Making manufacturing personal: Episode 7

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 Mogel, senior industry manager at Autodesk, and each week I'll be joined by two experts from the design manufacturing world to discuss their perspectives on the challenges our industry faces and share what they're doing to overcome. 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 [00:00:55] Hello again, welcome to the podcast. Now, Henry Ford is famously quoted for saying about the Model T that his customers could have their car in any color they want as long as it was black. And I think that's a really well known and often quoted comment. But maybe what's not so understood is kind of the why. And I think it's down to two a couple of reasons. First of all, for the Ford Motor Company to produce enough cars at a level of quality, they had to make some compromises. And so limiting the choice was definitely an option. And secondly, if it's OK to say this, there wasn't a lot of competition around. So I guess Ford Motor Company could get away with it because if people wanted their cars, they'd have to accept that compromise. Now, fast forward to today. The world is really different. We're seeing demand for personalized products are just going through the roof. We're seeing the number of companies that are ready to deliver these kind of levels of personalization also increasing. And in fact, a report by Deloitte last year suggests that one in five consumers are willing to pay a 20 percent premium for these personalized products. And nearly half of them are prepared to wait longer just to get that thing if it's tailored to their needs. Now, delivering that type of personalization can be a real challenge to the design and manufacturing industry, particularly the SME sector. But as we've heard from the Deloitte report, it's potentially a huge opportunity if we get it right. So to talk about how we can make manufacturing more personal, I'd like to welcome our two guests for today. First of all, Dr. Saeed Talibe, who's a senior lecturer at the Department of Architecture and 3D Design at the University of Huddersfield, and Raam Shanker, who's the founder of Equitus Engineering Ltd. So welcome to you both.

Dr Saeed [00:02:44] Thank you for inviting us.

Raam [00:02:46] Thank you, Asif.

Asif [00:02:48] So Raam, maybe we could just go help the listeners kind of understand what Equitus Engineering does. Could you tell us a little bit about yourself and the company?

Raam [00:02:56] Of course. Yeah. Hi. I am a chartered mechanical engineer by qualifications and Equitas Engineering Ltd. is the company I founded five years ago. The intention, the mission statement, if you will, for the company is to help people excel at what they do. And a vision for the company is a better engineered world. Now, keeping this in mind, the things that we do are we offer services with regards to product development, engineering services,

innovation delivery, sustainability and intelligent manufacturing solutions. These are all interrelated, but kind of different to each other. So that's the crux of what we do as a company.

Asif [00:03:36] Perfect. And Dr Saeed, could you tell us a little bit about your work at the department at the University of Huddersfield?

Dr Saeed [00:03:43] Hi, thank you Asif, for inviting me again. I am a senior lecturer in Construction Project Management at the University of Huddersfield at the moment and probably once this broadcast with the published I will be at the Birmingham University because I'm in the move to go there as again a senior lecturer there, I'll be working in construction, construction management. My research is around construction engineering and one of my research interests is mass customization and platform design. We establish a task force on mass customization platform design a year ago and we received a huge interest from the construction industry and we had more than 50 companies enrolled for the task force. And we have, you know, working on this topic for some time. And I look forward to our discussion with you and Raam.

Asif [00:04:42] Great. Well welcome both. Thank you so much for giving up your time to have this conversation with us. So let's kind of really just get into it. And Raam, I'd kind of like to start with you. We hear it all the time, certain buzzwords and phrases that are being bandied around the industry, and in the design and manufacturing sector mass customization is referenced a lot. From the work that you do with clients and customers, what is it that's driving that sort of shift in customer expectations? Why are we becoming so demanding?

