

Company Name: ASML  
 Company Ticker: ASML NA  
 Date: 2018-10-17  
 Event Description: Q3 2018 Earnings Call

Market Cap: 65,919.34  
 Current PX: 152.78  
 YTD Change(\$): +7.63  
 YTD Change(%): +5.257

Bloomberg Estimates - EPS  
 Current Quarter: 1.753  
 Current Year: 6.008  
 Bloomberg Estimates - Sales  
 Current Quarter: 2967.588  
 Current Year: 10754.893

## Q3 2018 Earnings Call

### Company Participants

- Roger Dassen
- Peter T. F. M. Wennink

### Other Participants

- Krish Sankar
- David Mulholland
- C. J. Muse
- Mitch Steves
- Andrew M. Gardiner
- Alexander Duval
- Stéphane Houri
- Mehdi Hosseini
- Sandeep Deshpande
- John William Pitzer
- Amit B. Harchandani
- Tammy Qiu
- Adithya Metuku

## MANAGEMENT DISCUSSION SECTION

### Roger Dassen

#### *Financial Highlights*

##### *Net Sales, Revenue, Gross Margin, R&D and SG&A Expenses*

- I will first highlight some of Q3 accomplishments and then provide our expectations for Q4 2018
- Q3 net sales came in at €2.78B, which was towards the higher end of our expectation
- Net system sales of €2.08B was a bit more weighted towards Memory at 58%, with the remaining 42% from Logic
- EUV revenue of €513mm was from five shipments
- Installed Base Management sales for the quarter came in at €695mm
- Gross margin for the quarter was 48.1%, just above our expectations, reflecting the strength of our Deep UV and Applications business, as well as the progress in EUV profitability
- Overall R&D and SG&A expenses basically came in as expected with R&D expenses at €397mm and SG&A expenses at €122mm

#### *Balance Sheet*

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Turning to the balance sheet, €362mm worth of shares were repurchased in Q3

This leaves around €1.7B of the 2018-2019 share buyback program remaining

We ended last quarter with cash, cash equivalents, and short-term investments at a level of €2.95B

### ***Order Book***

- Moving to the order book
- Q3 system bookings came in at €2.20B
- Memory order intake continue to be strong at 64% of total value
- Logic made up the remaining 36% of the bookings
- We took five new EUV orders in the quarter, which contained a mix of both Logic and Memory

### ***Q4 2018 Guidance***

#### ***Net Sales and Expenses***

- With that, I would like to turn to our expectations for Q4 2018
- We expect Q4 total net sales of about €3B, leading us to expect another record year with close to €11B of revenue
- Our total net sales forecast for the quarter includes around €500mm of EUV system revenue from five EUV systems
- We currently expect to ship six systems in Q4, including one EUV system to a collaborative Research Center, imec, which will not be recorded in revenue but will be used to settle R&D services from imec

#### ***EUV Shipment, Production, Order Flow and Revenue***

- Q4 will be our highest EUV shipment quarter-to-date bringing the total to 18 systems in 2018
- Due to a combination of EOY production challenges and customer readiness, we now expect a couple of the originally-planned 2018 systems to ship in early 2019
- We expect the EUV order flow to continue next quarter such that we will basically have our 30 systems planned for 2019, covered by purchase orders by the end of this year
- We expect our Q4 Installed Base Management revenue to be similar to last quarter at around €700mm

#### ***Gross Margin, R&D and SG&A Expenses***

- Gross margin for Q4 is expected to be around 48%
- Taking Q4 guidance into account, gross margin for the full year would be around 47%, which is a step-up from last year's 45% gross margin
  - This reflects the strength of our Deep UV and Applications business, as well as continued progress in EUV profitability

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- The higher R&D expenses for Q4 of about €420mm are due to an acceleration of the NXE:3400 roadmap and the High-NA EUV program
- SG&A is expected to come in at about €135mm
- We remain excited about 2018 as the customers' demand for our products continues to be strong
- We look forward to delivering another record year with continued strong growth in both sales and profitability

