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Mark: Innovation by everyone is creating just an amazing, unbelievable future. And for those who learn new knowledge and skills the fastest, those who can contribute the most, and who collaborate most effectively will be the ones who will succeed.

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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.

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Our guest today is Mark Maybury. Dr. Maybury is Stanley Black & Decker's first Chief Technology Officer and former Chief Scientist at the US Air Force.

Mark, interesting background there. Tell us a little bit more about yourself, how you got involved in all of the things that you're doing today.

Mark: Well, it's a pleasure to speak with you, Mike. My background has been 31 years working in the public interest, both inside the government, but also in the National Laboratory, working at the MITRE corporation. I was a Chief Technology Officer, Chief Security Officer. Early in my career I was an Air Force officer—actually on scholarship, originally from the Reserve Officer Training Corps. And then later in life, I became the 33rd Chief Scientist of the Air Force. And about three years ago, I

became this first Chief Technology Officer at Stanley Black & Decker.

Mike: Cool! Mark, your company is really known to many of us as a tool supplier, but I believe the company has a much broader perspective than that, don't they?

Mark: Well, indeed. One of the things that shocked me when I came to the company is, of course, I knew about our DeWalt products, our Stanley products, all the tools. And subsequently when I came to the company, we purchased the Craftsman brand. And now we manufacture Craftsman in the US.

But we have 60,000 employees around the world. We manufacture a half a million products in 60 different countries. So, it's really a large global enterprise. And what many people won't know are, for example, in 1930, we invented the electric door. And so, if you walk into a Home Depot, or Lowe's, or Marshall's, or a hospital, or bank, one out of two of those doors are Stanley doors. Similarly, if you drive a car or a truck, there's a 90% chance that your car has been robotically fastened by Stanley-engineered fasteners. So, there's just a whole bunch of amazing technologies. Like 2 million babies are tracked by "Hugs" IOT devices to ensure that the babies and their mothers are connected together.

Mike: That's great. Interesting! Our project, Preparing Technicians for the Future of Work, of course, is focused on technicians. So, my question is at Stanley Black & Decker, is there such a thing as a "typical technician?" What do they do? What do you think they should be able to do?

Mark: Well, I don't think there's any "typical technician," but there is a highly diversified set of technicians. So, we have machinists, we have welders, electricians, assemblers, automation experts, experts who are distribution technicians. So, what they do ranges from building things, to maintaining things, to optimizing things. And what they need to do as we go into the future—and we'll talk more about this—is they need to increasingly transition to a automated and digital world.

And, if folks are interested in kind of what we do, last month was "Maker Month." And we actually highlighted 31 trade professions on our homepage, on StanleyBlackAndDecker.com, and currently highlighted that—

across America, there are 94,000 openings: electricians, plumbers, welders, etc. And what people don't realize is that some of these are actually very well-paying jobs. Globally, we have something like 10 million unfilled manufacturing jobs, which is a tremendous burden on the economy and a tremendous opportunity for many who are skilled in the trades.

Mike: Here's a hard question, Mark. I think it's hard. How do you know what's coming down the pipe for Stanley Black & Decker in the next two to three years? That is, how do you know what skills those technicians are going to need? Maybe AI? Machine learning? Automation aspects. You mentioned some are those. How do you know what's going to happen in the next two to three years? Do you have like a crystal ball or something?

Mark: Well, it's been famously said that "the future is already here. It's just unevenly distributed." And indeed we pay a lot of attention to the research and development. Some of that's invested by the federal government. Some of that in universities. Some of that within industry.

So, how does it affect the technician? Well, we know their knowledge, skills, and abilities need to be digital. They need to understand automation, artificial intelligence, robotics, data analytics. And indeed, if you look on our webpage, and you see what job openings exist, you'll see jobs. Certainly, some of the traditional jobs like a machinist or like a welder. But you also see digital analyst. Or robot maintainer. Automation engineer. Upskilling advisor—someone to teach people how to learn new skills.

So, we really do have a good sense of where the technology is going, in part because we're inventing it. Many of our partners are inventing it. And that helps us sort of anticipate the kind of skills we'll need for the future.

Mike: Mark, you just mentioned a key word: "upskilling." And that was one of my questions. So, if you look at your current workforce, right, it's evolving. You're bringing in these digital technologies.

How does your company address "upskilling?" Or maybe, "reskilling?" I'm not talking about the entry workforce, but rather your existing workforce. Do you send them for vendor training? Do you have an internal program? How does it work there, Mark?

Mark: Well, we do a lot of those things, Mike. So, first and foremost, we have a very simple app that PWC created called the Digital Fitness app that allows anybody with just a cell phone to learn about digital information.

We also have access to online training things like Coursera and other online training sources for our employees, so they can upskill.

