Ramona Schindelheim, WorkingNation editor-in-chief:

You're listening to Work in Progress. I'm Ramona Schindelheim, editor-in-chief of WorkingNation. Work in Progress explores the rapidly changing workplace through conversations with innovators, educators, and decision makers, people with solutions to today's workforce challenges.

Semiconductors are the backbone of the digital economy, powering our cars, planes, medical tech, cybersecurity, our dishwashers and TVs, and they are at the heart of AI. Manufacturing construction is surging in the US driven in part by federal government investments designed to bring more chip manufacturing here. Do we have enough workers in the wings ready to fill the tens of thousands of chip making jobs and other electronic jobs? John Mitchell is the president and CEO of IPC. John, thank you for joining Work in Progress.

John Mitchell, IPC International president & CEO:

Pleasure. Thanks for having me, Ramona.

Ramona Schindelheim, WorkingNation editor-in-chief:

IPC is a big association. Why don't you give us a sense of what you do, who you represent?

John Mitchell, IPC International president & CEO:

Sure. So IPC is a trade association for the electronics industry literally across the globe. We have over 3,200 member companies, about half of which reside in the US. Wherever electronics are made, IPC gets engaged. And so we cover from the semiconductors to the assemblers, people that design the products, the board manufacturers, materials, equipment manufacturers that help make all of that possible.

So we really have members that cut across the entire value chain ecosystem of the electronics creation. And we focus on standards, education, and skills development, and advocacy as well as solutions. So our role is to help the electronics industry continue to succeed as it moves forward because it's constantly changing.

Ramona Schindelheim, WorkingNation editor-in-chief:

Absolutely. And as I mentioned at the top, it's part of everything. And so we talk about the semiconductor, I think that's something that everybody really understands and really, well, maybe they don't understand how it works-

John Mitchell, IPC International president & CEO:

They've heard of it at least.

Ramona Schindelheim, WorkingNation editor-in-chief:

They've heard of it, yes. I don't think any of us understand how it works and there's so much that goes into making it. So what does go into making a semiconductor?

John Mitchell, IPC International president & CEO:

When you think about semiconductors, many people think about the processor in your computer. Okay, let's use the analogy of a car. It's the engine, the engine of your car. And it's a fairly complex thing just like an engine is. It's not just one thing. So you have the silicon and there's companies like Intel and TSMC and Samsung that really design and create the silicon, if you will. But the silicon as itself, just like if

you had the engine just sitting there, it's not really good for much, but you have all the connections and wheels and doors and electronics that tie through all of the systems. And when you put all of that together, then you end up with a car.

And so IPC likes to talk about taking things from silicon to systems because what we all use, whether it's a phone or your computer, your car, your plane, it's a system that we use. And so you're right, people have started to understand a little bit about semiconductors. Instead of the car, if you use the human body, it's really the brain of the system. But a brain sitting on the desk is not good for too much unless you're Frankenstein and trying to put it in something else. We try to make sure the entire system works.

Ramona Schindelheim, WorkingNation editor-in-chief:

And that makes it even more interesting that when we hear about the CHIPS Act, which has already, there's over $200 billion in commitments to building here in the US. It's not just a handful of people who are making that little bit of silicon into that chip.

John Mitchell, IPC International president & CEO:

The brain.

Ramona Schindelheim, WorkingNation editor-in-chief:

It's a lot of people. Yeah, the brain. It takes a lot of people to bring that to life. So how many jobs do we have in the US that fall into those categories?

John Mitchell, IPC International president & CEO:

So the estimates right now that I'm seeing as a result of the CHIPS Act and bringing more chips manufacturing to the US is anywhere between 20 to 45,000 jobs. As I look at that in terms of what kinds of jobs those are, a lot of those are indirect jobs. They're not necessarily working in the semiconductor industry per se. If you were to create a plant in Ohio or Arizona or someplace like that, there's a certain number of workers and then there's this infrastructure to support those workers. They have to eat places, they have to sleep places, things like that. And then a good chunk of them also are the construction workers that are building these factories right now.

Ramona Schindelheim, WorkingNation editor-in-chief:

You talked about it a little bit already, that there's a lot that goes into this body, this car, and there's design, manufacturing, testing, R&D. What kind of skills do you need for those kinds of jobs?

John Mitchell, IPC International president & CEO:

On the research level, you're talking PhDs and high degrees of capabilities, but there are roles all the way along that entire chain there. So there will be some operator level positions, if you will, but most of that is being automated. So machines do a lot of that. More than operators, there's technicians, and so technicians are very much needed as well as engineers.