## Peter T. F. M. Wennink

### *Business Highlights*

#### *Sales and Demand*

- As Roger highlighted, we had another good quarter and we expect Q4 to be even stronger
- With the current guidance, we expect that our sales for the year would be close to €11B and then our profitability would improve over last year
- We continue to see strong demand for our products in both Logic and Memory, as witnessed by our strong order book
- Logic customers continue to ramp to 10-nanometer node and are also starting to ramp 7-nanometer
- As customers prepare to ramp-up the 7-nanometer node, it not only drives the EUV demand but also drives a significant demand increase for EUV

#### *DRAM and NAND*

- In DRAM, customers are continuing with technology migrations as well as adding wafer capacity additions to meet bit demand growth as evidenced by our strong third quarter order intake for Memory
- We believe that the limited number of wafer capacity additions by a limited number of customers combined with a healthy demand for DRAM bits should not lead to a structural overcapacity in this industry segment
- In NAND, a significant 2D to 3D conversions have taken place next to investments in several greenfield fabs
  - This is likely creating a period of some digestion as we mentioned in the prior quarters

#### *China*

- With regards to China, we continue to see strong demand for a broad suite of our products
- The China region has delivered around 20% of our sales this year and is on track to set another record revenue number
  - And this is driven by both multinational customers as well as domestic China customers
- And all five domestic customers that we discussed in prior quarters have at least some pilot capacity in place now and are looking to begin the ramping next year
  - We believe this region presents a significant growth opportunity under the assumption that these ramps of the domestic customers are successful and that the non-domestic customers will follow through with their investment plans

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### ***EUV Business***

- On the ASML product side, let me start with an update on our EUV business
- In EUV, we continue to make good progress
- We have multiple NXE:3400 systems at customer sites that are running at 125 wafers per hour or higher, and are ready for high-volume manufacturing
- Availability is progressing in support of customer volume ramp, with a clear focus on machine consistency
- The overall progress has led to the decision to accelerate our EUV roadmap and we are as a result of this now planning the introduction of our next generation, the 0.33 NA EUV system called the NXE:3400C in H2 2019
  - This system will deliver a productivity of over 155 wafers per hour
- And we will talk more about the performance specifications and the roadmap during our Investor Day next month

### ***Shipments and Production***

- As Roger mentioned, we continue to increase our shipments per quarter and plan to ship six systems in Q4, bringing the total to 18 systems in 2018
- As we mentioned in earlier calls, this year, our production output is heavily back-end loaded, which has led to some production output challenges combined with customer fab readiness logistics
- We now plan to ship a couple of systems originally planned in 2018 now in early 2019
- And our shipment plan for 2019 remains at 30 systems, as we now have an increased mix of the NXE:3400C systems in H2 2019
  - Which will enable a significantly higher wafer output capability than the earlier specified 125 wafers per hour

### ***Capacity Plans***

- With this higher productivity, we expect that we'll be able to meet our customers' current EUV capacity plans in 2019
- And as Roger mentioned, we expect order flow to continue next quarter, and expect that our 2019 demand for EUV is covered by orders by the end of the year
- In Deep UV, the introduction of the NXT:2000 system into the market is making significant progress and will be used in volume manufacturing for both Memory and Logic
- We're also seeing significant demand for our dry products in support of a number of greenfield fab ramps in China and other regions

### ***Applications Business***

- In our Applications business, we continue to see growth across our full portfolio of Software and Metrology products, notably related to the adoption of our YieldStar 375 system, expanding from Logic and DRAM, now also into 3D NAND manufacturing

### ***Summary***

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To summarize 2018, we expect the growth to continue from Q3 to Q4, and set us up for another record year in both sales and profitability

Now, regarding 2019, it's a bit too early to provide detailed guidance, but I will provide some qualitative comments regarding our initial views

We continue to see strong demands for our products in both Memory and Logic, in support of our bookings, and Deep UV demand continues to be healthy in Memory, as discussed earlier, and we expect Deep UV demand in Logic to further strengthen in 2019, driven by the 10-nanometer and 7-nanometer ramp

Furthermore, we expect continued growth of our Applications business, with expansion of both Metrology as well as Software products

EUV demand continues to be driven by Logic, but also with a clear opportunity in DRAM, when we meet our availability and productivity targets