For those who are on the factory floor, we have a "Vocational Leadership Program" (VLP). It's a 12-month curricula. Sort of an "Industry 4.0," which is sort of all the automation in the industrial future, but also mixed together with leadership skills. And we only require high school diploma.

We also have a program in Tennessee called the "Local Options and Opportunities Program" (the LOOP Program), which targets high school students. So, both for new students, but also for existing employees, we need a whole variety of on-ramps to the future.

And one final thing I'll note is we've actually begun to invest in technologies to up-skill our talent. One of my favorite examples is a new company we've helped accelerate, called DeepHow. And basically, it uses artificial intelligence, where you can take a cell phone, record somebody doing a task, like setting up a machine. Maybe they're maintaining it or just operating it. And it takes that collection of imagery in natural language, and it uses artificial intelligence to segment the videos, and to translate the natural language—both to transcribe it and then allow it to be translated in other languages. So, that's a good example of how we can use AI to actually help people understand and learn, and also potentially make them more effective at their actual tasks.

Mike: Mark, I'm fascinated. Did you say that's an app? What was it? The software?

Mark: So, the app is from Pricewaterhouse and Cooper, called the Digital Fitness app.

Mike: Okay.

Mark: That's more like information about all things digital: robots, digital analytics, AI, and so on. In contrast, the other application is called DeepHow, as in like "deeply understanding how people do things." So, that DeepHow is a company that was accelerated in a Techstars accelerator,

which we've now partnered with and brought into the company. And we actually have applied it to over 30 different locations in our plants. And we're just now beginning to commercialize it, so others can benefit from it as well.

Mike: I'm going to look into that: DeepHow. That sounds fascinating, Mark. Thanks.

Mark: By the way, there's also another interesting digital marketplace. This is for people who are already skilled in the trades. It's a platform called "Surehand." And it's already got 20,000 workers registered, skilled tradesmen and tradeswomen. And, again, it allows them to both show off their skills, but also to find customers and also use digital capabilities to upskill. So, we really see this as a very large critical enabler. Talent—right?—is our future. And so, if we don't have enough talent to run our factories, we're not going to be able to effectively work.

Mike: Well, that's great. I really appreciate your bringing my awareness of things like Surehand and DeepHow. We're going to link to some of those things in the Show Notes so that folks can follow those references. You know, Mark, I found you through your recent IndustryWeek article. It had a great title. It's called "The Well-trained Workforce Is Manufacturing's Future." So, we get that. But one of the things you mentioned in that article I wanted to bring up. And you said we need to move away from this singular focus on four-year education. Can you expand on that a little bit for us, Mark?

Mark: Sure. I think our original conceit was that: a formal education is the only way to get ahead in society. And the reality is: there are not only "blue collar" and "white collar" jobs. There are now a new emerging set of jobs that some people call "gray collar" jobs. And those are jobs that require a set of skills, a set of capabilities, but they're applied in the many skills we've been talking about so far: the digital robotics analysts, for example. These are skills that require people to have hands-on, to have mechanical knowledge and insight, but also have to have a digital component. And these can be very lucrative.

Traditionally, our parents, teachers, career counselors... I know this myself! I was basically saying you have to go to college. And I was steered away from a trade school. Well, in fact, just because you go to a trade school, by

the way, doesn't mean you can't go to college later on. Interestingly, in Germany, about 60% of students in apprenticeship programs subsequently go on to get a college degree.

So, the other aspect of this is economic. A four-year college typically leaves a person about \$127,000 in debt. If you go to a trade school, it's more like \$33,000.

Mike: Sure.

Mark: So, do you want to spend over 21 years paying back your college debt? Or do you want to get to work right away and begin to pay off a much smaller (third or less of the actual) debt?

Mike: Just thinking about that, Mark. One of the areas of my own background is in the semiconductor manufacturing side. And I'll tell you a technician with some experience, they can command a really good job. And a strong salary. And they want that position. They're comfortable there. They're very happy there.

Mark: You're absolutely right, Mike. Right now, there are 12,000 openings for manufacturing engineers. The average median wage of a manufacturing engineer is just shy of a hundred thousand dollars. So, many of us know in our own neighborhoods, you see electricians, you see a plumber, etc. And they're driving nice cars, right? And their skills are extremely relevant.

And so, as we move into this digital world, where we're digitally measuring water, and we're measuring electricity electronically and doing analysis--these skilled technicians, who've got also that digital expertise, I think are going to be extremely valuable and extremely successful.

Mike: Mark, do you think we're going to need more of that sort of technicians? Or less, as robotics and automation come on? I mean, it's a hard question and it's not an easy answer. But, in general, do you think we'll need more of them—or less?—as robotics come on?