Raam [00:05:12] Well, I'm going to start a little bit on a slightly philosophical note, Asif. We're all surrounded by social media today. You know, you've got Facebook, Twitter, Instagram, Pinterest, Snapchat, and who knows what will come up in the next ten minutes by the time we finish this interview. Now, as a consequence of this, we all want to belong. The sense of belonging has been a constant throughout humankind. We want to belong to our clusters, our groups, our tribes, whatever you call it. Now, as a paradox to this, we also want to stand out amongst the people with whom we want to belong. I'm part of a group, but how am I different in this group. Now that has manifested itself in everything that we use today to the point where I don't want my BMW to be a metallic icy white, I want it to be a Raam's wizard white. So this desire to belong and paradoxically, the desire to stand out is causing this mass customization to happen. And it's not, it is not a new thing. It's been going on. I mean, all of us being, living in Britain, we're not strangers to a kebab shop. You go to a kebab shop, Asif and I, you could both go to a kebab shop, both of us. And we could be having the same kebab with its own trimmings. Now, that is a nonfunctional mass customization, but you have the functional customization wherein the stalwarts? and mass customization. So you have a bunch of mass-produced components, all of which can be used in a way in which you want them to create a special product for your own self. Like the personalized laptop I'm using to talk to you today, or the car that's in my drive, that's sitting, it is a functional mass customization. So it's more to do with the human desire for us to have things exclusively made for us is what is driving this thing. And it's nothing new.

Asif [00:06:59] I'm really hoping that Raam's Wizard White is actually a real color that I'm going to have a look at my showroom. So, you know, a really strong sense of it's just human nature. This kind of need for wanting to feel like we're part of something, but maybe in a unique way that's very meaningful to us. And that's probably a clear indication of certainly what's driving this trend in the design and manufacturing sector. But Dr Saeed, it isn't just the manufacturing industry that seems to be bitten by the mass customization buzz. But I mean, you work in a complementary industry, sort of the architecture and the construction world. Can you give us some examples of how this is showing up in the world that you work in?

Dr Saeed [00:07:38] Yeah, thank you. First of all, it's very interesting that Raam, on this conversation, with all of this, particularly Raam from a manufacturing background. Look, I know that mass customization has been manufacturing since 80s, but in construction is slightly newer. We are talking about 20, 30 years. And, you know, it was very interesting that you mention about the T model of Henry Ford, because our argument in construction is that we shouldn't only look at T model, but we should also look at the value generation perspective. So we have a theory called TFV - Transformation Flow and Value. So we also think that how we can deliver the value to the customer, so in construction, there has been some programs around the world, particularly developing countries, about how we can provide social houses like houses with lower cost because of the housing shortage. Initially, most of those programs had used mass production ideas, which means repetition and standardization. To reduce the cost, obviously. But there was a problem there. There was a problem that the customers weren't happy. They weren't satisfied with that. Right. So there was a need to potentially that we could adopt mass customization from the industry that Raam is work in - manufacturing. So we tried to adopt those concepts and see how we can actually increase the value of housing by delivering products that fulfill specific requirements of different customers. And they are not only standard components. So mass customer mass customization as a strategy emerged in the construction industry. And, you know, we have been working on the idea of, of course, our idea is that reaching a large number of customers. Right. Like in mass production, but giving them an individual treatment like craft production. So now that's something that we are trying to do, and particularly we have been successful to implement that in offsite construction, which is very close to manufacturing to some extent.

Asif [00:10:11] And it's really interesting. You kind of mentioned the word value there, Dr Saeed. And it's kind of made me think that I guess many people's perceptions of mass customization is limited to the physical dimensions. You know, I can have a pair of jeans that fit me or have trainers fit me. I can have a phone that literally fits my hand, it seems to be. And then maybe the colors and it seems to be limited to the physical stuff that you could see. But I guess there's more ways, if mass customization is really about delivering - I wrote down - value in a personalized way to an individual, there must be more ways than just the physical aspects of it. I mean, you get to work with a lot of kind of smart products and helping companies develop products. What are some of the other ways that people are helping deliver value in a very personalized way, thinking of software and intelligent systems combined with products?