EUV revenue growth is expected from both a significant increase in unit shipments as well as a higher ASP of the NXE:3400C, for which shipments are planned starting, as we said earlier, in H2 2019

Our Installed Base will continue to grow driving increased service revenue

Furthermore, we expect customers to take advantage of system performance upgrades on their installed base to maximize capital efficiency

Our current view of the overall business next year remains positive

We expect H1 to be somewhat similar to H2 this year, with business strengthening in H2 2019

### **Outlook**

Putting this all together, we expect another year with a good growth opportunity

I think we're well on track to achieve our 2020 targets with significant growth potential beyond 2020

And we plan to communicate the size and the extent of this growth opportunity through 2025 at our Investor Day, which we will hold on November 8 this year

## **QUESTION AND ANSWER SECTION**

**<Q - Krish Sankar>**: Two of them. First one, Peter, looks like your demand from your Memory customers has been very strong so far, both in terms of bookings and sales, and you're also guiding to a strength into 2019. Just trying to help, can you reconcile what's been going on in the memory industry with NAND pricing weakness and potential CapEx cuts in NAND and DRAM? And how do you reconcile that with your numbers and where do you see the strength in 2019? Is it going to be DRAM or NAND in H1? And then I had a follow-up.

**<A - Peter T. F. M. Wennink>**: Okay. Well, I think also on Memory, the one big hit, of course, you need to separate as you indicate it between NAND and DRAM, so let me talk about those separately.

On DRAM, we haven't seen CapEx cuts. We have seen in this year some push-outs but also pull-ins from different customers. So you could argue, it's customer specific, but we haven't really seen a change in the DRAM memory demand for our products this year and we don't see it also in 2019.

Now, we always seem to forget recent history, so let me talk about bit – DRAM. You have to put it all in two perspective. Up to – including 2016, there has been a significant conversion of DRAM into 3D NAND, which resulted in reduced DRAM capacity, which actually also led to a reduced DRAM memory spend of about 30% in litho, and also a 10% to 50% reduction in the wafer capacity at our customers.



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Now, in 2017 and 2018, customers have been working to recover this wafer capacity and to increase the bit supply, because the bit demand also was higher than anticipated. So this required, indeed, a much higher litho spend per unit bit growth that is due to a combination of increasing litho intensity at these new nodes due to, say, an increasing number of critical layers, which includes double patenting now and the slowing of the shrink roadmap, which actually means you don't get the bits – the same number of bits through shrink, you actually get less both leading to higher wafer capacity additions to meet this 20% to 25% demand bit growth. So this is what we have seen. So in that context, the high investments in DRAM from our customers is not a surprise and is also what we are seeing in 2019.

Now, on 3D NAND, over last couple of years, almost all the 2D to 3D conversions have taken place. They've actually happened and those were very significant. Now, we have not participated in it as a litho supplier because we basically use the same litho. And next to that, are our investment in greenfield fabs. And if you add those two together, it's the 3D conversions and then the greenfield fabs, and that has indeed led to a level of capacity. And don't forget these are big fabs or the step-ups in capacity to a temporary weakness of the 3D NAND pricing which we've all witnessed. That is the digestion that we're going through as we speak.

And as logical and especially if you look at the number of greenfields fabs that have been opened and the wafer capacity that have been added to the industry is quite normal, but don't forget that the growth rates of 3D NAND are particularly good at 40%-plus. So I think this is how we look at the market and this is why I also think that it's not a big surprise that our customers are still significantly spending on increase in wafer capacity both for DRAM and to a lesser extent today, 3D NAND.

**<Q - Krish Sankar>**: Got it, got it. Peter that's very helpful. And then just as a follow-up, if I look at your commentary on calendar H1 2019 similar to H2 this year and strengthening H2 next year, beside that DUV should be strong in Memory and further in Logic, is it fair to assume that DUV units next year should be higher than this year?

**<A - Peter T. F. M. Wennink>**: Well, I think the DUV units will be at least at the same level as this year, whereby I think the mix which was this year will be skewed towards Memory, will probably skew a bit more towards Logic, although it's too early to say which part of the industry segment is going to be the largest, but in Deep UV, I think we'll see at least the same number of Deep UV shipments and sales in 2019 as in 2018.

