

[music]

Joe: What becomes important is that an operator who wants to move up understands that the technology is available, and not to be afraid of it. But more importantly, to understand the core process. The more they understand the core process, the easier it is to apply the automation.

[music]

Mike: From the Center for Occupational Research and Development, welcome to Preparing Technicians for the Future of Work. I'm your host Mike Lesiecki. In each podcast we'll reach out to people who are actually on the front line of the future of work and hear what they have to say. That means interviews with industry, interviews with working technicians, forward thinkers in the field. We'll do some background research, and we'll curate that research to make sure you have the most up to date and relevant information. And in every episode, we'll suggest action that you can take. We want to inspire you to take that action.

This podcast is brought to you by the Center for Occupational Research and Development, known as CORD, with financial support by a grant from the National Science Foundation's Advanced Technological Education program. Opinions expressed in the podcast do not necessarily represent those of the National Science Foundation. You can find out more about our project and our approach at "PreparingTechnicians.org."

Our guest today is Joe Campbell, Senior Manager for Applications Development at Universal Robots. Joe, welcome! Your company is best known to us as a manufacturer of flexible robotic arms. But tell us more about UR. And what is your role there?

Joe: Be happy to Michael. So, UR has actually been around for 15 years. We just celebrated our 15th birthday earlier this fall. And we actually brought the first commercially viable collaborative robot to market about 10 years ago. It's a Danish company, but we're in operation around the world. And we're actually active in 26 different countries. The product itself, from the outside looking in, looks very deceptively simple. But it is a very tightly controlled product line of four robot models, four different sizes. And they're collaborative in nature.

Collaborative really has one primary feature: it is intrinsically safe and is able to operate in close proximity to skilled human operators in a safe manner. This is technology that was developed over the last decade and is really gaining traction now in the market.

The second main attribute of our cobot, in particular, is that, by design, it is very easy to use. And therefore, it's very easy

to deploy very quickly. And that has helped fuel our growth. In fact, just this month, we shipped our 50,000th robot...

Mike: Wow.

Joe: ...which is a real significant milestone in a very short period of time. And the market on the whole is growing. I think the COVID year of 2020 is painful for the whole industry. But we and all the other major players in the industry expect to be a double-digit growth again next year.

Mike: Joe, beyond COVID, what's driving that trend to bring collaborative robots? Is it efficiency? Is it workforce? What's driving it?

Joe: Well, I think there's a couple drivers. So, first of all, because it is so easy to deploy, a collaborative robot can be deployed at a fraction of the cost of traditional automation. And I know this very well. I spent 40 years on the traditional side of the automation industry.

Very common to see our collaborative robots installed: full cost, "all in," in the \$75,000 to \$85,000 range. Now part of that is: it's not that the robot itself is a giveaway. But our philosophy from the founders on up has been to strip cost and complexity out of the overall automation process. So, our programming is very, very simple, for example. It's a really radically different construct to programming automation.

Our training is offered at the entry level through an online academy. And really, within a couple hours, you can learn the fundamentals of operating and programming our robot. We have a large ecosystem that we call "UR+," which is very similar to the App Store.

Mike: Right.

Joe: It is a large family of developers who have created accessories and peripherals for our robots. But they've created them to our specs and we actually do the testing and validation. And consequently, that just strips out the engineering cost and time and risk associated with these peripherals. So, every step of the way we've taken cost out. So that's been a big part of the growth.

The second part is by making the product that easy to deploy, we've actually entered a market segment that was historically very underserved by the traditional automation companies. And that is the small and medium enterprise. There's about a quarter million manufacturing entities in the US and about 90% of them have less than 100 employees. So, this community didn't have a robotics department or an automation department, they didn't have specialized robot programmers—because they're small companies. They just don't have that kind of overhead. But they could

successfully deploy our collaborative robots very quickly. And that also has really fueled the growth.

Mike: Well, you know, Joe, it's funny, on a recent podcast interview, I was talking to a CNC manufacturing group. And that's exactly what they said! "We represent a lot of small- to medium-sized businesses. And what is the biggest trend in CNC manufacturing? The introduction of cobots into their systems." There...exactly what you just said.

Joe: It's compounded by the really serious issue with manufacturing workforce today. In spite of the COVID crisis, which just had an appalling impact on unemployment and the economy on the whole, there are still hundreds of thousands of manufacturing jobs that are unfilled today. And if you're a small enterprise, and you can't fill a position in your manufacturing team for a CNC machine operator, that machine sits idle!

