



Transcript

KLA Corporation at 45th NASDAQ Technology Conference

Friday, December 3, 2021

Corporate Participant

Oreste Donzella KLA Corporation - EVP of Electronics, Packaging & Components

Conference Moderator

Joe Moore -- Morgan Stanley Research

Presentation

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Morgan Stanley and I'm happy to have with us today Oreste Donzella, who's EVP and runs the Electronics Packaging Components group for KLA. He's going to give a presentation, and then we'll have time for Q&A at the end. If anybody has questions, please e-mail them through the system, and I can relay those. Just quickly, as a safe harbor. For important disclosures, please see the Morgan Stanley research disclosure website at www.morganstanley.com/researchdisclosures. If you have any questions, please reach out to your Morgan Stanley representative. So with that, Oreste, turn it over to you for the presentation. Thank you.

Oreste Donzella - KLA Corporation - EVP of Electronics, Packaging & Components

Sure. Thank you for the introduction. Hello, everyone. I'm happy to be here, at 45th NASDAQ Investor Conference. So forward-looking statement for more details, please refer to KLA IR website.

Today, I'm going to talk about a couple of topics. One is the introduction of EPC that is Electronics, Packaging, and Components group that I have the honor to lead. And in particular, where we are with the process of integration. EPC was born as an aggregation of multiple companies that we bought in the last few years. And then I'm going to dive down into packaging market, packaging technology and explain how packaging is becoming an interesting driver for growth at KLA. So let me start with EPC first. It's all about the market expansion, diversification. That's the story of EPC group. So everything started when we acquired Orbotech and SPTS in February 2019. It was a single transaction. We acquired Orbotech. SPTS was an independent subsidiary of Orbotech. So we got pretty much 2 different companies in one. And the purpose of this transaction was twofold, was really, first of all, to extend our reach into electronics ecosystem, in particular, expanding in new markets for KLA, printed circuit board and flat panel display. The second reason was that we wanted to extend and expand our portfolio in the specialty semiconductor and packaging. And this was done with the SPTS acquisition with the addition of process equipment to our process control portfolio in these markets, specialty semiconductor and packaging. So after the acquisition was completed in February 2019, our job was to integrate all these companies, and we created an EPC group, Electronics, Packaging and Components.

February 2020 was right before COVID started to rise in Europe actually and then the rest of the world. Not an easy time for me to aggregate companies that were globally located in particular in Belgium, Germany, U.K. and Israel from the headquarter in the United States, but we were able to face the challenge and I'm really happy to see how these companies are now integrated under EPC in KLA.

ICOS was a company that we acquired in 2008 to start our presence in packaging. We found a very nice house for ICOS in EPC where we integrated with Orbotech and SPTS.

Rick Wallace has been our President, CEO since 2006 now leading 3 business groups. Ahmad Khan is in charge of Semiconductor Process Control. This is the core KLA inspection and metrology business in semiconductor front-end fabs. Brian Lorig is in charge of service for semiconductor front end. And then we have my team, EPC, that is spacing across multiple market segments, including packaging, specialty, printed circuit board, and flat panel display.

One of the narratives behind the creation of EPC was to implement the so-called operating model. KLA operating model is a set of process that we have been developing for many, many years at KLA to make sure that we instill rigor and discipline in the way how we manage our finance, how we develop new programs, in the way how we interact with our customers and our suppliers. And I would like to say that is one of the secret sauces



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of the success of KLA. And my job as a leader of EPC was also to make sure that we integrate under KLA operating model newly acquired companies like Orbotech and SPTS.

When you look how these 3 groups are present in the electronics ecosystem, going from the left to the right, you see like all the production chain of an electronic device up to becoming an integrated board in a car or in a mobile device, 5G infrastructure and so on. So everything starts from a wafer in front-end fabs, then packaging, assembly and test. The components are then integrated into printed circuit board, you add flat panel display and then you get the final product for all these industries in the new digital society.