**<Q - David Mulholland>**: Just coming through the comments you made on EUV and good to see the progress on the 3400C, I just wanted to clarify a couple of things. Firstly, of the bookings that you've seen in the quarter for EUV, are those still the 3400B or are you now booking the 3400C? And then as we look into 2020, I wonder if you could comment just on what impact in the way that this is potentially slightly dampening the number of tools needed in H2 2019 what they might mean on 2020, obviously we've assumed some of that's made back on pricing, but where do you end up in kind of revenue expectations for 2020 from EUV as you kind of net those two higher productive systems but potentially higher value?

**<A - Peter T. F. M. Wennink>**: Okay, good. Well, I think everything we're booking is 3400C. I mean we're not taking any orders for 3400Bs, because the only thing we will sell as of the middle of next year is 3400Cs. Yes, there will be a higher potential productivity coming out of these systems, which of course will have an impact on the number of systems that customers potentially want if they look at their wafer capacity that they are planning for.

Now, having said that, there's also a flip side to higher productivity and higher up-time and which is cost, so cost is actually going down, with these higher productivity tools, which actually means that it opens also a possibility to add one, in Logic more layers; and two, in Memory DRAM to start using EUV in DRAM. Generally, you could say if you have more than 2,000 wafers per day, productivity on a DRAM system, it becomes attractive to add – to basically start using EUV for several layers in DRAM, and that will drive the 2020 number.

So I think what is important for us is that we execute, that's why we pulled the R&D in because we want the 3400C ASAP, because it will one, as you indicated, provide us with a higher value; and two, it will also provide us a higher value, i.e. lower cost to our customers, which will drive the demand for EUV, which means that we still stick to our production capacity of 40 units in 2020, and I think the final 2020 number will be a function of our successful introduction of the productivity and the availability metrics that we have currently in our targets.

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**<Q - David Mulholland>**: Maybe one just quick follow-up. You haven't commented as directly in numbers in terms of the progress on availability for EUV. Obviously it seems like you're saying it's at the level you need for insertion with customers, but last quarter you were saying you had to get to over 90%.

**<A - Peter T. F. M. Wennink>**: Yeah.

**<Q - David Mulholland>**: And can you quantify where you are and where you're heading?

**<A - Peter T. F. M. Wennink>**: Yeah. I think we've said we want to have a target of 88% availability by the end of the year. This is where we're heading to. I think with the 3400C, we will go over 90%. I think – and we have a target of 92%. I think what I said earlier, we need that 90% threshold, that's what we said in the earlier calls. It's our opinion today that with the current availability targets customers will use EUV in HVM, and it's very simple – in Logic it's very simple, because without EUV – and I just referred to comments that was made by some of our customers – without EUV it simply won't work, and there is so much 7-nanometer demand or if you want our 7-plus or 5-nanometer demand that you cannot escape using EUV. They will use EUV at 88%. I would love it to be higher, and it will be higher, but that is not a make-or-break number.

**<Q - C. J. Muse>**: I guess the question, if I could go back to your 2019 outlook for DUV. It sounds like you're now saying kind of H1 similar to H2 an [ph] accelerated (00:23:37) growth into H2 2019. And just curious is that a changed statement from your views three, six months ago? And if so what has changed, I guess, vis-à-vis DRAM contribution advanced logic in China?

**<A - Peter T. F. M. Wennink>**: Well, I think it has not changed. I think it's been – one, we haven't qualitatively guided any trends for 2019 until today. So I think this is the first time. But internally, of course, we have this outlook. I don't think it has changed that much. Absolutely not. And in China nothing changed in the sense that what Chinese customers were planning, let's say, this time a year ago on 2019, they're actually executing on. So you could argue that their execution of their first lines in the pilot lines have actually gone well. So I think it's – there's no change. I think it was no significant change nor in Memory nor in Logic.

**<Q - C. J. Muse>**: Okay, very helpful. And I guess as my follow-up, can you talk to how you're expecting linearity of shipments for the 30 EUV tools in 2019? And how we should think about the progression of gross margins in that same timeframe? Thank you.