Raam [00:11:07] Yes thank you Asif. So, value, again. Value, the way I'm seeing it is not an absolute entity. It's based on the perception or the perceived importance of what something can do to alleviate a problem or help status quo and value is not driven or tied to a product itself, but to the solution a product can offer. Now take for example, backscratcher - if you have long hands, you don't need a backscratcher for the product as the backscratcher. The product is not giving you any value if you have long hands. So the value is in the solution provided, first of all. Secondly, when we look at things when, for example, at the moment I am holding a valve in my hands, which a lot of people cannot see right now, but this valve was developed by us in response to a call from a client in the Netherlands to help prevent death by choking. Now, no electronics - it's all pure fluid mechanics and based on whether the pressure in your lungs goes up or down, the valve will open one way or the other to let air in or out. The really intelligent bit inside the valve is a spring, a combination of springs which work on a certain value of the pressure in the human lungs. Now all I need to do to mass customize this is simply change the rate of the spring and the valve will work for a different pressure rate, which a different doctor may want in a different hospital. So this what I call is a functional mass customization. There's the esthetics one where you combine your white trainers with rainbow colored laces. But this is more of a functional mass customization way that by simply changing the springs inside of our valve I can make the model work for a different range of pressures on the human lungs. Similarly, all of us have computers. It's the same intel chip, it's the same RAM chips. It's the same set of hard drives. What I can pick a combination of an I7? with a 32 GB round on a one terabyte hard drive, which are all mass produced components. Bring them together, assemble them in a certain way, and then enhance its functionality by asking for a 64 bit operating system or Windows or Linux or whatever. So that, again, a functional mass customization in the software or in the computer industry. One more example. Airbus and Boeing must kind of mass manufacture their aircrafts, but they tailor the interiors of the aircrafts based on various customer requirements. That, again, is a mass customization, but it is not obvious to us. But that's, again, a mass customization carried out by Boeing and Airbus to cater to the various clients. And the functionality will also depend on what each customer wants to provide to their passengers, what airlines want to provide to their passengers for the various things happening in the mass customization world, in the field of manufacturing.

Asif [00:13:58] I think in my mind, building really kind of nice, almost like a Wikipedia definition, but a broader definition of mass customization, which seems to be about the combination of different aspects of a thing as Raam, as you said, the esthetic or the functional. There could be just physical materials. There could be software and systems, be this combination of different bits to deliver unique value, to solve a specific problem for more of an individual basis. And so it's hardly any wonder that people are going crazy for it. And I think if you can get it right, we are seeing some examples of companies that seem to be really in that spot and kind of maximizing their potential. So I'm just wondering if what examples have you got of companies that are really doing it well. So, Dr. Saeed, from the work that you do, who in the sort of architectural construction world do you think is really getting mass customization really right on the nail?

Dr Saeed [00:14:58] I think that the question that you ask was absolutely spot on - that mass customization is not about only physical configuration of different elements. It's more behind that, to my understanding. So initially when we adopted mass customization in construction, we were thinking that how we can increase our capabilities to produce a variety of products, variety of architectural drawings at low cost. But now our focus is broader and we emphasize our supply chain coordination and customer involvement in the process of designing, producing and delivering mass customized products and services. So it is really beyond that physical aspects and it is more leaning towards value perspective. So in terms of what exactly companies are doing, there are different level of proficiency and adoption of mass customization. Some of them are just at the beginning, for example, cosmetic level. But there are some more, some of them are more advanced. But I can see, for example, just give you an example. Some companies, construction companies, now have moved towards using choice menu design. Perhaps it is very common term in manufacturing, like when you want to order a car, like a new BMW or you have your different colors, you know I dunno, different engines, different things. We all said this is still an unexplored function in construction, but we are trying to use that, that actually choice menu. It is also known as InterAction system as you know, or configurator, which is used for guiding the user through the customization process. And we want to really reduce the burden of choices from customers' perspective because we don't want to provide the customer really with a huge number of options and choices because that can actually confuse the customer. We don't want to go through that route. We just want to give we want to see what how we can deliver the maximum value to the customer by having, for example, four types of living rooms or four types of bedrooms and then give them like a few choices. So I can see now, for example, in the UK and in Brazil and Sweden, there are very good companies are adopting that sort of stuff. You know, they have those websites and the other best practice that I can say is that there is a reason to launch an application called Seismic, which has been funded by Make UK. And its main purpose is that, okay, look, we have very common spaces in schools. So rather than designing everything from the beginning, let's use the solution space, which means that we give you a few options today to the designer about like spaces they'll be needing in school and then designer can easily adjust them next to each other based on some embedded rules in the application, such as the frequency that we need, the connections, the adjacency on all those rules. And that application has been being developed. We are also working with our partners on using machine learning about what sort of standard design we get for health care, for example, like hospitals. Do we have to design from the beginning? No, we can just, you know, see what are the common spaces, adjacencies, frequencies, and then the machine can actually do the variety design based on those standardized platforms that we give it, we give to the machine.