When you look at EPC, it's very much in every single part of this electronics ecosystem and in particular it is close to the end of product. EPC gives KLA the possibility to bring the company closer to the end customers because we are much closer when we have to deal with the components in packaging or populated printed circuit board or a flat panel display. So that's really the expansion that I was explaining in the beginning of my talk. Looking at our EPC and the acquisition that we have done with Orbotech and SPTS and previously ICOS, we were able to expand our market, and get to even closer to the end customers.

Now packaging is probably the most interesting portion of the new markets we are serving right now. And the packaging is also including some portion of PCB that we call IC substrates. In this case, you can see the product portfolio that we designed in the last few years, before and after the integration of Orbotech and SPTS to serve the packaging industry. On the top, you can see process tools that come from SPTS. These tools are plasma vacuum-based, either etchers or dicers or deposition machines. At the bottom, you see process control tools. These are inspection and metrology tools that are generally coming from our front-end product portfolio and they have been customized to tailor the need of wafer-level packaging industry.

Now let me go through some slides explaining why packaging is so important, so critical. I put like in quotes there everything is hanging. That is true. So, if you look at how the semiconductor technology is advanced in the last 50-plus years, it was all about Moore's Law. It was Gordon Moore that said the semiconductor is going to scale every 2 years or every 18 months doubling the transistor density. And the biggest, enabler of the semiconductor technology roadmap was the ability to scale the lateral geometry of transistor and eventually pack more chips in the same real estate on a piece of silicon.

So we were able to do this continuously for many, many years, according to this Moore's Law. And of course, lithography was the big driver of the advances in the semiconductor technology. At the certain point though, the Moore's Law started to slow down, because of the complexity of scaling the lateral dimension of the transistor, but also because it was becoming extremely expensive. And of course, Moore's Law is not dead, we are keeping progressing our lateral scaling, in particular with EUV lithography in the last couple of years. And we will continue to scale the lateral geometry for a long time, but we need something else to augment the front-end scaling in a much cheaper and more economical way.

And this is where packaging is becoming very, very critical. And it's crucial for many reasons. It's, of course, crucial for costs and it's crucial for improving bandwidth. I'm going to talk about heterogeneous integration later that is extremely important to really speed up the bandwidth and making sure that there is not much lag time in the communication between, for example, memory and the CPU or GPU. It's also important for power for form factors. Overall, it's all about cost and performance.

When I look at back, I've been in semiconductor for 29 years, with most of my experience is in front-end semiconductor. Packaging is a new territory for me until the last couple of years. Packaging is now going from protecting a device to differentiating the performance of the entire semiconductor. There are plenty, plenty of packaging types available in the market for every single industry or every single usage of a semiconductor device.

Today, I'm going to go deeper in one of these, but we can talk about many of the innovations that are coming for every single packaging type.

I want to dive deeper in what is happening for high-performing computing chip like CPU and GPU because I believe this is where the most innovation is happening right now. And is happening because there is a secular shift from SoC that is a system on a chip to aggregation of multiple dies in a single package. So, in other words, in the past, it was an aggregation of multiple functions in single die, now this aggregation happens with multiple dies on a single substrate. All the main players of CPU and GPU are following the same trends, how to integrate multiple dies,



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different dies, memories, logic control, CPU, GPU in a single package that is vertically integrated to create also an efficiency in terms of bandwidth that I said and also form factor.

This is what we call heterogeneous integration. So, it's really enabling the scaling of the technology while keeping costs down. And disaggregation of the noncore functionalities makes the silicon chip less expensive and eventually the integration comes at the packaging level where is cheaper and more efficient to do.

So, let me say a little bit about the heterogeneous integration, what are the challenges in integrating multiple dies in a single package, and what are the roadmaps that are driving these changes in the packaging industry. First of all, we are going through smaller features size. The geometry that generally doesn't change much in packaging now is changing more and more with heterogeneous integration, but also with other type like fan out wafer-level packaging, for example. We have new materials. The packages are becoming bigger. We have new failure mechanisms.