And as I've sat in a couple of workforce meetings on the CHIPS Act, and even in the White House, it seems to be about 50/50 technicians versus engineers that'll be directly working in the industry, if you will. Now on the ancillary stuff or indirect work in terms of construction, that's an entire field that I honestly don't know much about, but that's where the bulk of the jobs actually are, between construction and the indirect stuff it looks like from what I've been able to see in the estimates.

You don't have to have a degree. You could be coming out of the banking industry and say, "Hey, I really want to work in the electronics industry." And one of the things that IPC does is we have credential programs where you can literally get a certification or a credential and develop those skills very quickly in a matter of hours. And you could be starting helping out in an electronics factory and then you continue to add from there. So there's stackable credentials and there's pathways.

So say I want to become a quality assurance supervisor, there's a path that you can build as you go in there, but getting started can be very, very quick. And that's one of the things that we do as an association because frankly, companies aren't designed to be education institutions. They're designed to build this stuff and a lot of them have to do that, and we're trying to support them in that across the industry.

Ramona Schindelheim, WorkingNation editor-in-chief:

I read that one of the things you have is a registered apprenticeship program.

John Mitchell, IPC International president & CEO:

We do.

Ramona Schindelheim, WorkingNation editor-in-chief:

That's new, right? Fairly-

John Mitchell, IPC International president & CEO:

Yeah, as of last November, we're the first federally recognized electronics apprenticeship programs. And so we're very pleased about that and we keep adding to that. We originally had two that were approved in November, and since then we've added another one and we expect to continue to add as time goes forward.

Ramona Schindelheim, WorkingNation editor-in-chief:

So it's clear that a lot of what you support, and again, part of that that makes this brain work is the electronics. What kind of work are we talking about, the skills that you need to do that? Because again, I know that there's different levels of this and you don't need a degree, but what are some of the components that you're working with? Because I'm really interested, I was reading one of the things, and I'm going to get it wrong, wireframe? Was it wireframe? And I don't know what that is, I really don't know what it is.

John Mitchell, IPC International president & CEO:

It's maybe wire harness?

Ramona Schindelheim, WorkingNation editor-in-chief:

There you go. See, that's what it is. I told you I got it wrong.

John Mitchell, IPC International president & CEO:

It's all good. So a wire harness, think of it as your nervous system. So it's connecting your brain or various modules. If you have a radio in your car, you can put the radio in there, but if it doesn't connect to something, it's not going to work with your voice recognition system or with your phone. And so the

wire harness is really about connecting things and then transferring signals between different modules, if you will, so that you can turn on your air conditioning system. It still has to interact with the air conditioning system itself, not just the controls that you touch. And so wire harnesses, I think of them as the nervous system. So it's ways to connect and ways to transfer information.

Ramona Schindelheim, WorkingNation editor-in-chief:

So is there a lot of work in the US for that wire harness work?

John Mitchell, IPC International president & CEO:

There are hundreds of wire harness companies all over the country, and a lot of them are smaller companies. So if you'd rather not work in a big gigantic company, these tend to be medium to small size organizations and they tend to be close to where the items are fabricated because you want to put things together. So yes, there are jobs available in that area.

You were asking about skills and in general, having a pretty decent background in math, you don't have to have super high, you don't have to be doing differential equations every day. Even the engineers I know don't have to do differential equations every day, but you do have to have some aptitude for math. And a lot of the technician roles involve some programming. So getting some skills in computer science is always a good thing because these machines, you program them and set them up so that they can operate very, very quickly, et cetera.

Because a lot of these things, if you think about a semiconductor, while it may be different sizes, as you put it all together, the pieces that go in within it, and as you think about the entire electronic system, they're resistors that you can't really even see with your eye. And so picking them up with your hand is not really feasible. And so these machines do it very, very quickly. And so learning how to maintain and program these kinds of machines is a very valuable skill, especially if you want to move into the technician roles and engineer roles as well.

Ramona Schindelheim, WorkingNation editor-in-chief:

I know you have a background in engineering.

John Mitchell, IPC International president & CEO:

I do.

Ramona Schindelheim, WorkingNation editor-in-chief:

And you just said, you don't do differential engineering every day, right?

John Mitchell, IPC International president & CEO:

Differential equations, no, I don't. I enjoy doing differential equations, but I don't get the opportunity. My undergraduate was in electrical engineering. I got a master's in business and a doctorate in education, so I'm still trying to figure out what I want to be when I grow up.