**<A - Peter T. F. M. Wennink>**: Yeah. The linearity is what you would expect with a ramp. I mean this year we – if you look at the quarters, we do 3, 4, 5, 6 and I think this is the kind of linearity that you would also expect next year whereby the 3400C of course is the model that customers would really like. So we would clearly see also H2, demand for that product going up. Now, on – Roger on...

**<A - Roger Dassen>**: Sure. On gross margin I think we've articulated a target of 40% there for 2020, and I think we're on track to get there. And I think as we've mentioned before four levers to get there. The first lever obviously is higher ASP which is to a very large extent correlated with the productivity and the throughput of the machine. So that's the major driver of the gross margin. Second, volume, fixed cost coverage obviously increases to the extent that volume further ramps. Third, learning curve, and we're already experiencing that, and we continue to experience that into the next couple of years. And fourth, service, service revenue and service margin will go up as well. And the combination of those four levers, we believe, gets us to the 40% target that we've articulated before for 2020.

**<Q - Mitch Steves>**: I just had a quick question on EUV. So basically because you guys are off by about two units here in 2018 and you guys still re-guiding to 30. Is the 40 units still the right number for 2020? And then second, I'd guess why doesn't the 2019 number go up by two units? Thanks.

**<A - Peter T. F. M. Wennink>**: Yeah. To answer your last question, we're introducing by the middle of the year the 3400C, which has a productivity which is over 155 wafers per hour, which is a significant improvement in terms of productivity, which means that customers are not planning systems, they are planning wafers. So when you get more wafers out of machine that you might potentially use less machines. So that's why the 30 unit is still good when we – and it's not more than that.

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You could argue that the two units are then cannibalized by the higher productivity of the 3400C. Okay, I mean that's good because the 3400C is also a higher value tool, we'll just price it higher. So from a sales point of view, I think it's a good progression. On the 40 units, I said it earlier, in the previous answer. I think the 40 units is the capacity that we have. I think that is – whether we will sell it all is really a function of the success with which we're going to introduce the 3400C and we're able to start running up the availability of the machine over the 90%.

That will drive down cost for our customers significantly and cost is the main driver for our customers to buy tools. And adding the – the opportunity here is in the Memory space, in the DRAM space and also somewhat in the Logic space, because then you can add a few more layers to EUV, because the cost is just better. And in DRAM, like I said, if you're over 2,000 wafers per day, we come into realm where customers are really seeing the economic benefits of EUV application in DRAM. So 40 is the capacity, let's go after it by executing on our 3400C program.

**<Q - Andrew M. Gardiner>**: I just had a few more quick ones on the EUV program. Firstly, Peter you just mentioned it briefly there again the question of layer account within Logic. If I go back to this time last year, we were talking 10 layers at the 7-nanometer node. To your point the improved productivity and specs on the 3400C suggest it's going to be higher than that. Can you give us any initial indication from your customers as to how much higher the layer account maybe relative to that initial number of 10?

**<A - Peter T. F. M. Wennink>**: Yeah. I think it's really different numbers, but again like I said earlier, I assume a successful execution of our 3400C specification targets. And you could look at anywhere between 12, and perhaps 14.

**<Q - Andrew M. Gardiner>**: Okay. Thanks. And then just a quick follow-up is on EUV. Can you give us an idea of mix between Logic and Memory in the 30-tool shipments next year? Clearly, again, if I go back a couple of quarters, Logic was going to dominate, but you're sounding a bit more optimistic about DRAM demand. And also perhaps one for Roger, is there going to be any EUV deferred revenue left to recognize in 2019? Or is the rev rec next year purely on the 30-tool shipments? Thank you.

**<A - Peter T. F. M. Wennink>**: I think the mix is predominantly Logic. But like I said, there is an opportunity there. And of course, throughout 2019, when we see the first module results, the test results of the critical modules of the 3400C, we can probably engage with our customers at that time – the Memory customers to see whether they would like an increased number of Memory tools. So there is an opportunity, I would say, but it's predominantly Logic.

**<A - Roger Dassen>**: And in terms of revenue recognition, as we know, at this stage, the systems revenue gets recognized upon shipments and that will obviously continue for this model into 2019. The introduction of 3400C at this stage again we believe that we will recognize revenue at shipment at this stage.

