it had taken so much longer than we had expected it to. And it got to a point where we had to just deliver it at the stage that it was, which was probably 80 percent where it is. But that's quite common for a project to be - you get 80 percent there and if you've achieved - the 80:20 rule - if you've achieved 80 percent of what you wanted it to do, it's there and you have to deliver it at that point. But genuinely, well, it really wasn't a point at which I had to convince them into this. There were other things we were looking into, such as wanting to use 3D scanners to help with our site surveying or how we can improve, how we can introduce automation, if you like, but how we can improve those processes where we've got salesmen trying to do a survey and not getting the thorough information. So, there were other projects that have possibly been slightly harder to get across the line but definitely with this sort of thing, it's been just really supportive. That's not a very good answer, I appreciate, but that's genuinely how it's been.

Asif [00:19:05] it's a great answer. And I think what the golden nugget there is what you said about them getting to 80 percent. I'm just kind of wondering if maybe the natural tendency for organizations when they put a project forward is to expect to deliver 100 percent of the results really quickly. And if you don't get to 100 percent, not to forget that actually you've got to 80. And that sounds probably good enough to deliver the results. I think the answer was absolutely fantastic. So Simon, the age-old concern that people have around automation is going to take away jobs - a two part question; what's your view on that? And how have you personally worked with people to sort of help them understand that that's not the case?

Simon [00:19:49] Yeah I mean, it's difficult with the whole automation taking away jobs. I think we have to be honest to some degree and say it will remove some jobs. And that's I mean, that's going to be natural. We can't say that it's not going to happen because it will happen. I think there is a responsibility on us as a sector across manufacturing and on a more broadly is to acknowledge that and to say that if we do bring in automation, then we need to think about what the impact of that is as well. So I guess you can take that kind of an example of things like Amazon and stuff wanting to do automation and take out the delivery driver out of the process. And that's fine if you want to reduce time. But what are you going to do about that person who's been displaced? It's a kind of it falls upon you as the person creating that technology, or the person deploying that technology to redeploy that person or to reskill them. And I think that's, of course, something we have to really say - it's kind of the unspoken rule or at least people come up with these automation technologies and go, well, clearly it'll maybe free up people to do more high level things. And it's like, OK, that's fine. But what are you doing - you have responsibility creating this technology - what are you doing to reskill those displaced people? And I think we have to have that honesty. And only when we can have the honesty can we move forward and really embrace the benefits of automation. I'm not sure I can answer your question, sorry, but-

Asif [00:21:15] No, no, I think it has. I'm getting a sense of, that there's a bit of a hard pill to swallow in terms of that there are certain jobs and maybe if we go back and look at the sort of definitions of automation that we came up with, is that that sense of I'm taking a kind of a non-value add task that a human being might have to do anywhere in the business, and it

just feels to me that automation is a way of accelerating the, you know, taking the non-value add work off human beings and allowing them to focus on value add and whether they're in engineering or any actually any part of the business. And so if we look at that definition of it, perhaps there's a sense of certain jobs are going to be impacted. But again, it comes down to leadership and management. It seems like the if the management has a plan - well, look, we're going to introduce automation and there's a technological part of it, but there seems to be a need to have a human being part of the automation plan as possible. What are we going to do with our resources that were kind of sat there polishing the turbine blades - how can we redeploy those human beings into something more more rewarding and more valuable? And I think if we did that, do you think, Joss, do you think some of the concerns around automation would sort of soften or lessen and we might drive adoption faster?

Jocelyn [00:22:28] Yes, absolutely. So it's always definitely from an SME, it's always about kind of a change management, if you if you like. So making sure the people whose role it is going to impact are embracing that technology or that change that you're trying to make because it's never going to work if you don't do that for starters. There will always be problems if you don't get everybody to embrace that change. And then we found where those non-value added tasks have been removed, that's just been very well received because it's not a whole role, it's taking a task out of a role that has freed them up some time to do a value-added task. That's a very sort of smaller end of the scale to where you are talking about your Amazon deliveries where you are going to remove an entire role from a company. Ours is smaller in scale to that. And actually, the automation has allowed us to increase the number of welders we need and the number of fabricators. And so that has improved us rather than taken away any roles because we've not changed the process in that sort of way that you've removed an entire function. I agree with Simon entirely. When that's the case, it is down to the companies, the roles that are making those decisions and putting those in place, that we have to look at the impact of that and how that is going to be redeployed. And that's a model as well as a model function that we have to do that and it will happen - we do need to do that.

Asif [00:24:10] Great response, actually. So we're going to go on to the next question I want to ask you, which is kind of like imagine that all of us now where we're totally - the both of you, not me - you're the driving seat; you can give one or two bits of advice to the entire design and manufacturing sector on what they can do to step up their level of automation without - with as little or low risk as possible. So, Simon, what would your top tip be to the leadership of the industry out there listening to this? If they're looking to explore automation, where should they start?

Simon [00:24:49] I think there's a couple of aspects to that. So, really start looking for the little wins because those little wins start all kind of building up and they start having this kind of this wave of change across your business. Also, consider the impact. Obviously, I work in education, [00:25:05] inaudible [0.0s] is bringing in some graduates, obviously, see what kind of - and give them the kind of free space to operate. Obviously, that you've got to kind of bring them into your business, but give a little bit of freedom to operate and see what they can do or what changes they can they can kind of help your business with.

Because certainly these days, if we're kind of graduating mechanical engineer, that mechanical engineer will have a knowledge of systems engineering, they can probably code. They're not kind of a mechanical engineer you would have seen 10, 15 years ago and kind of embracing those skills that they've got a little bit and kind of not just trying to pigeonhole them into an existing role. You'd be surprised at kind of the change and the ripples that can have - that effect they can have on your business. And I've seen it happen with some of the SMEs who work with some of the graduates with work where they've gone out to companies, and they've kind of completely changed the way that company operates or changed some of the markets they operate in as well.