Ramona Schindelheim, WorkingNation editor-in-chief:

Well, it sounds like you found a job that you can put all of that together.

John Mitchell, IPC International president & CEO:

Exactly. It's the juxtaposition of everything I've ever done and I'm having a blast. It's a great industry. And as you said at the beginning, you've got telecommunications, you've got automotive, aerospace, many, many different industries, and electronics really cuts across everything. I have yet to find any position, teaching, electronics is there, writing, electronics is there. It's everywhere. So I joke with people at the beginning of each year and I said, "I'm pretty sure this electronics fad is going to hang on for another year."

Ramona Schindelheim, WorkingNation editor-in-chief:

I think it's going to hang on and grow and grow and grow. I mean, everything that we do now is part of this.

John Mitchell, IPC International president & CEO:

Yeah, so if you're looking for a career in a place that you want to know that will have a future, electronics is definitely one of those places.

Ramona Schindelheim, WorkingNation editor-in-chief:

Do you think that AI is playing any role in your industry and is it going to be hurting the workforce or helping the workforce?

John Mitchell, IPC International president & CEO:

So I'm a big believer in tools and I look at AI as a fantastic tool. So as we were mentioning math skills and computer science skills, AI skills is another set that I think is really important for individuals to have in their toolbox, if you will.

I think about back when I was younger, we had typewriters. And if you were typing up a research paper and in chapter 12, page 27 of that chapter, you had an error and all the other pages behind it, you basically had to retype that entire chapter. That was horrible. And then we came up with word processors and everybody's like, "Oh my gosh, secretaries are going away." Yes, in many regards, those roles changed because you couldn't just do that anymore, you had to add additional skills. And I look at AI as the next iteration of the word processor, and actually it's not just in that realm, but in many realms. So I'm not really afraid of AI.

Now, if you can't use AI and you're very narrow, your job could be eliminated. There's no question. But the studies that I've seen say that approximately 50 million jobs will be impacted by AI, it will also create 80 million. And so we need to embrace it because it's coming. It's here and it's continuing to grow quickly.

But yes, it impacts the electronics industry as well. We're able to do things much more quickly when you're setting up a factory. We've been collecting all kinds of information, and AI just loves information. And as it gathers that information beyond what we're able to see, it makes us more powerful in making decisions. And so in that regard, I see it as a great boon to helping the electronics industry and many industries grow even faster.

Ramona Schindelheim, WorkingNation editor-in-chief:

You're not just in the US, you're global.

John Mitchell, IPC International president & CEO:

Yeah.

Ramona Schindelheim, WorkingNation editor-in-chief:

And what do we see globally in the electronics industry then?

John Mitchell, IPC International president & CEO:

It's an interesting experience that's happening literally right now. So let me tie it to the semiconductor piece that we talked about a little bit with the CHIPS Act. TSMC announced a plant, I think it was back in, I want to say it was around 2020, maybe a little bit later than that, maybe it's 2021 in Arizona. Shortly after that, they announced a similar plant that they were going to build in Japan. The Japan factory has been producing chips since February. Our factory here in the US is not even built yet.

So we in the US get in our own way a lot. So instead of having chips coming off the line today, they probably won't happen until almost a year after the Japanese factory because of various challenges and it's complicated. It's not a simple, oh, we just didn't have enough people. It's the right people and working in a way that's trying to actually accelerate these things.

So when I compare and see how different countries are trying to move quickly, the US, while we are putting a lot of funds behind it, and that's fantastic, we're getting in our own way. We're not as effective as we could be. We literally could be having those chips coming off the factory today because our factory was announced before the one in Japan was. They just prioritized it and made sure it could happen.

Ramona Schindelheim, WorkingNation editor-in-chief:

What do you think is standing in the way then? Because if the money is there and it's not necessarily the workforce, what's in the way seeing that there-

John Mitchell, IPC International president & CEO:

Well, some of it is the workforce. We don't have the people that are ready to go, and I think some of it is regulation issues as well in terms of we said, "Hey, yes, we approved building this thing there," and then there's a lot of political pressures there that drive me crazy. Like I said, it's complicated. There are certain roles that we don't have the skillsets for here. And when we try to bring them in from overseas, as I've read in some articles, it seems like people get upset about that. And so, oh, well, we're taking jobs away from people here, and so if they're going to do that, then apparently we're going to rather go slowly.

