

*Kuehne+Nagel's Inside Semicon*

**Episode #2**

**Bringing home the chips**

John (00:02.638)

Welcome to our podcast series Inside Semicon. And in today's episode entitled Bringing Home the Chips, we will be talking about Nearshoring, the EU Chips Act, and challenges within the semiconductor industry in terms of qualified workforce and where to find them.

**John (00:2:35.98)**

Hello everyone and welcome to this episode of Inside Semicon where we'll be following up on our previous episode on resilience. And we're going to tie that in with the EU CHIPS Act and with the US CHIPS Act. So my name is John Desmond. I'm the VP for Key Accounts for Semicon and High-Tech in Europe. Today I'm joined by my colleague and friend Lars Eger from Germany. Lars, if you'd like to introduce yourself, please.

**Lars**

Hello, John. My name is Lars Eger. Yes, as you mentioned, I'm the leader of the High-Tech and Semicon team in Germany. Looking forward to that episode.

**John**

Yeah, and I think from our point of view as well, Lars, it's good that you are German, because when we look at the amount of companies coming into Europe that are reshoring, that are coming back home, hence the title of the podcast, Bringing the Chips Home, it's important that we actually look at Germany, because that's one of the biggest countries, which will have the biggest amount of investment coming in. I'm just wondering, from a German perspective, how do you see...

the advent of all this new infrastructure coming in, and these new companies such as the Intel's and so on into Germany. How was that played out in Germany from your point of view?

**Lars**

Yeah, well, one of the lessons we learned is to get the reliance on the, we are relying on the Asian market on the semiconductor production. If it, yeah, on the production and on the packaging and everything. So I think, yeah, Germany and Europe need to be more independent from all the others.

And that's a chance to get that done now in Germany with all the investments we've had in the East part, especially in Germany. And yeah, and where we are on regular base now within Kuehne+Nagel.

**John**

I think as well, if you look back at the production, say, going from the last two years, actually over the last 10 years, there was nearly 90 % of the world's revenue. And hence, well, not really the world's production, but the revenue coming out from Semicon, it was all going to Asia. So the overall alliance was that if you look at that forward, it's a heavy alliance, 90%. So the latest figures are now that we're looking for you to get 30 % back of the chip market by 2030. The US is likewise trying to get 30%. It did have 40 % back from Bloomberg when I looked at the research statistics on that.

**John (02:44.078)**

that there was a 40 % back in the early 2000s and that dropped off to 12. So they do want to come back as well. So then when we actually bring these chips back home and we look at how we're going to put more resilience in, into Europe and into the US so that we're not heavily reliant on the Asian market, then we see that the influx of, you know, companies such as Intel, STMicro, Infineon, Bosch, I mean, the list is quite endless really. And it goes into the trillions for the investments.

But again, the majority of it being in Germany. And I think that kind of leads us onto the next area. So we have the investments going on. We have the companies coming in. We know the countries are going into. But you can see then that there's going to be a lot needed in terms of infrastructure. And again, looking at, say, Germany, because obviously, you've been German, the town, and I keep getting this wrong, Lars, is Magdeburg. Magdeburg, I keep calling it Magdeburg. So the town Magdeburg is, you know,

If you look at the location of it and you see, you know, there's like really kind of one road in, one road out, and then you look at the logistics of that, how, you know, do you feel that that's going to be able to develop over the next, you know, four or five years?

**Lars**

Well, Magdeburg, I'm not that familiar with Magdeburg. I just the hotspot, one of the hotspot is Dresden, of course, and in Dresden already today, every fifth chip of building in Europe is built in the Saxonia region, around, that's a country around Dresden. So, and yeah, Magdeburg will be very close to that, but will be on a later stage, I believe. So now at this moment, you're talking about Bosch, you're talking about Infineon now, the TSMCs and everybody's head. So that will come along. And that's a massive impact of the whole region.

**John**

So. Yeah, and I think that impact as well will be...compounded by the fact that not only will you have the fab facility being set up with the sub fab, but then you'll have to have all the ancillary companies coming in because as we mentioned the last episode when I was with Tom Mulders, we mentioned about the baking the cake that is not just about the final product, but it's about all the other ingredients that go into making and I see an integrated circuit. So you're going to have the gases companies coming in, you've got the chemical companies coming in.