Asif [00:26:02] OK, fantastic. And then, Joss, same same question to you. You have every single design or manufacturing leader in the world listening to you and they're saying, what's the one thing I could do to start? What advice would you give them?

Jocelyn [00:26:15] Well, that's going to echo pretty much what Simon's just said it was bringing in varying levels of expertise. Like Simon said, I am the mechanical engineer that graduated 15 plus years ago, so my education is nothing like what's coming in now. We have a range of students from placement years to KTP schemes graduates, and they bring with them so many different ideas and different techniques that they've learned. And the technology is rapidly changing. So working closely with universities and getting students in it is work. It is work to have a student in - I'm not going to deny that. But they bring a lot a lot of benefits. Working with universities because universities are always really open to working alongside businesses. So we're on the advisory panel with Sheffield Hallam. So you get a lot of information that way. So definitely bring in skills from different levels. I don't want to do myself a disservice and say you don't want your old engineers, but we bring our own expertise, but the new ones coming in. But also when you're tackling a project, it is just take those small steps, because when you learn the basics of automation, the design automation particularly, you realize how much of an impact that has across everything you design in every way you model from scratch. So, going and changing one of the models, even if you've designed it - if you've designed it with a thought process of naming it correctly, just changing it is so much simpler. And we've adopted those methodologies across the entire business, which will then just make things adaptable in the future. Even if you don't automate it now, it will be possible to automate it going forwards and we can spread that out into - we do it into sales, into the order processing - you can just get the rest of your business. Design is always, in my opinion, the the core of the business. And just being able to push that information out into the rest of the business quickly, succinctly and correctly - really important.

Asif [00:28:33] Great. And I actually lied - I've got a second part to the question I want to ask you both. What are the risks for, again, particularly SMEs, so Simon, I'll come to you for this. What are the risks of companies not embracing - again, I'm talking about this much broader definition of automation than just robots in production - what are the risks if companies don't embrace that level of automation? What what do you think might happen to them?

Simon [00:28:58] I guess the ultimate kind of doom and gloom outlook is they're going to get disrupted. If you've got companies who are embracing automation, actually, it makes

them much more agile to move into different markets, different sectors. Then they could potentially encroach on an SMEs business quite quickly without you kind of realizing it's happening, because actually if they're automating their design process, they might be able to apply that to something that you do in your business. So I think it's worth keeping an eye on that because it will make companies more agile. And that's a risk to some businesses.

Asif [00:29:32] I really love that word - agility. Great response, thank you. And Joss, same question to you. What you think would happen if people don't at least try to embrace some level of automation?

Jocelyn [00:29:44] The marketplaces are getting a lot tougher and customers are a lot more demanding in the time I've spent dealing with customers. Customers want information at the drop of a hat - that they want your lead times to come right down. So everything has to be quickly deliverable and it has to be the best price with far more reasoning than it used to be. So, being able to automate processes, being able to automate designed to give the customer the best information, then the best product, quick as possible - that's what customers demand, now. It isn't a want, it's a you have to do it.

Asif [00:30:28] And again, I really like that word demand because that honestly is the sense that we get in terms of those customers who kind of really know what they want and they - they don't just politely ask for it. They kind of really demand it. And I think that automation sounds like it's a way for the industry to respond to those demands with agility, as Simon said. So I've now got a slightly difficult job of trying to summarize and kind of put everything that I've heard you both say into a few golden nuggets. So, here's my go.

What we're hearing from what you said, Joss, is that the market is increasingly competitive and demanding. So people and customers in particular kind of know what they want when they kind of want it yesterday. And what they sort of saying is that they expect their suppliers to add greater value to them beyond just, you know, a good product. And there's only a fixed amount of time in the day for us human beings to respond. So perhaps automation is a way of removing some of the non-value add stuff that we have to do or had to do in our jobs and freeing up more time for us to be focused on the value add. Now, whether that's value added sales, value added design, value added production, or even value added managing and working with customers, all of it's a shift from non-value add to value add. I think that's what automation can do from what I've heard. That means it is broader than just buying robots in a factory. And so that's a motivating thing for me to hear. You can automate almost any non-value add task or process in a business beyond production. And maybe the way to start is Simon, as you said, why don't you just start small? You don't have to have this big bang - let's have a, let's remove every single human being from our business or cut out an entire process. But why don't we start small? And then picking up on what you said, Joss, perhaps just getting to an 80 percent solution is good enough. So take the small steps and to help you bring in this sort of fresh perspective that you've both talked about - one thing I'm a big fan of is these kind of students, fresh perspective, digitally native individuals who come in and kind of look at the business and say, hey, have you thought about X, Y and Z? It might help leadership step out of the automation is production sort of world they live in. And the net result is perhaps our



businesses and our industry become just much more agile and be able to respond to opportunities and challenges that we see. So, I hope I've kind of summarized everything that I heard you both say succinctly, and I hope as ever that anyone listening to this podcast has had at least one thought, one idea, one fresh perspective that you could apply to your daily business. So I'd like to really thank Jocelyn and Simon for being such fantastic guests. Thank you very much, both of you.

Jocelyn [00:33:12] Thank you.

Simon [00:33:13] Thank you. Thanks for the invite.

Asif [00:33:14] And we will look forward to speaking to you on our next podcast. But remember to subscribe to the podcast series for your favorite platform, and we'll speak to you very soon. So thanks very much.