Asif [00:19:18] Again, it's really fascinating, the sort of the parallels between the two sectors. And we do often talk about the convergence of manufacturing and construction and lessons that can be learned from each, but the similar trends are impacting both industries. And whilst one might be slightly ahead of the you know, in terms of the maturity than the other, I think that's going to be moving towards this kind of one place of combining physical, operational and other characteristics of your solution. Not now, not even a product, your solution, understanding the value that solution delivers and then deciding

how you can deliver that value in more specific, meaningful ways. And so it feels like it needs a bit of a mindset shift in terms of our own thinking. And so Raam, coming back to you. I know you work with a lot of SMEs as part of the work at Equitus. How ready and willing or willing and able do you think our industry, particularly the SME, is to start thinking in this way? Or do you think we're still sort of pigeonholed in a physical mass customization or function?

Raam [00:20:25] Not only are they willing, Asif, some of them are actually doing it

Asif [00:20:30] Have you got some examples of people you could reference that you think are really doing it well?

Raam [00:20:35] There are people. I'm going to, I'm going to take the name of one company, which you may like actually. A lot of people I seen are using this technology called Generative Design, which is part of Fusion 60, which is a Autodesk product, which is taking the old concept of product design, bundling it all up and throwing it out of the window, and it's making the design more A.I.-driven. You know, we talk about digital, it's taking the design driven by A.I., driven by digital, but with real applications in a physical world. And I've seen companies who have adapted it adapted to this like fish to water. I mean, we've done some work with generative design and we're developing components for bicycle's and other sorts of transportation. And the key is the thing that people often need to remember is the whole mass customization revolves around the basic functionality and technical integrity of the product. Which brings us back to the other layers which everyone is talking about, the minimum viable product. More often than not viable being in the middle kind of gets the middle child treatment. People seem to forget the viable bit of people only focus on the minimum and the product. But viable is by far the most important bit. So you cannot do mass customization without having a product that meets the minimum requirements and that is viable to provide the solution that it tends to. And for example, everyone seeing that famous image of, you know, going from a scooter to a bicycle to motorcycle to car. That is not how you do a minimum viable product. A better way to do a minimum viable product is an economy seat, a premium economy, a business class, a first class seat, and then whatever adds on top of that, because at every stage of its development, the product has to be minimum, it has to be viable. As in, it must meet a minimum requirements in terms of functionality and integrity and all that. And it has to be viable, which means it has to gain acceptance in people. Otherwise, what's the point in creating a product? And then comes your mass customization around that which enhances the value of the perceived value of what you providing. It also makes sense, so far?

Asif [00:22:49] Yeah, yeah, totally. So this is sort of, kind of a.. Maybe this is the wrong word, but like a baseline that, you know, will tick all the boxes to a certain level. Then adding on top of that baseline was like baking a cake. You have the same base and then, you know, not that I'll be watching the Great British Bake Off or anything like that, but you can put different toppings on it, depending on the taste and the flavor of what your market needs. So it sounds like that might be quite a stretch for some organizations to really understand. But if there are people doing it, Dr Saeed, it surely can't be a really straightforward process. I mean, there must be some things that SMEs sort of struggle with

or find difficult as they start their journey to mass customization. What are some of the most common things that you find people struggle with when they try to adopt this way of working?

Dr Saeed [00:23:43] Last year in November, the government put a call that we want to use platform design. Sorry, two years ago, two years ago in November, 2018. And now we want to use platform design in construction, which means that, OK, if I'm using one component in hospital, in one hospital, I want to use to say I want to be able to use the same component in another hospital to, you know, to reduce the manufacturers, to reduce the procurement process, all those things, so the ambitions of the government was to reduce around 30 percent of construction costs. But as we can imagine, platform design, which is associated with the standardization, got a very negative feedback because like, again, we are going through the reputation standardization and we're going to get the same spaces. And that's not good from the client perspective and the customer perspective. So, then we said, OK, we can mix this platform design with mass customization so we can provide a variety of platforms to the end user to choose. But surprisingly, none of the Tier one contractors were willing to adopt this concept. So at the moment, there are some offsite companies working offsite construction that they are doing, you know, this concept of mass customization platform design. But there is some hesitancy to say that we are doing.