Mike: Yes.

Joe: And if you're a small business owner, it is painful for you to watch a half million-dollar machine tool sit idle. It's very difficult. So, I think that's also been part of the motivation.

Mike: Let's turn a little bit to the workforce now, Joe. I've heard you talk and read some things that you've written about the "skills gap," when it comes to the workforce. And they're working with automation, with cobots, and things like that. What's that gap that you might see today? And do you see it not only for people that are coming into the workforce, but people that are currently in the workforce? So, tell us about that gap that you see?

Joe: Yeah, I think it manifests itself in two different ways. First of all, for people coming into the workforce, too many people equate manufacturing is dull, dirty, and dangerous. The three Ds that we always talk about as being the places you go look for automation projects.

Mike: Right.

Joe: And so, it is difficult right now to attract younger generations into manufacturing because this perception is so terribly negative. So, part of the skills gap is just about introducing technology that is approachable to this younger generation who are ready to come into the workforce and making sure that they have a comfort level. So that's one.

The second area that we focus on is helping current operators in manufacturing to recognize that with some very basic skills, they can start to actually deploy collaborative robots into their manufacturing operation. So, in this case, you need a logical thinker, somebody who can solve problems, communicate well. But it's more about those skills, in my opinion, than it is about

hard programming knowledge and advanced mathematics, etc. The whole industry, and Universal in particular, are building tools that really deliver that high technology part of the equation. And there's no need for somebody to deploy a cobot that has to understand third-order polynomial math. It's just not there anymore.

Mike: Right. Right.

Joe: We do need people who are interested. And who can think logically. And understand their manufacturing process. Cobots don't know much about an individual manufacturing process. That's part of the setup and programming.

Mike: You know, Joe, we saw recently lots of notices about URs introduction of their new Cobot Education and Certification Program. To my way of thinking, that's a real step forward for a company, to create something like that, to help move this whole industry forward. Could you tell us a bit about how it works?

Joe: Well, let's go back and talk about our training philosophy from the beginning. And then I can fast forward us into the "EDU" side of the world. This is the vision of our founders that was really significant. The traditional approach to automation is: if you want to go learn how to program a PLC or a robot or a CNC tool, you will go to that manufacturer's facility and you'll spend one to two weeks learning the fundamentals.

Mike: Right.

Joe: That's a really significant expense to a project. And it really has a huge impact on the small and medium enterprise because, if your team is off site at education-learning--they are not in production. So, it's a double-double hit.

Our founders actually started very early working on an online training Academy, and today it's fully up and running. There's 14 modules. The core 9 modules will teach you the fundamentals of operating and programming our robot. And they can be mastered in a matter of hours.

To date we've trained over 100,000 people on this online Academy! And it's just been very, very successful. I've met so many customers who had no other formal training other than the Academy. It's also valuable because new hires into the manufacturing organization can quickly come up to speed--again, at a very low cost, because they're doing it in a matter of hours, online. So that's the first building block.

The second building block is we have in-classroom training. And we talked to a lot of customers who wanted to go faster. Or they wanted to go deeper. They wanted to learn more. They wanted face-to-face training as a means to accelerate, maybe a more complicated application.

Mike: Yes.

Joe: So, we offer training at all of our UR facilities. And I think more importantly, we establish training partnerships with our distributor base. And we actually certify them. We certify the facility and we certify the instructor. And our distributors actually teach the same curriculum that our instructors do. And what that's done is bring that level of training closer to the end customer—which is important.

Now, the third tier is what we just talked about and that is the introduction of our EDU program. We heard from a lot of technical vocational schools and community colleges, even high schools, honestly, and four-year colleges, that there is a renewed interest in learning about this next generation of robots. And so, we put together a hardware package, which is exactly the same hardware package that we use in our training classrooms.

Mike: Right.

Joe: And we put together a curriculum. And the curriculum includes robot fundamentals: how to program and how to operate the robot. But it also includes some of those non-technical fundamentals like communication, and problem solving, project management, fundamentals, etc. And that is what we're bringing out to the education market and we've gotten a fantastic response so far. It's really been heartening.