Ramona Schindelheim, WorkingNation editor-in-chief:

I've read that the companies that are starting maybe in Arizona or Ohio where construction is starting, one, they are having some of their own workforce issues, not having enough skilled trade workers-

John Mitchell, IPC International president & CEO:

Yeah, that's part of it as well.

Ramona Schindelheim, WorkingNation editor-in-chief:

Yeah, I've read that. And actually I'm going to speak to someone later in another podcast recording. I'm going to speak to a researcher who was looking into that skilled trade. We need plumbers, welders, et

cetera, to go in and build the factories. And then are the companies themselves who are building this infrastructure to build out chips, et cetera, are they working with the local community to find that workforce, to upskill that workforce? Do you know any examples of how that might be?

John Mitchell, IPC International president & CEO:

I know that's definitely the plan and what they've been doing here and in the other country. It just seems to go slower here. It's almost as if while we said it's a priority, we're not acting like it's a priority. Like you said, in terms of construction, it's not like we don't have plumbers, welders in this country, but have we relocated them to the locations that we need them to get these things built? Have we prioritized this? It doesn't seem like it when I compare it with this other factory that Japan did prioritize it and that it's up and running.

It's just a very specific example. How do we compare with other countries? Again, I wish I could point to one thing and say this is the problem, but it's not one thing. There's a lot of things that we do that get in the way of growing as fast as we could here. If everybody's excited about bringing semiconductors and other roles back into the US, we're not necessarily streamlining those processes to make it happen.

Ramona Schindelheim, WorkingNation editor-in-chief:

So what would you like to see moving ahead, let's say the next couple of years? Do you have some recommendations on how we can maybe speed up that process?

John Mitchell, IPC International president & CEO:

Semiconductors are going to take a little while. It's not happening tomorrow. And while we're building that, if we don't build the right ecosystem around it for the entire system, if you will, we're going to end up actually lengthening the supply chain. Let me just limit it just to semiconductors.

So creating just the silicon is nice, but if you don't have something called substrates and OSATs, the advanced packaging, the way you put it together, which right now we really don't have in this country, we're going to end up sending those chips over to Asia, have them packaged, and then have them bring back them over here. So it actually will lengthen the supply chain.

What I would have the government to do is really prioritize the key industries across the entire ecosystem to build those systems. So you've got the chips and we're investing a ton of money in the chips because it takes a ton of money to make chips. For much smaller investments, you need to invest in advanced packaging, in the printed circuit board industry, the assembly industry, and those key components.

I'm not saying bring everything back because that would be cost prohibitive, but the key things. As long as you have that capability and then if you end up with another pandemic or something else that disrupts the supply chain, you can build the rest of it through other means.

Ramona Schindelheim, WorkingNation editor-in-chief:

While we're doing these investments in the US saying we're building these chip factories, I'm summing up what I think you're saying, which is if we don't do the investment around it for all these other parts that help our body function, that help our car go, we're not going to be able to really be as competitive as we want to be globally.

John Mitchell, IPC International president & CEO:

That's right. I mean, because basically it's like we're creating brains and if we have nowhere to put them, we're going to have to send them over to the people that make the bodies.

Ramona Schindelheim, WorkingNation editor-in-chief:

That's a very graphic way to describe it, but I think it's very effective. Is there anything else that you think I should know about and we should know as an audience about the industry, about how important it is in our country and where are we going in the future?

John Mitchell, IPC International president & CEO:

So electronics is doing nothing but growing and growing fast. So it is an exciting industry. If you're interested in getting more engaged, there are roles for you. There are many, many unfilled jobs across all different parts of the industry. It's not just semiconductors, although that's an area that's growing.

And so if you're looking to get engaged, we're really excited about the work that IPC is doing to help provide those things through those apprenticeships or internships or credentials to really help anybody who wants to get involved in electronics and have a great industry that has a fantastic future.

And so the thing that I would love for all your listeners to hear is that electronics is here to stay. There's a constantly evolving set of opportunities, and so building some key building blocks that can stack on top of each other through programs that IPC offers, as well as perhaps your local community college or other locations, will help you have a secure future and that's great.

Ramona Schindelheim, WorkingNation editor-in-chief:

John, thank you very, very much for joining Work in Progress.

John Mitchell, IPC International president & CEO:

My pleasure.

Ramona Schindelheim, WorkingNation editor-in-chief:

I've been speaking with John Mitchell, president and CEO of IPC. I'm Ramona Schindelheim, editor-in-chief of WorkingNation. Thank you for listening.