**<Q - Alexander Duval>**: Just a quick one on Logic spending in 2019. You obviously talked about most Memory and Logic spending remaining on high levels in 2019, but talked about DUV Logic actually being up even though revenues were already on a high level. So I wondered if you could just talk about what the key swing factors are that are driving that?

And as a brief follow-up, you talked about a H2 weighted year for your overall group revenues in 2019. And you've just talked about a flattish half-on-half growth rate in H1. So how should we be thinking about the step-up into H2? What is the key reason for that step-up? And are we talking low-single digits growth half-on-half or something of greater magnitude? Many thanks.

**<A - Peter T. F. M. Wennink>**: Okay. The Logic spending in 2019 is up, but don't forget, I mean, the majority of the spend this year was in Memory. And Logic will be ramping 10-nanometer in microprocessors and 7-nanometer in the foundry space. And that's happening because when we listen to the customers, the tape-outs are there, the customers orders are there. That will happen and that will increase.

Now, like I said earlier, that's why I think that the Deep UV business for 2019 will be at least as good as in 2018, but a little bit more skewed towards Logic. And it's driven by 7 and 10-nanometer.

Now, on the half-on-half, I said in the earlier answer that our view as to 2019 and the – let's say, the shipment levels H1, H2, haven't changed that much from where we were one or two quarters ago. So it effectively means that our



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customer plans, which is a result also of when their fabs are ready, when can they take the tools, yeah, that hasn't changed that much.

So I would say the half-on-half is more a function of when the customers need the tools. So when do they ramp what? That's the main reason. So there's nothing magical behind it. There's no other reason why there would be this particular cyclicity, if you want to call it this way.

No, I think it's just the way how customers plan and this means that H1 2019 will be somewhat the same as H2 2018, which was a pretty good half. And any acceleration you will see in H2 also the EUV numbers will go up and the 3400C will be there, that's all H2 skewed. So that's probably the only answer I can give.

**<Q - Stéphane Houré>**: Actually, I have a question about the OpEx lines. Because we saw really an increase in R&D and SG&A as you said, to ramp your new EUV tool, but the pace is accelerating throughout the year. We are now up 26% year on year on R&D. Where do we go and how do we model it for 2019? Thank you.

**<A - Roger Dassen>**: I think we've said before also on Q2 call. I think we've mentioned that we believe in the short-term there will be an uptick in R&D. And that uptick is to a very large extent or is uniquely related to two things. It's the acceleration of the 0.33 EUV roadmap, as we mentioned before, the 3400C, and also the High-NA program acceleration. So that's why we said, mid-term, we expect that – so we said short-term that will lead to an uptick of the numbers. We also said that, medium-term, we expect that to go back to the model that you've seen before and that we've given to you for 2020, which is 13%.

**<A - Peter T. F. M. Wennink>**: Of Sales, yeah.

**<A - Roger Dassen>**: Of sales.

**<Q - Stéphane Houré>**: All right. And the follow-up is about Metrology and Inspection. You had a very good quarter this quarter. Is it a trend that we should push forward or was there anything special this quarter?

**<A - Peter T. F. M. Wennink>**: No. I think it's just a trend that Metrology and Inspection will become more important that there's a couple of drivers there. I think the introduction of the YieldStar 375 is a metrology system that is now not only being used in Logic and in DRAM, but now also is introduced into 3D NAND with very clear advantages for our customers.

On top of that, we see good growth, very clear growth in HMI in the e-beam business. We're planning to ship the first 3x3 multi-beam tool in 2019 that will also help the top line. And there's a whole suite of Software products that we're helping our customers to deal with the complexities and the intricacies of 7-nanometer and the 5-nanometer development nodes. So there's a whole suite of products that are actually helping our customers to basically deal with the increased cost of the next nodes. And that's particularly helpful when you look at our Metrology and Inspection business. So it's a trend.

**<Q - Mehdi Hosseini>**: Peter, I just want to go back to your comment about 2019, H1 2019 vs. H2. And I appreciate the details is still the same view as a couple of quarters ago. I'm just wondering does that reflect the finalized CapEx plans by your key customers. Or if there is a change those CapEx plans related this year, or early next year that could – something that could have an impact on your view that has not yet materialized?