Mike: Here's a question for you. So, let me put on a hat. Let's suppose I'm an instructor. A faculty member at a community college teaching a manufacturing program. And I want to bring in some of this robotics technology. And I'm thinking, wait a minute: my college has limited me to 64 credits in this degree. And so if I'm going to bring this in, I'm gonna have to take something out, or... What do I do here? Have you run into that? How do we integrate these new things? That's always something faculty face. Have you seen that? Have you seen workarounds or workable solutions to that?

Joe: Yeah, I think everybody solves it in their own fashion. But the discussions that I've been part of have always been to make sure that the faculty understands the alignment of our technology in our curriculum to what is really absolutely needed out in the field. From that standpoint, I can offer no better recommendation for what we're doing. Other than to say we're trying to deal with the problems that we hear every day. And this curriculum is built off of the training that we've done—both in our online Academy and our classroom Academy. So, we know it resonates. And we know it's successful.

Again, I also talk about the labor shortage in manufacturing, because my belief is that the educational institutions are really

trying to prepare people to solve problems in the outside world...

Mike: Yes.

Joe: ...and this is a significant problem. I speak at length on this, I've done so for the last two years. But we have a real demographic problem that is a tsunami coming at us. You know, I'm a "boomer." I think you're a "boomer." And our peers are retiring at the rate of 10,000 per day!

Mike: Hmmm.

Joe: 27% of the manufacturing workforce today is 55 years or older, which means significant turnover here in the next decade. And that's been exacerbated by the COVID crisis, because frankly, there were many workers who were approaching retirement, maybe they weren't there yet and they looked at the impact of the pandemic and decided they were going to take early retirement and not come back.

Mike: Right. Right.

Joe: And so, we have to encourage the younger generations to be interested in manufacturing. We have to give them the tools.

Mike: You know, we just talked about—on the EDU side—about the people that are going to come into the workforce. But what about the people that are there? I guess they can work with your distributor network and get upskilling that way. How does an industry upskill their current workforce? Let's suppose they've got an operator and they want to bring them up into the automation area. What do they do?

Joe: Well, I can give you a couple examples that are particularly close to my heart. We have a customer out in Oregon. And they're in a very isolated area. There's virtually no unemployment out there and they were just impossible for them to hire. And they had a whole number of processes in machining, and assembly, and packaging. And so, the plant manager decided to try a robot. He had no automation to speak of in the facility. And so, our distributor worked very closely with them, and the production manager decided that he needed a Lead Robot Technician. Somebody who's going to be responsible for this new technology coming in the plant.

Mike: Right.

Joe: What he did (which I thought was brilliant), he pulled his entire manufacturing team together—line operators and all—and said, "One of you is going to be the lead robot tech. And so, if you are interested, I want you to go to the UR Online Academy, take the training. And then we're going to buy a robot. And we're going to

have a competition. And I'm going to give you a programming assignment, and we'll see how you do."

A 26-year-old woman, who had no technical training in her history in her background, absolutely wanted this job. She did the online Academy. She absolutely excelled at programming the robot. She could visualize the application and she knew what she wanted the robot to do. And consequently, she became the leader of this company.

What I like about the story is the Production Manager put it out to the whole team to see who really wanted to advance. And with all the online tools that we offer, she was able to make that leap. And is today deploying more and more robots into their operation. And we see variations of that all the time.

Mike: It's a great story!

Joe: The other point I should make in that regard, too, is that upskilling doesn't necessarily mean taking an operator off the line. It might mean taking that operator off of a dull, dirty, or dangerous assignment and moving them into a higher-value assignment.

An example that I like to use there is arc welding. We've been in many, many shops, either job shops, or even vertical shops. And there's always a mix of parts. There's the very simple brackets. And connectors. And widgets. And then there's the more complex weldments. A good welder does not want to weld brackets all day. It's just not satisfying.

Mike: Right.

Joe: It's pretty dull and repetitive. And quite frankly, you start to see a quality drop off at the end of the day, because they're bored with this job of making hundreds of brackets in a day.

Again, and again, we've seen this philosophy where the shop manager automates the simple parts, and takes that same welder, and allows them to do more complex weldments. It's more profitable for the business and it's far more satisfying for the individual. That's what they want, right? They want to work on the high-value parts.

Mike: That's a great analogy. You're moving someone from, say, a good-skilled person up into a higher-value position. Very interesting.

Joe: Yep.