**John (05:08.75)**

the air purifiers, so on and so forth. So it's not just about the fab itself. There will be just as many jobs created and just as much in terms of logistics to move around the ingredients that go into making the

chip. I think if you look at where they've located, which is right on the river, they have access to water as well, which is inherently required for the cooling and purification of various gases and so on.

So they have a lot going on there. That kind of leads into where the people come from. Because you have a lot of engineering jobs, you have construction jobs, and you look at Magdeburg, and it's really a small town. So then you have to look around it, and you see you've got Leipzig and Dresden, like you mentioned. What other centers are there, university-wise and people-wise?

**Lars**

Yeah, they have a close relationship to the... They grow up step by step in Dresden. Now in a massive way, yes, true, but they have a close relationship to the Fraunhofer Institute, to all kinds of research institutes and to the university. But however, human resources is really getting talents attracted is a topic. So what they do is also they hire from abroad, people from abroad to come into Dresden providing them a full package once they identified that there's a need, clear need of that. And that will be, I think, that will be driven by all the new companies coming along. How do they want to make it? I don't know at this moment. Yeah. I understand. I think when you mentioned about bringing people in from abroad, you'd have to look probably towards India.

**John**

I think we were talking about this last night over dinner, that while initially we can actually offer positions to people from India and they have a good educated workforce, the issue will be in say four years time, we do know that a lot of semi-con companies will be starting up there as well. So then they will be looking for the educated people who are now located in Germany. So then they could actually end up going back home to India. And then there's another.

**John (07:29.006)**

brain drain, so to speak, within Europe. So there is definitely an issue there because if I look back to say the early 80s in Ireland, you know, when I was growing up there myself as an engineer, you know, Ireland did put a lot in in terms of attracting Intel and analog devices. The universities put in a lot of effort into driving science, technology, engineering and manufacturing, which is referred to as STEM, the STEM jobs. But it goes beyond that now because you're really looking for everything from pneumatic engineers to chemists, to biologists, because the actual technology is driving so far with material science, because materials are constantly being developed within Semicon. You are not just stuck with engineering, it's also the physics side of it.

**Lars**

Yeah, true, true. I had an interesting conversation with one of the ladies. She's running a startup agency of getting people attracted to the job. She's hiring especially from India. And yeah, the people, I thought they come here for just for the good job. No, they come here for because they have a work life balance. And at their hometown, maybe it's not possible in that way. They cannot cycle the riverside on the afternoon because it's too hot or yeah, maybe they are too crowded. And so the people like it. And then...Once they like it, they get settled and they only lose a few to other industry centers, let me say Munich or high-tech centers. So they stay and they like Dresden and I think that's a clear advantage of Dresden.

## **John**

Yeah, I think as well in this particular case with Dresden and with the German government, if I look at what's actually being invested in terms of money, the US is pumping in 40 % billion. And the Europe is probably under 27 to 30. So that's 80 billion going in over the next two to three years, because these plants have to be up and running by 2024. Or sorry, at least 2024, maybe even 2026. So there will be some delays as we've seen in Arizona and in the US. But also, if you look at the UK, for instance, they don't inherently have a

## **John (09:51.15)**

strong semi -con producing. We do know there's a company, Pragmatic, for instance, that's just started up in Durham. And there are in Newport Wafer Fab below in Wales. But when you look at, say, the German market, you have a plethora of various semi -con companies and they have a good, and Germany is renowned for its engineering. I mean, the Mercedes, the Porsches, it's all been there. The car manufacturing, the automotive is driving, it's so engineering, it's very strong there.

So I think that Germany will probably be able to attract enough people to drive this. But then when you look at in two or three years time, how do they keep that? How do you think that they'll manage to actually retain these people?

## **Lars & John**

That's a good question. How to retain? Because there is no home working from home. If you run such a plant 24 -7, you have to be on site on Sundays or today. So I don't know how that works for the young people.