**<A - Peter T. F. M. Wennink>**: Mehdi, what you're asking me is looking at my crystal ball what the customers' CapEx plans are going to be going forward.

**<Q - Mehdi Hosseini>**: Yes.

**<A - Peter T. F. M. Wennink>**: I don't know. They're going to change. But there is nothing today that leads us to believe that they're going to do that. When you look at their plans, it's about technology transition in our Logic, trust me, it's going to happen. If you then look at the DRAM expansion plans, we have a limited number of customers, only three and two of them have some capacity expansion plans with fabs are being built and you're long enough into this industry to understand that once you have the DRAM structure there, you're going to fill it up because it's the only way

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to cover your fixed cost is to bring out as many DRAM business you can in this new fab. So these are all plans that are pretty cost installed. And whether they are going to cut or to slow down that ramp, I don't know. But the current plans are what they are, which means that the shipments that we're seeing in H1 and H2, that's been planned for sometime now, they're still valid. And what changes in the future I don't know.

**<Q - Mehdi Hosseini>**: Sure. Thanks for the sincerity and the fact that your customer mix has increasingly consolidated does make it more challenging to forecast. Just moving on...

**<A - Peter T. F. M. Wennink>**: Or it makes it easier.

**<Q - Mehdi Hosseini>**: Yes. It's easier for you because your crystal ball is better than mine.

**<A - Peter T. F. M. Wennink>**: That's absolutely true.

**<Q - Mehdi Hosseini>**: Right. One thing with EUV I'm just very intrigued. We started the year with a commentary that you can ship 22 this year now it's down to 18. I appreciate the improved throughput with the 3400C coming out H2 next year. But on the flipside, your customer mix has also consolidated. One of the key foundries is no longer pursuing leading edge and the leading foundry is now the leading semiconductor manufacturer and they're well ahead of others. And perhaps the DRAM industry is waiting for 3400C before they finalize their plans.

And I'm just trying to better understand when we dial in a 30-unit system into our expectation and 40 into 2020, what are the key wafer capacity targets that you're looking at? In the past, you've talked about certain foundry capacity for leading edge. Is there any measure that you could provide us so that we could have a more realistic set of expectation? And if there is a change we know what are the key parameters that have changed?

**<A - Peter T. F. M. Wennink>**: Okay. Well, I think the more realistic expectation is the expectation that I gave you. Because I think it is realistic, yeah? And it has to do with the fact that yes our customer base is consolidating which in itself generally leads to a better capital efficiency in the industry, because every customer plans for winning business and if you have multiple customers they're all planning for the same business that – yeah, there might be a reason or that might be a very good reason why you ship a few more systems.

In this particular case, it's not the case, because like you said, there's one customer has stepped out of 7-nanometer, GlobalFoundries. And that business now goes to Taiwan. But the real question is if that's a 7-plus or a 5-nanometer-type business, what is the size of that 7-plus and 5-nanometer business for that customer? And that is significant. I can only repeat what the CEO of that company said a couple of times, 7-nanometer 7-plus and 5-nanometer are going to be big. And that's based on what their customers are telling them what they need in terms of wafer capacity.

Now, since they're the only one really in that space, I'm not going to tell you anything about the plant wafer capacity. You should ask them. That's not my role. But I can tell you that it is a big driver for the 2019 EUV shipments. And that's only for the foundry business. On top of that you have the microprocessors and you have the first start of some pilot production on DRAM. If you add it all up and you see those plants and you see their roadmaps, then the 30 number we think is a realistic number.

Now, if there's some upside – hey, if the 3400C turns out to be it's a very good tool and we'll figure it out in the course of 2019, given our module testing in all level, could we output one or two or three more? Potentially. But then that the customers decide and I would not think it's going to be in Logic, that upside would probably be in Memory and in DRAM. So that's the situation today and we're giving you clear guidance on the 30 units. That's really based on a realistic scenario as presented to us by our customers.