Asif [00:25:30] Why do you think there is that sort of reluctance or hesitancy? What do you think is behind that?

Dr Saeed [00:25:36] Because they think mass customization platform design, which means that we are moving towards standard designs and it means that there will be less work for them in future because the same thing can be done by the generative design, for example, the software. There is no need for architects, designers. We are using same products - there would be a need for less manufacturers, contractors, there would be less need for it. So the industry seems to think that if you move towards that route, it means less job in future.

Asif [00:26:16] So in a similar kind of argument that we hear a lot about automation and robots will take the jobs of human beings, which some people believe and some people think is not true. It sounds like it's a similar kind of concern about if we ought to make the production of these variations of products, then there'll be less actual work for human beings. Would you say that's true, Raam? I mean, we know so many examples. And the one that's always quoted is what desktop publishing did to the printing industry decimated the traditional market. But now that printing the DTP business is, you know, billions and billions and billions of dollars in a global industry. But do you think that the level of automation as applied to mass customization, will threaten jobs? Or will it create more opportunities that it destroys?

Raam [00:27:05] You didn't put me in the spotlight at all. Thank you, Asif. Right, I'm going to use a movie culture reference. Now, the problem that I see in the sector when we talk about the industry for the digitization is depending on whom you're talking to, the future is painted in a very dystopian manner. If you talk to the robotics people, it's Terminator. You know, robots are going to steal your jobs. If you talk to the people with AR and VR, it's a

combination of Inception and Matrix. You know, what's reality, what's not. And, you know, it's a dog's dinner. But the real heart of the matter is the way I look at it is digitization or the digital technologies is a natural evolution of the industry driven by technology, as was the previous three industrial revolutions. You know, we started with water and steam. Along came electricity. We quickly adapted electricity to deliver meals. And then came the CMC. And now we are basically banking on the power of data and what computers can do. And the common trait throughout the history of the Industrial Revolution has been taking the best of what technology can do at a given state of time. Combine it with what people are good at, which is, you know, intuition, instinct, a sense of ethics and moral responsibility and being decisive. And when you combine these two is when you get the maximum from any industrial revolution. Now, there is a difference between jobs going and job titles going. The way I see it, job titles will go, but the jobs will be different. People will still have jobs, but the job titles will go away. And which brings me back to the skills thing. You know, everyone's talking about skills and which is why I feel I also need to talk about skills in this forum, because it'll be an incomplete conversation, you know. The problem with skilled people, again, we're all focused on the technical on the job skills that we need. But that's going to change. I don't know. I don't know what skills I'll be needing in five years time. But I know one thing for certain. If we teach people resilience, critical thinking, problem solving, these what I call the life skills, then you enable and empower them to go out and find out what they will need in terms of on the job Hands-On skills, and they will train themselves and adapt themselves to the needs of the industry. So the focus for us has to be on resilience, critical thinking, problem solving and all these things that form the foundation or the bedrock for further skill development. That’s my take on the matter.

Asif [00:29:42] So there's a sense of our roles, the nature of our work, it will be disrupted, but this disruption through an evolution in terms of let's take the like a mechanical engineering student who has just graduated. Today, they come out with a sort of a certain set of knowledge and skills and expertise that they've been taught. But in the future, what they need to learn, they need to know, is going to evolve. And I think the same thing will probably apply to existing jobs that you might find across any sort of design or manufacturing company. Dr Saeed, what’s your view on that? Is it more of a disruption or an evolution or a - where do you think it lies on that spectrum?

Dr Saeed [00:30:22] Well, there is a huge focus at the moment in the construction industry on digitalization, automation, and it seems that the future is around that. So there's you know, there's no other choice than moving towards digitalization or just lose a job. Saying in academia is the same thing. Our research used to be, for example, on a theory or more conceptual frameworks, but nowadays is right, you know everything should be around digitalization. Otherwise, our research is not interesting and this is less likely where we get research funding. So it is very important. I do agree with Raam that the job title has changed enough for us. The fact is that we need to be focused on how we can get the ideas from manufacturing and get the ideas from, you know, how we can digitalized the processes in construction and put our cities and other threats that in a few years time there wouldn't be any need for civil engineer or court surveyor or project manager because, for example, electric engineers can replace us. So that's another like a theme school of thought and construction at the moment. That's how we can avoid that, how we can still say we need

those kids. Maybe this, again, related to resilience. As Raam said, I don't know this ongoing debate that how we can secure those, you know, feel like quantity surveyor, project manager in future. And we will then be replaced by people from manufacturing or people from other engineering departments.