Yeah, I think it's a challenge. I think it will be. I think there's something as well that needs to be looked at from an HR point of view. It's very important to know how you're going to retain the next generation of engineers, of material scientists coming through. How do you make the job likeable for them rather than if you look at, say, you know, we've come through from the 80s where it was a different environment and we've just accepted that you had to come to work, you had to be on site. And that was just the way it was. Since the advent in the last...20, 30 years, there's so many options open to people, especially digital media and being able to dial in from home, which wasn't possible back in the day. A lot more people would like to have that freedom. But with the semi -con business, you need to be on site. The machines need to keep running. You have to be constantly checking the processes. So it's a very manual operation. And there are certain elements in there that you don't have to be on site for. But I think nine times out of 10, you need to be there. But it's just how to understand and what HR will have for you.

The work cut out for them to understand how do we make this attractive, you know, and attractable to the next generation of people coming through who's going to work in Semicon. And not everybody wants to wear the suit in the clean room for a whole day. Yeah, no, I remember that. That was something that we used to joke about because by the time you get de -gowned and get gowned up and then go through the first day of shower, maybe even a second day of shower.

## **John (12:13.646)**

And then you're in what we call the bunny suit, which is basically you can just see people's eyes. And then you're walking around in that for many hours in a controlled environment for light heat, humidity and temperature. It's a strange environment to be in. And then you get to come out for your lunch break and it takes you 10 minutes to get de -gowned again. And then you come back, it takes

you another 10 minutes to get back into the clean room. So it's quite a special environment to work in. And it does actually take its toll on your body because it's humidity control and so on.

You get used to it, but it's a new environment for a lot of people. And if you didn't grow up with that and weren't used to it, it can be a shock moving from coming into an office in a pair of jeans or flip flops on a sunny day. You're always going to be getting your gown on. And it's not that it's 35 degrees outside. You still have to put on your clothes to go into the clean room. So it is an industry that needs to maintain strict standards because of the damage that it could possibly cause to the production facility. And that's something that a lot of people think we'll find tough to work in.

#### **Lars**

Yeah, another topic is all the jobs which come along of the suppliers. So there's one number. One employee at, let me say, name it Infineon, six will follow in the supply chain or in the infrastructure to get the served. So that's also an interesting figure. But that brings a lot of jobs around there.

#### **John**

Well, that's the thing we were saying earlier that for every probably one job inside, let's say in the fab, you then have outside and that's the go back to the cake, baking the cake thing. You have the, you know, you're. your chemicals, your gases. So then you have different people within the different STEM jobs. You know, you have your science guys, technology guys, your engineering people, your manufacturing people. And then on top of that, you have your gas specialists, your air specialists. And then, of course, you have all your environmental specialists as well, your quality, safety, health. So probably for every one person inside in the fab, you could have anything up to four to five people outside. I think as well for the local economy, that will also kick through because you will have a lot of people moving in, moving out and visiting.

#### **Lars (14:26.542)**

So therefore the hotels will, you know. Yeah, that doesn't cover the hotels. It's just the supply chain. So the hotels, the bakery and the petrol station, everything will follow after that. So I think, and here I think it is a clear advantage of Dresden because you have a safe environment. You have the city provides all of that at the moment. So I think it's for Magdeburg, it will be a more, more, a bigger challenge, I believe.

#### **John**

Yeah, because it's a smaller town. I actually didn't look that up before I started, but it's something that, again, I'm just curious as to the size, the actual resident population of Magdeburg. And if you think about, you know, one of the Intel sites coming on, it'll have a huge impact, you know, on the number of people that will be moving around. That kind of brings us back to the whole resilience as well. And the supply chain there, how do we move not only the product in and out, the people in and out, to even have car parking spaces? Yeah, flats and flats as accommodation. But there's, I think you were working with Silicon Saxony, you were saying as well. So you've done a lot of work with them and that has caused, you know, the, the semi-con industry has now, you know, made, like I said, there's Holland, Holland High Tech, you've Silicon Saxony. These organizations are now sprouting up to support that. But how, how are Silicon Saxony involved with that?

#### **Lars**

Well, we have, we have continuously workshops together.

And you get, I think it's one community and they started very small and it's now extending. So I think they have a different spirit because the spirit of Dresden will get it done. So Saxony, it's not only Saxony anymore, it's also covering whole Germany and a lot of suppliers. So proud that last year, 81 new suppliers are now members of Silicon Saxony, very proud of that.

These are now plus 500 companies. Yeah, and that's interesting because they built a circle around and the umbrella and we all can participate. Also, Kuehne+Nagel, yeah, when we provided more information about sustainability in the supply chain. What about taking direct flights instead of a flight via Dubai, an example.