We need to deal also with the fact that a packaging that has multiple dies inside will have even more challenges to yield. So now we are facing an integration of potential yield losses because of multiple die integration in a single package, yielding very complex packages is becoming a big challenge. So, we have a lot of challenges and a lot of opportunities in packaging for KLA to play a very pivotal role. And one thing that is important to highlight is what I said in the previous slide, when you aggregate a lot of dies in a single package, the yield is going to be a function of the yield of every single die plus the yield that you are obtaining aggregating the dies. And the yield is becoming a key factor, a key areas of concern in the packaging industry much more than in the past.

And on top of that, we also have the possibility that some of the chips failures will escape the functional and the final testing and become a reliability concern whenever the chips are on the boards that are, for example, assembled in a car or in a data center. So for that kind of reasons, we need to really to change the way how the packaging industry is approaching yield enhancement.

I have done a lot of work in the automotive market from front end semiconductor fabs, where we enabled some screening methodology for the quality of the chips in front end for automotive that make sure that we have a pre warn of potential reliability failures in line instead of waiting for the chip to be assembled on a board and eventually integrated in a car. So I believe we need to use a similar methodology for a chiplet packaging to track reliability. And this is where KLA has a long history and experience how we can really help the industry.

Of course, in order to be successful, this is KLA playbook, we need to work with all the customers and key relevant players. So there are plenty of customers who are now investing heavily in heterogeneous integration, multi-die packaging, including the top semiconductor companies, the Fabless and eventually also substrate fabricators because substrate is becoming a key component of the entire package with heterogeneous integration.

And as I said, we can offer multiple areas of collaboration. We can offer collaboration in implementing new architecture of die stacking process with our SPTS process equipment. We can collaborate with our customers on defectivity reduction and metrology process control. Even in the automation that is extremely important factor in semiconductor front-end manufacturing where has been adopting for many, many years to generate enough data, relevant data to create process optimization.

This concept is unknown in packaging. And we will see more and more automation entering the packaging industry, and this is where KLA can provide an incredible help to the entire industry.

The next inflection in heterogeneous integration is going to be doing bumpless integration. And this is what people refer as hybrid bonding. In hybrid bonding, of course, you don't do thermal compression bump-based bonding but you do copper-to-copper bonding. Of course, in this case, you have a huge benefits in terms of speed bandwidth of our efficiency. But on the other hand, you are getting a lot of challenges in terms of inspection, metrology and process integration. We are doing a lot of work with the top customers to develop integration process flow with all the inspection and metrology steps are needed to be successful in hybrid bonding.

So just to close my speech, I will say, advanced package is a terrific opportunity for KLA. And we are seeing already benefits in our revenue. When I was in Investor Day 2019 in New York City. At that time, we started outlining our presence in packaging. And you see for us, at KLA, packaging has



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been a very small market, growing at 12% from 2014, 2018, but in 2019 when we started integrating Orbotech and SPTS, and in 2020 with the creation of EPC. and now 2021 that you see from the forecast a huge growth explosion for KLA revenue in packaging.

We see 3 times the CAGR in the last 2 years since the acquisition of Orbotech, SPTS and aggregation to EPC group versus the past history of revenue rend at KLA. All in all, it's great time for advanced packaging and extremely exciting time from revenue growth, financial, but also technology complexity and for whatever KLA can offer to the industry.

This is the end of my presentation. I hope you enjoy it. Really excited about talking about packaging that is going to be a big driver for growth for KLA in the next future.



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Question and Answer Session

Joe Moore -- Morgan Stanley Research

Great. Well, thank you very much for that. That's very interesting. I'll start with some questions, and then if there's anyone in the audience, I think you guys know how to submit questions through the system. I'll come to my e-mail, and I'll relay them. But I'll start. So you're nearing now year 3 since the acquisition of Orbotech, and I guess a little longer than that from ICOS, right? Seems from the outside the integration has been pretty seamless. Has anything surprised you as you've sort of combined the companies and anything in the integration process that's kind of upside or downside relative to your expectations?

