

Episode 44, *Advanced Biotechnology: A Changing and Evolving Working Environment*

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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 COD, 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](https://www.PreparingTechnicians.org)."

Our guest today is Jon Tucker, who is the site leader at the Pfizer Global Supply Manufacturing site in Sanford, North Carolina. That's a large multi-product pharmaceutical facility with more than 1200 people working in vaccine and gene therapy manufacturing. Jon, it's a pleasure to have you today. Welcome to the podcast. Give us, your audience, a little bit about your background. You're originally from the UK. How did you get over to Pfizer in the United States and all of that? Give us a little background, Jon.

Jon: Thanks, right. Yeah, as Mike said, I'm the Pfizer Global Supply Site Leader here in Sanford, North Carolina. This site manufactures drug substance and drug substance intermediates for both vaccine commercial and clinical portfolio. We're also the site for manufacturing cell and gene therapy products for Pfizer Global Supply. Prior to

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Sanford, I was the Site Leader in Andover, Massachusetts for eight years where we manufactured drug substance, both mammalian and microbial. It also was the site that manufactured drug substance for the COVID vaccine. And prior to that, prior to 2013, I was the site leader in Havant, the south coast of England, which was manufacturing (or packaging, shall we say) end item cold chain and distribution for vaccine and mammalian products.

Mike: Good. Good. Thank you, Jon. For our audience, everyone's aware of a vaccine manufacturer today, clearly, but what do technicians really do in this area? What does a technician do in an advanced biomanufacturing facility? What do they worry about supply chains? What typically do they do?

Jon: Yeah, great question. Technicians are at the core of the operation really—from start to finish of a batch. They're responsible for understanding the automation system, setting up the componentry, starting the bioreactors, but also documenting the process contemporaneously. The focus is really on safety, compliance, of course, and product understanding. And without that, the expectation is to be involved in continuous improvement. The technicians are really involved in new technologies—new processes. New technologies create a great learning opportunity, I think, for colleagues that enjoy a changing and evolving working environment.

Mike: As you look at those technicians working—let's suppose, people that come into your facility as new employees, or existing employees—what gaps do you see out there in the workforce? I'm particularly interested in those technical skills that you would like to see strengthened. What do you see out there as a gap?

Jon: Yeah, good. Thank you. In the world of biotechnology, technicians need to understand the automation space of the process. And the science behind the process. It takes us 9 to 12 months to fully train a bioprocess technician in their role, so they fully grasp the understanding of the process. You see, the technicians we hire come with limited knowledge of systems. Manufacturing systems, such as DeltaV or automation systems are a really crucial part of that process. So, in order to close some of the gaps, a stronger focus on equipment uses and the automation behind it is essential. It's important for the technicians to understand

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how the systems work and the engineering behind it. Less about "what buttons to push." We can help that understanding, of course. Someone with strong attention to detail is really kind of important in that space as we look at hiring technicians. And also, science and math is really our backbone of all that we do. So, any gaps in that space is something that we have to work through.

Mike: You mentioned safety and compliance as a facility—for those things are paramount. Do you do internal training for these things? Or do you hope that they come to you with a knowledge of that? How does it work?

Jon: Yeah, good question. Thank you. Yeah, we have a very strong internal program for training—both in safety processes, but also, really important, safety culture. And, on top of that, of course, internal compliance and quality programs are really key in a facility such as this. So, yes, internal driven, that's for sure.

Mike: Sure. Now, Jon, if you think about the community and technical colleges around the country who are helping to prepare the workforce. From your point of view, how could these educators do a better job of preparing? You've mentioned things like "systems." And just now, "quality." Are they doing enough? Could they be doing more? What do you see—where we could improve—on that preparation?

Jon: Yeah, firstly, I think... I recently moved down to North Carolina. I've been really impressed with the Central Carolina Community College System. It's been very impressive. The education has continued to focus on biotech programs, teach students, "What are bioreactors? And chromatography skids? What is a drug substance versus a drug product?" And provide students with more general understanding of the process, such as inoculation, cell culture, growing cells, and the sciences behind them. Really invaluable, I think, in terms of gaining entry into our business. Providing hands on training on equipment. Graduates have the ability to use bioreactors or skids of some description, or columns and filtration—are pivotal. Sure.

On top of that, I think kind of alluded to in a previous question, some of the fundamentals for CGMPs (Current Good Manufacturing Practices) and data integrity are topics that we obviously ingrained in our technicians. But also, if

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that can be taught at an early stage for the community college network, that would be powerful. We have colleagues from Pfizer and routinely collaborate with community colleges and universities that help refine and build robust curricula for biotech programs. And especially important here in North Carolina, with such a growing industry, which is awesome.

Mike: Jon, I think that's such an important point. Right? That interaction with industry colleagues and the educators working together to build programs. I think that's a really important point. I'm pleased to hear that you're and your colleagues are active there.

In our project, Jon, titled "Preparing Technicians for the Future of Work," we think about cross-disciplinary skills. And we wonder, does a biotechnician (a biomanufacturing technician) need to know about data science? And cybersecurity? In addition to their—let's call them their "manufacturing related skills?" Do they need to know this? Or does somebody else handle that? You see what I'm getting at?