**Lars (16:46.702)**

which will have the emissions in the CO2 reporting. And that's all interesting news for the companies. But yeah, step by step, we will grow into that.

**John**

So that would mean that, say, for instance, taking silicon's actually, that they're actually acting as a kind of a catalyst or more of a bridge between the Semicon company and say the universities or the engineering firms who are then going to be there supporting. So that wasn't there before.

**Lars**

Absolutely, yeah. And then in the sustainability workshop, for example, they start to think about supplying water together and finding really a plan how to do that and how to proceed and how to follow the goals, the strict goals and SBTI goals. For example, a lot of companies signed, yeah. But also it brings new companies, new suppliers into the game and from all over Germany.

And that's interesting because these are all customers of the future. And we can benefit by the growth of those companies. Because maybe today they just supply STMicroelectronics in Grenoble and maybe in Dresden, some companies. But we can, I think the key is that Kuhn and I can support them wherever they go, to Austin or to Taiwan or wherever. you want to be served and we can support them with our knowledge and intelligence.

**John**

Yes, I think one of the things on supporting them, which is probably good, a lot of people would say, or have the opinion of why can't we just retrofit the old fabs and make them newer. But with the fact that for every generation of microelectronic chip that comes out of the Infineon's, the Bosch's, the ST Micros, et cetera, et cetera, the Infinies and the Global Foundries and so on, you do see that there's a lot of equipment just gets bigger and bigger and bigger as the chips get smaller and smaller and smaller. So therefore, I think the cost of a fab was a couple of million back in the 80s. And now you're talking 20 billion just because the equipment is so heavy, so big, so complex that you can't retrofit an old site. It now needs to be new, new because you have newer handling equipment. You have new specifications when it comes to the control of the humidity and so on. And that leads then to.

**John (19:12.686)**

Like I said, Intel expanding within Europe, STMicro, even in Finland, the company OK Medic is also driving. So it's all across Europe. And it's not just located in Germany. But I think Germany is obviously giving the most amount of assistance in terms of funding. So it makes it very attractive for these larger multinational firms to move in there. Plus the fact that the automotive industry, which will be

taking the majority of the ICs coming out is heavily invested in Germany, who is also driving. So it's kind of a chicken and egg scenario, where you have the automotive driving semi -con, and then semicon is driving automotive. And then with the advent of AI coming, it's going to really drive things through the roof.

#### **Lars**

Yeah, and the OEMs, they build up their own semicon department, yeah. Making sure to deliver the right chips.

#### **John**

It's that as well. It's the packaging as well, because...in all Portugal where you wouldn't have expected much semi -con going on. Amcor is now there in Portugal, mainly for the testing, but you do see a lot of movement from the Intel's across to Portugal. I think Global Foundries recently moved a number, I think 50 pieces of kit from the Dresden facility to Portugal. So therefore you can see that it's not just going to be the sites in actually Germany, but they're going to be pushing a lot of their equipment. and a lot of the finished goods from country to country that moves around through the test process and the packaging process, which isn't really what we would think in logistics terms of packaging as in putting it in a box. That packaging is actually taking the cut die and encapsulating it into a package, which is where the legs that you would see come out and that's to be as well done at a different location. So the whole supply chain there is going to really...need to be looked at. I think central gravity studies and so on will need to be taken apart here.

#### **Lars & John**

Yeah, but the packaging is still, the concentration of packaging is still in Asia Pacific. I think there we need to find new ways. And I think Intel in Wroclaw is going for the back end. Yeah, I think that's right. They also have a facility in Poland starting up. So I think that will also be... That will be, I think, after 2020.

#### **John (21:33.07)**

2028 or something. Yeah, and it's a long -term plan. So definitely, I mean, these facilities won't start up at least for another year and a half. And they're staying 2026 before they open the door. Otherwise you're not independent anymore. Yeah, exactly. Yeah. Plus, I'm still not independent. And then you're going to have to move, make sure that all your suppliers are ready. So it's going to take a long journey. It's a year and a half left now before we expect the first plants to be opened up in Europe. And then we should see the reliance less on the Asian suppliers and more into Europe, even though the Asian suppliers are also following the Intel's and the ST Micro's and the global founders are coming in. Like you mentioned, TSMC, for instance, are looking to take some land and to move into Germany to be close to their suppliers.