Oreste Donzella - KLA Corporation - EVP of Electronics, Packaging & Components

Yes. Let me say we completed the transaction of the acquisition Orbotech in February 2019, it's almost 3 years. And we started integrating with ICOS and SPTS in February 2020. So it's less than 2 years ago. And I cannot be happier to say that we are ahead of our revenue and profitability targets.

I would say, there are a few reasons why we have been successful and makes this integration seems seamless. Of course, there is a lot of work that is going in an integration of a large company like Orbotech and SPTS.

But let me say 3 reasons. First reason is we have been very, very clear what we wanted to achieve with this acquisition. We wanted to expand our SAM reach into new markets and extend our presence in specialty semiconductor and packaging with the integration of process equipment tools from SPTS. So we did that. We have been consistent with our deal thesis why we wanted to buy Orbotech and SPTS.

Second, we wanted to buy leaders in their own industry. We wanted to buy companies that KLA can provide help, either technically or from market acceptance. And let me give you a couple of examples. Technically, for example, the next generation of automated optical inspection in PCB and substrates is coming with the optical modules designed by KLA. So in other words, you see already the synergy between whatever was Orbotech before and what is KLA starting to integrate technology from KLA into Orbotech products.

From a market point of view, we got access to customers for Orbotech and SPTS that they couldn't get any access before. So our ability to open the door with top semiconductor companies in packaging is clearly benefiting the former Orbotech and SPTS divisions.

The third thing is the ability to implement the KLA operating model. And I think this is essential. So you asking me, are you surprised? I'm not surprised because we know how resilient and strong our operating model is. And actually, if I'm surprised a little bit, is in the fact that -- now looking at these large companies we buy, we figured out even more how strong our operating model is.

For example, the rigor that we have in developing new technology, so any time we ship the first tool out the door, the tool is ready for prime time without scrapping material or redesigning parts. This is what we call PLC, product life cycle. This is our way to develop technology. Orbotech and SPTS didn't have this kind of discipline before. Now we are integrating and they are getting a lot of benefits from it.

So again, I didn't get really surprised for all these reasons. And I believe this was good and seem that the integration is simple despite as a lot of work and effort went in with no major hiccups.

Joe Moore -- Morgan Stanley Research

Yes. Good to hear. So -- and I guess, another reason I was excited for your presentation is that there is so much discussion of advanced packaging from your customers. 10 years ago, I don't remember CEOs talking about it. And now when I meet with Pat Gelsinger or Lisa Su, it's a major topic and not just is something we're talking about, but as a way of really building advantage into their business. How does that affect the fit? Because I think it does really elevate the importance of these technologies to your customers?

Oreste Donzella - KLA Corporation - EVP of Electronics, Packaging & Components

Yes, absolutely. As I said, it's a roadmap enabler right now. So, it's a combination of performance and cost that is driving big interest from the top semiconductor companies in advancing the packaging roadmap. And we see clear benefit to KLA because the complexity is driving process



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control business. And as I said in the presentation, putting all these dies together in a single package is uncovering a lot of challenges in terms of yield reliability and KLA is there to help.

Think about, Joe, if packaging was not going to scale as much as is today, maybe we were not going to invest in packaging. Maybe we had like ICOS only for assembly and test, dominating their market applications. But the way how wafer level packaging is progressing right now is really exciting and KLA is there to invest more and more.

One of the reasons why we acquired Orbotech and SPTS is actually because we saw an opportunity with level packaging to play a bigger role. I'm not surprised why the top semiconductor CEO are mentioning packaging all the times because this is an enabler and is a differentiator for them. And I'm not surprised either to see KLA investing more in packaging because the complexity will drive more process control and process integration challenges that we can help with.

Joe Moore -- Morgan Stanley Research

Yes. And you had mentioned in the presentation, chiplet yield and some of these other issues. And it kind of raises the question, outside of packaging, how do these developments affect KLA's overall process control business? Because you have smaller die, more heterogeneous die, like how does that affect the way people pursue overall yield management and process control?