Mark: That's a great question, Mike. And our natural intuition is to say, "Well, the robots are gonna replace the humans." And, in fact, it turns out we have some very interesting data on this. McKinsey did a study and took a look at the use of personal computers. And what they found was that, yes, the personal computer did destroy about just under 3

million jobs. So, if you were a typist, you were likely going to lose your job as things went digital. But it turned out, it generated over 10 million jobs! In fact, the net of just under 16 million new jobs were created.

And so, what we realize is that similarly, robotics--this study was just completed by the Center for Economic Policy Research--it studied 1900 factories over a 10-year period of time in Spain. And what they found was that those companies that did not invest in robotics hired 20% fewer people over the 10-year period. Those that invested in robotics, hired 50% more people.

And so, I believe we're going to need more skilled technicians in the future. Yes, there will be robots, but there are going to be more robots that need to be maintained, installed, designed, optimized, improved. And so, my advice to those skilled technicians is to learn about this innovative new digital technology, because you will actually be in short supply in the future.

Mike: Sure. Good, great comment there! Here's the last question I've got for you Mark. As you think about the workforce that enters Stanley Black & Decker, you might have a sense of what their skills are or maybe what skill gaps there might be. If you were talking to, let's say, community college and technical educators around the country, many of whom are listening to this podcast, and you had to say the one thing you could do to better prepare the folks coming into our workplace, could you say something like that, Mark? Or could you give them a sense of what you're seeing?

Mark: I think to those community colleges and to those technical colleges and institutions preparing the workforce, you want to provide two things. First of all, we need "more." But more of what?

We need two things. One, certainly we need the new digital skills. So, skills in computing, data analytics, robotics, artificial intelligence. And these skills are no longer esoteric. These are the skills that you can master in a few months of time because they've been made to be much more learnable subjects. But, of course, those are certainly things you can be a lifelong learner of as well.

Mike: Right.

Mark: But, in addition to those hard skills, we also need soft skills. Because the soft skills are the hard skills. That

is, we need people who have learned how to learn. Why? Because, if we know nothing, the future will be different, will be constantly changing. We need people who can communicate, who can read well, and can write effectively. And we also need people who can collaborate, who are very good at listening, and very good at understanding, and empathizing. So, I think those soft skills, as well as the hard skills, are two key things that we want from those candidates of the future.

Mike: Perfect, Mark. You know, today in our discussion, I really appreciated your insights, especially on the digital side, right? The "digital literacy," so to speak. The digital mastery that our current workforce and our workforce entrants... They just have to have to help move things forward.

And then your comments, in addition to those skills, as you just mentioned, those soft skills, the ability to work together, to be able to understand what drives a business. I think those are important things for making our industries more competitive.

Mark: I agree, Mike. One of the comments I'd make is, is I am really actually jealous about those new workforce entrants, because it is going to be such an exciting future. We are living right now in what we call a "VUCA world." V-U-C-A. V for volatile; U for uncertain; C for complex; and A for ambiguous.

And this VUCA world also is a world of extreme innovation, where innovation everywhere, innovation of everything, and innovation by everyone is creating an amazing, unbelievable future. And for those who learn new knowledge and skills the fastest, those who could contribute the most and who collaborate most effectively, will be the ones who will succeed.

And the skill trades offer an amazing on-ramp to a career that is, not only financially rewarding, but it's also very personally fulfilling with continuous learning and an ability to make a positive impact on our lives, if not our planet.

Mike: Alright, that's just a great wrap up comment. I just appreciate your vision there. And you and leaders in the workforce today are just really, I think, helping move things forward. Mark, thank you for all the time today. I appreciate your comments.

Mark: Thank you, Michael. It's a pleasure to speak with you.

Mike: That's it for today, listeners in Mark's comments, two things really struck me. Number One: the need for this "digital mastery." I mean, we all know this, but it really came out that to make the skilled workforce of the future, they must have that digital mastery. And Number Two: the ability to continually learn, right? Things change. New technologies come on. Obviously that's a need for our workforce. So, we appreciate those comments.

Here's your actions for today. Take a look at Mark's article about the skilled workforce of the future. Lots of insights there. Not a particularly long article, but really well worth reading. And Number Two: Mark mentioned the Digital Fitness app by Pricewaterhouse. So, right after this podcast, I went in. I downloaded the app to my phone. Set it up. Took the assessment. And started exploring the content. It's free. It has information for your learners, for your employees, and it has about 60 different topics in the digital realm. It's more of a way of motivating you to explore these topics, than it's deep content. There's a lot of content there, but it's really worth taking a look at. So, download it to your phone, Android or iOS, and take a look at it, and see what you think.

As always, find our podcast on preparingtechnicians.org or subscribe on Apple Podcast or Google Play. A rating and review are always appreciated. And, as you know, our series is produced by John Chamberlain at CORD. Thank you, John. The project is led by Principal Investigator Ann Claire Anderson. And thank you, Ann Claire. And our listeners: thank you, for Preparing Technicians for the Future of Work!

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