Jon: Ach! Yeah, yeah, I do! Yeah, so at sites such as this, most systems we have are on a digital platform. And certainly, if we don't have it now, it's moving towards that direction. So, the expectation that a technician has the ability to run the process (at some point, without paper, of course), obviously, your data captures. It's mostly done through data-historian type technology and techniques. So, that digital platform is providing real time trend analysis for quicker access to data. And it's important that the technician has that understanding—automation systems—and the function behind it. So, anything that can be done through the education system, so through the community colleges, so that we can then build on that—I think is really powerful. There's no doubt about it, of course, that most of our systems here in Pfizer are bespoke. But anything that from a broad understanding will be very beneficial, I think.

Mike: Sure. You mentioned the rapid pace of change in these new technologies coming on. How does your existing workforce keep up? Do you have internal training? Do you bring in vendors to do training? Do you send people outside? Do you

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work with colleges? Do you do all of those things? How does an existing tech "upskill" at Pfizer?

Jon: Yeah, I think it's all of the above, really. So, we continuously invest in our training programs. Specifically at Sanford here, we're building a training facility center. And we're continually updating. Our training programs are up to date with our existing and growing processes. We often send our technicians and our validation teams to seminars around emerging technologies. And assess what we could implement to support or enhance our manufacturing processes. Colleagues are involved with external training from professional organizations such as the ISPE, and continuing education at universities. And, in addition, the industry as a whole has communities of practice that we share best practices within industry. It's very specific, I think, to biotech. It's very collaborative in that space. And obviously, vendors offer training when new technologies present themselves. And your "lunch and learns." Or in-house demonstrations. So, coming back to your question, I think it's "all of the above." For us to be successful, it can't be just one thought process. It has to be multi-thought processes.

Mike: I have a brief follow-up question on this. As I've talked with colleagues around the country—and industry members—factory metrics, or the way that things are monitored, and what are key performance indicators, and so on. That's a topic that's not often addressed in our community college programs. And yet that must be important at Pfizer, right? You have a series of factory metrics that people look up, and they see what's posted on the monitors each day. "How are we doing?" sort of thing. Or how does it work at Pfizer?

Jon: Yeah, we have a strong culture of a production system in play, which is pretty much a "tiered approach" with metrics—from the technician through to the site leader—on a daily basis. And, as you'd expect, it covers the whole gambit: from safety and compliance and quality through to supply and obviously, financial metrics as well. So, on a daily basis, and a weekly, and then a monthly cadence, we review site performance as a whole.

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Mike: Okay, good. As we think about wrapping up today, get out your crystal ball, Jon. And what do you see that's coming from your position in this biotechnology manufacturing, vaccine manufacturing, all of this area... What do you see coming? And do you have advice for how our educators can help prepare their students for that coming future?

Jon: Yeah, I guess over the last 2 to 3 years, we've seen significant large investments made in technology. Examples in some gene therapy and, obviously, through the mRNA, as part of the COVID vaccine. Certainly, in manufacturing terms. So, both new modalities requiring different types of technologies. I think we're just going to continue to see that change at that macro level.

But also, that micro-improvement level. New pieces of equipment, helping to us understand better analytics of the process, for example.

So, I think, for me, it's that big takeaway—would be that constant collaboration between the educational environment and the industry. It's never been more important for us to reach out to the local community colleges. And in two ways, if you like. It's, I think, so important as we move forward. I think it's the change will become faster. And, therefore, between industry and the educators, it's so important to be in constant dialogue about what's changing.

Mike: I was hoping you might say "things will slow down a little bit." Instead, they're going to happen even faster!

Jon: And I think environment has taught us that. And taught us to say, look, how do we "think and act differently" in the industry. See, we're manufacturing products, at a site such as this, which are true breakthroughs that change patients' lives. And therefore, I think it's important that we keep abreast of what's new. And what's evolving. But how to do it better and better. And I think, for me, that's a collaboration. That's where it pays dividends.

Mike: Jon was just amazing to look back now from this perspective and see that rapid scale up that Pfizer did to make it possible to get that vaccine out. It was just an amazing story. I'm gonna put a link to some of that in the Show Notes, so people can look at it further. So, I just want to thank you for all of Pfizer's efforts on that front.

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Jon: Thank you. Much appreciated.

Mike: Jon, thanks again, for joining us today. I was struck by several things. One, that you spend 9 to 12 months for a new person coming in to train them to get ready to work on everything. That's a real investment on your side. I thought that was important.

And then thinking about this understanding of systems and automated systems, as opposed to individual things. But how things work as a system. that struck me as an important aspect as well.

So, Jon, on behalf of our listeners, thank you for your comments today. And we're looking forward to future things coming out of all of these new technologies.

Jon: Thank you, Michael. Take care.

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Mike: Listeners today, you heard Jon talk about the high-tech biotech manufacturing environment at Pfizer. And one thing that he discussed was the Community of Practice that they've created between educators and industry to help anticipate the changes that are coming to the workforce.

And one thing that struck me is changes in this area are going to come even faster! And hopefully, we can better prepare our students to anticipate those changes.

In the Show Notes, take a look at some of the links on resources for educators, as well as information about vaccine production at Pfizer.

Today, I'd like to thank our audio engineer John Chamberlain. Thank you, John, for the great work you do on producing these podcasts. And I'd also like to acknowledge Ann Claire Anderson, our Principal Investigator of our project. And thank you, our listeners for ***Preparing Technicians for the Future of Work.***

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