Raam [00:32:22] Yeah, can I just add onto that, please if that's OK to what Saeed just said? You know, in the 70s and 80s, Barcelona, the football club, pioneered a concept called Total Football. Which meant any of the 10 outfield players could play anywhere on the pitch. Now, let's take that logic and apply it into our industries, both manufacturing and construction, which means we become rather than task driven, we become results driven, which means any person within the team or the organization can pick up a particular job and run with it with a reasonable proficiency. And what will happen as a consequence? Well, first of all, it'll require a massive shift in culture within the industries. And what will happen then? It will basically eliminate phrases like "that's not my job." That's how we do things. Once you get this shift in culture where any of the outfield players can pick up a job and run with it, and when you become results driven, you work within the framework of the company's mission, vision and values, that you still stay on the ethical side and the spirit of the law. But people will take it as a collective accountability to get the job done and move projects forward and deliver what they should be delivering rather than, you know, these are my tasks. This is what I do. But what will happen when we talk about changing job titles and job roles, but jobs remaining?

Asif [00:33:46] Do you come across organizations - this question to both of you, but do you come across organizations that you think they're just not going to make the shift or change of the mindset? Because it feels like the best place to start is make a mindset shift, make a commitment to do something and then start adapting some of these principles you've both been talking about. But do you come across organizations that you think they're not going to do it? And what's the future for those kind of organizations? Dr Saeed, let's start with you.

Dr Saeed [00:34:13] Well, it's been always difficult to change the culture. And that's one of the main issues that particularly we are facing in construction because there's too much resistance to more work to move towards new ideas like mass customization platform design, lean construction, and most recently, the industry construction industry has seen benefits of adopting new philosophies. And, you know, because it is hard to prove from the monetary perspective that, look, this is going to give your benefit, profit if you adopt those ideas. So there has been huge work on changing the industry's mindset, mindset towards new ideas, more novel ideas. And recently, there has been a good progress. We are moving towards those ideas. Particularly, there has been a very good collaboration with the construction industry and the academic academia. So we are doing a lot of research together and research projects, research projects that are more focused on the industry and delivering short benefits to the industry. And so there has been a good progress. But I would say that, as you said, culture change is a big barrier for any for any improvement. And that is why maybe construction this year, when you look, for example, for productivity in construction industry, it hasn't changed since 30 years ago.

Asif [00:35:54] And so the culture seems to be holding us back, certainly from what you're seeing in the construction industry. Raam, earlier on you were saying that you felt that the manufacturing sector is certainly more willing and actually doing this kind of stuff. But for those people that, you know, aren't embracing that change, what do you think the future for those kind of organizations is?

Raam [00:36:13] OK, I'm trying to find a nice way, pleasant way to put it across, but I'm struggling to do that. So apologies for my choice of words in advance. It's basically going to be Charles Darwin all over again. Adapt or perish, for lack of a better phrase, because it's a bit like, you know, the anecdote about frogs in boiling water, stick them in water and they're fine and you start hitting the water up. They think it's going to be kind of very fine until they're basically boiled to that. I'm afraid I'm really worried that it might happen to some companies who really do not see how this is going to happen. But then again, you can't simply point fingers at the industry and say you guys need to change. If you look at, for example, the construction industry or even some of the more security, onerous, highly regulated industries, they're all driven by regulation. They're all driven by standards and codes and all of that. And they have to comply with what it says on the standard or code. If not, the products will not gain acceptance. So it needs a collective effort from industry, the bodies and the government to come together and decide on a framework for future growth. So the bodies and the government can say, right, we are willing to be flexible to a certain extent with regard to standards and codes that govern your sector. In return, how are you going to show what you're going to adapt to the new ways of working? It requires collective dialog from the three parties to and of course, big companies like, for example, Autodesk and the Siemens and the Kuka Robotics of the world to to be enablers in this journey to make things happen.