Oreste Donzella - KLA Corporation - EVP of Electronics, Packaging & Components

Very important. And I believe -- first of all, of course, process control is becoming more complex because what you said in terms of small die, large package, vertical integration, 2.5D, 2.1D integration, with plenty of challenges. On top of that, I believe one thing that I'm very excited about it because I like to see a big change in packaging industry is the usage of data and automation.

I know the top semiconductor companies are looking at that. We are getting a lot of requirements now to do more data automation in the wafer level packaging, even at IC Substrate level. Think about PCB, which is not automated at all, trying to transition into EFEM, SECS-GEM protocol, automation, data analytics in a packaging fab or in EC substrate fab is something really revolutionary. So I believe this is going to be a big, big factor in the near and long-term future in this industry. And the KLA, of course, can play a huge role because we have experience in data analytics, ultimately, we are a data company.

We develop incredibly advanced and sophisticated technology to solve very critical problems. But at the end, we are a company that deals with data all the time. So we can help with data automation of packaging and substrate industry as well.

Joe Moore -- Morgan Stanley Research

Great. And I guess, as you look at these trends going forward, I mean it's -- we've seen already a pretty big advantage to companies like AMD with maybe 4 die in the package. But some of the complexity going forward seems pretty significant. Intel was telling me that Ponte Vecchio, I think at one point, they're talking about 70 different tiles in Ponte Vecchio. So really, in order of magnitude more complexity than we're seeing today. How does that change the opportunity from your perspective? What opportunities does that open up as you get...

Oreste Donzella - KLA Corporation - EVP of Electronics, Packaging & Components

Yes, increased complexity in process control, increased data, increased automation and so on. I want to mention also another point that we are seeing on the process side, not process control, more and more adoption of plasma dicing. So today, the way all the customer singulate wafers in multiple chips is with mechanical or laser dicing. But because the cleanliness standards for hybrid bonding or in general for heterogeneous integration is so important, now people are looking more and more to dice wafers wafer with plasma. This is a completely new opportunity for our SPTS division here in U.K.

It's another way to see KLA playing a big role that you couldn't expect before SPTS or Orbotech acquisition, KLA became a key player in a plasma vacuum-based type of technology and this is happening in packaging because many, many things are happening in packaging.

Joe Moore -- Morgan Stanley Research

Great. And I guess we have one last -- last question for me would be, the intuitive thing to me, as a semiconductor analyst is these kind of CPU opportunities where we've seen the stacking and the benefits of it. But you also talked about areas like antenna and package, those kinds of things.



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How pervasive do you see that? And how -- do we see areas like smartphones and analog area is becoming a bigger driver for you going forward in these markets?

Oreste Donzella - KLA Corporation - EVP of Electronics, Packaging & Components

Joe, thanks for the question. Actually, it gives me the possibility to talk about another driver that is 5G. You mentioned antenna package. With the 5G millimeter wave, now a fully integrated RF front-end module requires also the antenna to be integrated with RF front end, switches, RF transceivers, power amplifiers and so on in a single package generally done in SIP.

The reason why you do that is twofold. First signal integrity and second is form factor. And the package is becoming more and more critical. In fact, we see an increasing demand for our ICOS advanced technology because these integrated packages are very complex SIP packages with all these functionalities that need more advanced technology. This is why we see our component inspection business growing quite a bit this year.

And on top of that, in order to make sure that you meet the signal integrity and impedance requirements, you need to go to the next level of PCB quality. So we see a completely different part of our business taking advantage of this antenna packaging for 5G millimeter wave, which is in the component inspection and PCB. The fact that KLA is so diversified now with EPC playing in multiple markets, give us the possibility to benefit and leverage all these drivers that are happening in the electronics ecosystem.

Joe Moore -- Morgan Stanley Research

Great. Well, with that, we're out of time, but this is a really interesting look at a new growth area within semiconductor. So I really appreciate your time today.

Oreste Donzella - KLA Corporation - EVP of Electronics, Packaging & Components

Thank you, Joe. I appreciate it. Thank you. Thank you all. Goodbye.