Mike: You know, Joe, as we wrap up today, I'm going to ask you to put on your magician's hat, or your open up your crystal ball, or whatever the term is here. But think forward: What's going to happen? And remember we're at the technician level.

Joe: Um-hmm.

Mike: What's going to happen in the next couple of years that you see? Emerging trends that maybe our educators should be aware of? Start preparing for? Things that you might see coming up in the future?

Joe: I'm happy to. And this is something that's emerging right now. The UR+ program is evolved from a series of components (like a gripper is a component)...

Mike: Yeah.

Joe: ...into application kits, which are like near-complete solutions. And our partners have developed application kits for screw driving, and nut running, and palletizing, and packaging, and welding. The key is that we've taken some of the more complex processes, and simplified the setup of those processes with advanced software.

Mike: Oh.

Joe: And so, what becomes important is that an operator who wants to move up understands that the technology is available, and not to be afraid of it. But more importantly, to understand the core process. The more they understand the core process, the easier it is to apply the automation.

And so, as I talk to educators, I encourage them to certainly teach the technology. Teach the robot, and the programming, and controls environment, but also teach the process. And make sure that their students are equipped to understand the manufacturing process so they can automate it.

Mike: That's a great comment. It really says a lot to the educators listening. Because it's more than the hardware, or making sure you can use the pendant, and driving the robot home, and things like that. But they also have an understanding of the process that they're trying to impact. That's a very important comment.

Joe: It's true. And I joke about this all the time. In my past life, I actually was a Systems Integrator and actually, delivered turnkey systems. And one of the things that we learned early on was you can talk to the engineer who will tell you what he thinks the system needs to do but if you really want to understand, talk to the operator. Because the operator is probably not 100% following the process that the engineer has laid out, but they figured out the best way to make the product! And that's an important step.

Mike: Boy, I totally agree! Joe, today in our discussion, you said some very key things. Number one: some of the drivers for cobot integration has to do with introducing approachable technology. I can see that as an important thing. As people are now better able to integrate these technologies. And for the existing workforce, there's options of how to bring themselves up to speed.

You mentioned your UR Academy (your online Academy), I'm sure there's other things as well. Plus, that classroom approach and let's put COVID aside for a second, but where they actually increase their skills. I think those are all good things to do.

And, Joe, I'm so glad when you talked about the EDU side, you talked about alignment to what's really needed in industry out there today. Boy, the faculty members, the instructors, workforce developers—that's a big concern. And showing that your program is so directly aligned—it just helps them move things forward.

And I think your final comment there, just if you don't mind me reiterating it: the more that an operator or a technician can understand the process that they're trying to impact, the better they're going to be able to implement that automation solution. It just makes so much sense, Joe.

Joe: Absolutely. And we see it every day.

Mike: Cool. OK, I want to thank you for taking time out of your busy schedule, out of the world of automation and robotics and cobots. I appreciate all your comments today, Joe. And in the show notes, I'm going to put several links in. You mentioned that story of the company in Oregon, I think we've got a video from your group that we're going to put in the show notes. I'll encourage our listeners to take a chance to look at that video as well. So, Joe, thanks again.

Joe: Thank you, Michael. Much appreciated.

Mike: That's it for today, listeners. You heard Joe Campbell from Universal Robots talk about all the drivers for cobot technology. And describe their new Academy—their online system of courses—to help people upskill. So that's your task for today. Go on to their online system and try one of their modules to increase your knowledge of cobot technology. I did it! I went in. I took one module. And before I knew it, I had a sensor system and a cobot picking up one item from a conveyor belt and transferring it to another. So, I felt a lot of accomplishment, having done that. And I learned a bit about how straightforward it can be to set up an automation system like this one. So, try it for yourself.

As you know our series is produced by John Chamberlain at CORD. John, thank you very much for all the help on the production, and your skill and expertise. The project is led by Ann Claire Anderson at CORD. Thank you, Ann Claire, for your leadership. And thank you, our listeners, for Preparing Technicians for the Future of Work!

[music]

Please include the following citation when citing or using content from this podcast:
Lesiecki, Michael (Host). Preparing Technicians for the Future of Work Podcast:
Episode 22, *Here Come the Cobots!* (audio podcast, transcript). Center for Occupational

Research and Development, Waco, TX. January 2021. Retrieved from
<http://www.preparingtechnicians.org/>