Asif [00:37:51] And that brings me really nicely to sort of the last, big question I want to ask you really is - imagine I'm listening to this podcast and I'm thinking about starting my journey to mass customization. I've run a design and manufacturing business, I'm the MD, so I have total authority, control of the strategy and direction. So Raam what's the first thing you would advise me to do to get on the road to mass customization?

Raam [00:38:17] You need to know is why do you want to do it? There can be two motivations. Motivation number one; everyone's doing it, therefore we want to do it. Motivation number two; we genuinely see the value we can increase to the customers and we can also see that the value the customers bring to us, both of these things going up, therefore, we want to do it. So the first and foremost step is a critical examination of why anybody wants to do it. And if they can answer positively to the second bit about the why, about the values, the mutual values between them and the customers going up, that's when you take the next step. If you're doing it because everyone is doing it, just don't bother with it.

Asif [00:39:02] Yeah, it sounds really similar to a conversation that we have a lot with customers who are just they're just doing technology for technology's sake. You know, they buy a robot or buy a 3D printer because everybody is doing it and I feel I need it, but they don't really ask that very fundamental question, why? So that's a great bit of advice. And

then if the why is successful in terms of it makes good business sense, good sense all round, then, yeah, make an investment. So to say, where would you advise companies in the construction industry or even the design and manufacturing industry - where could they go to get the support they need? Where are some of the places they could go to say, I'm struggling with this, I'm a lonely MD and - it's really lonely business, running a company - where can I go and find people to help me with this?

Dr Saeed [00:39:56] That's a very good question. So for us, it's about really research, a fundamental push of the industry, right. That commercialization. So as academic, I'm very much interested to work with some companies to the task force that we have established a mass customization platform design. There are some case studies, do some knowledge transfer, KTPs or knowledge transfer partnership between the industry and academia so we can get PhD students to or we can get KTP associates to go and work, you know, work with the company. Show them the best, a good practice of mass customization. Teach them what are the options in mass customization. What happened? What are the philosophy? What are the authorities behind that? And then demand for us would be more publications with the more research and then more importantly, more justification that why these are why do we need mass customization? So and then, you know, that would be a starting point for us and companies who are interested to focus on this topic.

Asif [00:41:10] Dr. Saeed, you do, you were talking about picking a project and giving it a go and maybe reaching out to universities and partnering with them. Raam what would your advice be on actually getting actual help to start your journey to mass customization?

Raam [00:41:24] First thing to do, like I tell you earlier is to start with your why. And if you're trying to get a better hold on the why and perhaps talk to a third party neutral expert like ourselves or neutral entity like ourselves, we can come and help you clarify the way to begin with and then perhaps create a journey for yourselves what what needs to be done, how you go about doing it, and then prepare a plan with distinctive actions and timelines with who does what, why, when and what benefit you will reap at the end of it. We're happy to work with people who want to kind of get onto the journey and we have enough support with the industry from the industry to do this.

Asif [00:42:05] Fantastic. So listen, there we have it. Mass customization. It doesn't seem to be about creating bespoke products. It seems to be more about the solution and the levels of value that that solution, or as Raam called it earlier, the minimum viable with less emphasize viable, the minimum viable product can deliver. To deliver it to customer, it seems to be critical that we understand the physical, the operational and the other characteristics of the solution that you're offering and figure out how you could combine those in a uniquely meaningful ways to deliver that sort of personalized value and having a very clear understanding of why you want to mass customize as opposed to I should. And maybe some of the best places to start are sit down with your team and say, well, why should we do this? What could the world look like for us if we did adopt some of this kind of thinking? And then, and from what Dr. Saeed was saying, is we'll pick a project and maybe connect your university and kind of give it a go and share the results. So that's kind of like the distilled learning that I've got in my head from the session today. And as always, we

really hope that some of the things that you've heard from our guests are kind of inspiring you to kind of ask those questions. Why? And maybe just give it a go. So I'd like to really thank both of my guests, Dr. Saeed Talebi and Raam Shanker, thank you so much for a great discussion.

Raam [00:43:42] Thank you, Asif.

Dr Saeed [00:43:44] Thank you very much Asif for having me today.

Asif [00:43:47] Great, and I'd like to thank you for listening. And we'll see you on the next podcast.