#### **Lars & John**

And you need, if you provide them some land, they want to double the size. Yeah. You need and they need at least the chance to do that. Yeah. In a later stage. Yeah. Because then the infrastructure, the cost will be reduced if you can use that double. So that's the advantage. So yeah, we've been there. It's still a green meadow. So yeah, it is. I thought they had cut ground on that last year. No, no, no, no, no. It's still a green land. So they will start soon. I think in August. Yeah. Okay. I suppose I'm just curious then about how the infrastructure for that, because you can imagine the amount of

construction that's going to go on when they're building these sites. And that's going to be a lot of trucks moving in and around the area and can the road infrastructure take it? Well, I think it's not a problem. It's next to the Bosch plant and it's really green meadow. It's industrial estate, so nobody, I think, will be bothered by that. So that's a good thing.

I think just kind of like to tie it up then in terms of what we've been discussing for this episode of bringing the chips home that the overarching idea here is to make Europe not so reliant on the Asian producers. Because we've seen even recently, even when we did the last episode, there was an earthquake. Now production wasn't actually upset, but still it just goes to show how vulnerable...

#### **John (23:50.51)**

Yeah, the whole market is and how we have all our eggs in one basket, so to speak. So over the next year, year and a half, it'll show exactly where we need to be. But I think it's a growing organism. It's an ecosystem that will develop itself as it goes along. And we have to continually adapt the methodologies that we're using to to move the product around. But also, I think people as well, you know, where are we going to get these people? I think that's the biggest thing, because in the US as well, they do have problems.

You look at Ohio or say Texas or where they're in Arizona where they're building the new sites. One of the biggest issues that they've said is that they need to get qualified people. So maybe from, we discussed this as well last night, I think you said Tijuana, the automotive sector, just across the border in the US. They might be able to draw from there, but then people have to move.

#### **Lars**

But you need the education and all the training. Yeah. So we...takes you five to seven years to get there. Yeah.

#### **John & Lars**

And if you look at like an engineering degree, it could take you four years. So if you were to start now, you know, as an 18, 19 year old person, you're 23 and then you've just entered the market, so to speak. And then you're just on your career path within Semicon. But it's taken four years. But then I think that because it's moving so fast, Semicon, Moore's Law, et cetera, we're all familiar with that, that the speed of which is developing means that the speed of the courses will have to change. I mean, what I learned back in the 80s for semiconductor design and manufacturing, I would be laughed out of an Intel site today because I wouldn't be up to speed with the latest design, the latest chemical advances, the latest etching and metrology systems. It changes that fast. And much more process. And much more processes. Steps in there. Yeah, we were looking at that last night. That in the 80s to make a normal CMOS chip, there was over I don't know, a couple of thousand different steps along the way. And that has gone up like 40 times now. So, you know, you used to have one pattern to lay down, but now you could have 80 different patterns being laid down just to manufacture one chip, which could end up with thousands of process steps. So it's, it has, and it's going to continue to move faster and faster and continue to be more complex and the machines will get bigger and bigger.



**John (26:11.662)**

which is why you look at the latest again, I made reference to this, the latest ASML piece of kit that was moved into Intel. It's absolutely enormous.

**Lars**

Talking about new talents, we won't forget to get into the schools. And this is an initiative, an example of Silicon Saxony. They are going to school, they are supporting math because we all know that math is really important for that kind of business. So they are supporting also young girls to get attracted and to get into that topic because normally those are not that familiar, let me say. And they want to close that circle. So they do kind of introduction to the schools, go into the schools, into the universities to get that more practice. And today we're short on teachers, so even some lessons are they missed some lessons and that's not a good thing. Silicon Saxony is really supporting that. That's really nice I think.

**John**

In the UK I think as well, I just read yesterday evening Cambridge are now having a new semiconductor course being put on and they're starting that in Cambridge so I expect that to be rolled out into other courses as well and with the UK government as well they'll need to.

I suppose that you do have the engineering side. And I'll just class it as engineering rather than calling it the STEM side, but the STEM is the overarching umbrella. But at the end of the day, it's math across everything in Semicon. So it's quite tough for that to find those people, regardless of where they've come from. Not everybody likes math. Not everybody has a thing for it. I mean, I - It's logic, yeah. Well.

You could say coding is logic, but I couldn't code it to save my life. But yet some people are very, very intuitive when it comes to coding. They just think in that direction. Right. And that's the same with the engineering. You think like an engineer or you're not. It's just a different way of thinking. Coding is a different way of thinking as well. You know, you have three or four things going on, so you're working in parallel. But I couldn't code to save my life. Yeah. But yeah, luckily I was like the engineering. So it.

**John (28:30.83)**

It stuck with me, so I found that easy. I found thinking in binary a simple way. And that's what most transistors, well nearly all transistors now except for the new quantum ones, it was a one or a zero. It was an on or an off. And that's how the transistor started from what they were to what they are today.

**Lars**

Okay, John, one more question. What do you think, what will the future look like? What comes along with all the new products? chip generations and what products will come out of it and what advantages for the future?

**John**

Yeah, I wish I had a crystal ball, honestly, to tell you that, because it's moving so fast and so quick. I mean, we just look at AI, for instance. It's really grown in the last number of weeks, in the last number of months, it's really taking over. They reckon that, I think there was a Bloomberg report on the fact that 30 % of marketing is now being done by AI. So it's actually able to push out more.

on the social media platforms. So that's definitely one that's driving forward. The rate at the way the chips are developing, again, we're still adhering to Moore's law, doubling with every generation of chip. That's getting faster the whole time. But it is impacting the automotive industry. It does impact all the other industries we have there. And even down to new areas, such as med tech. That's a whole new area. It doesn't really fit within medicine. It doesn't really fit within technology.

It's the technology that's used to improve our lives and make our health better. And that's something that I think that will definitely come up in the next probably year. As the chips get smaller and smaller, we can then use what's called micro machines, MEMS. You know, I can even, I think there was some research done recently on having something to clean arteries for people. So again, you can see how they're actually becoming closer and more aligned. I mean, a classic example of where we've gone to was with automotive. I mean, the car is basically a driving computer now.

it's no longer you driving the car, it can actually drive you. So if we take the next step there, and if I again look into the crystal ball, if you take your AI, and if you couple that with something for the medical technology, then that can actually preventative, I say preventative maintenance, the engineering term, but it could do preventative health issues. Yeah, sure. That sounds exciting. Yeah, cholesterol, for instance, you know, there's a big thing, making sure arteries are kept clean.

### **John (30:54.03)**

So it is definitely the way forward. I think that we will continue to make things smaller, faster. We will definitely continue to make things more intelligent. There's a whole other discussion there at the level of Elon Musk and Google with their AI. But I think from where the level of we're at and how it affects the regular Joe on the street, I think MedTech is definitely the way forward. I mean, you look at MRI machines even, they have come down in size, they've come down in cost. And now getting an MRI isn't such a big deal anymore. We go back to...

When I was growing up having an MRI even, I remember the first one coming into the Cork University Hospital. It was a big thing that we had an MRI machine in Cork. We didn't have to go to Dublin for it. But now they're everywhere. In fact, most practices have them. They've reduced in price, but they've also become more clear. They can do more and more. Yeah, a combination in AI. Exactly. They learn a lot. They can learn. And then the self-learning as well, so it can actually pick up a lot more.

that was humanly possible. So I think that's a definite area to keep an eye on. And then moving forward from there, I mean, who knows what's next? I mean, if you'd have said to me a year ago that AI would be as prevalent as it is today, I would have said, no, we'll never get to that level. But that's something that is happening. So it's definitely the, it's just a crystal ball. It's just my crystal ball on where I think it's going. I could be completely wrong, but maybe in a year's time it could be that, you know, that we do have machines cleaning our arteries and then able to, you know, to repair our eyes, you know, you can buy it in and put it on like a pair of glasses and suddenly you have your own laser surgery. I don't know. It's just, it's a fascinating time to be alive. It's a great time to be alive because the amount of change is happening all the time. Yeah. Looking forward to that. Me too. So again, thank you for coming in today, Lars.

### **Lars**

Thank you very much, John.

### **John**

Thanks for listening to today's podcast, Inside Semiconductors and the Semiconductor Supply Chain.

If you found any of the topics we discussed interesting and you want to find out more, you can find me on LinkedIn at John Desmond or go to Kuhnen Eichels website.