**<Q - Sandeep Deshpande>**: Peter my question is, I mean I'm trying to understand what you've been saying about 2019. Clearly, EUV is up to 30 tools is what you are guiding. You're Metrology business is growing into next year. Your Installed Base Management business is growing into next year. So I don't think there are questions about that. So the question is about the DUV business. I mean from what I'm hearing you're saying in response to earlier questions that you're looking for a flattish trend. And I mean that is dominated by the growth in Logic and Memory not that strong. But I mean if you have a flattish trend in DUV next year, I mean I think everybody's estimates on revenue for

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ASML are wrong.

**<A - Peter T. F. M. Wennink>**: Well, it's not my responsibility to come up with that estimate. But what I said, at least means I see a bottom for our Deep UV business to be at least the same. Now, Deep UV business has a lead time that is a bit shorter, so there are changes from time to time. So our customers could still change for H2 2019 to go up. And I just called a bottom which actually means that there could be upside. And yes, and I would not be surprised if there would be. But how big that upside would be? I don't know. So that is a bit where I had to stay qualitative and cannot be quantitative.

**<Q - Sandeep Deshpande>**: Because, I mean I'm just looking at the consensus ahead of today and the market is looking at about 7% revenue growth for ASML, so are you suggesting because we know approximately from the other three line items where your growth would be for 2019, but if you have flat DUV we're looking at well into double-digit growth, so would you say that you can potentially grow well into the double-digits into 2019?

**<A - Peter T. F. M. Wennink>**: I think you've done the math for us.

**<Q - John William Pitzer>**: Peter you mentioned in your prepared comments that China is going to end up being about 20% of the business in CY2018. What's domestic China going to be this year? And as you looked out to your 2019 forecast, is China domestic a breakout year in 2019, is it more in line with trend line growth?

**<A - Peter T. F. M. Wennink>**: Well, I think what I said in my prepared comments that five of those domestic customers are now planning to ramp in 2019, which actually means that we see our business in 2019 from China also growing. Now, beyond that, I think everything – and I said it also in the prepared comments, how big the growth will be also it depends on how successful all those ramps are going to be, because the first pilot lines have been installed and they are actually executing on their 2019 ramp plans. But as we all know, some of these companies are greenfield companies. Are they all going to be as successful? We don't know. But if they would be and they're executing on their plans as we currently see it, then our business in China will be up next year.

**<Q - John William Pitzer>**: And then Peter my second question is just managing through the transition on EUV as you bring out these Higher-NA more productive tools. You mentioned in earlier question that you thought about two tools next year got cannibalized on productivity. Of the 30 EUV tools you have, what's potentially at risk for a further cannibalization? Can customers future-proof? Can you upgrade an EUV tool to a Higher-NA once you've installed it or is that not an option? And to the extent that 30 number does get cannibalized, should that just upside our 2020 number for you guys?

**<A - Peter T. F. M. Wennink>**: So I think you cannot upgrade to Higher-NA. The High-NA EUV, those are completely different tool, different dimensions, it doesn't work. But you can upgrade from let's say a 3350 to a 3400 if you would like to do that. That is a big open heart surgery in the field. That could happen in 2020. And we see some of those upgrades. But I generally would say that there's not much downside to further cannibalization than what we just said.

I think there's some upside. If the 3400C turns out to be quicker meeting the performance targets then we could perhaps lure in one or two or three more systems in 2019 going into 2020, as a start for higher adoption in the DRAM market. But it's too early to speculate any further beyond the 30 units. I would certainly not speculate down. I wouldn't speculate up yet, but if there is a chance for a change I would say, it depends on the performance of the C, especially all those have the possibility in the DRAM space.

**<Q - Amit B. Harchandani>**: I really wanted to just circle back on a broader topic, Peter, if I could, this whole talk about trade wars that's going on right now and potential implications for supply chain.

Could you maybe give us a sense of if you have done any assessment whether you are likely to be impacted by the second tranche of tariffs? And if you see any need within your own supply chain to make any changes based on what's already been made public today? And then I have a follow-up. Thank you.

**<A - Peter T. F. M. Wennink>**: We can be pretty short on this. We don't see any significant impact. Not for our business, not for our supply chain either.

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**<Q - Amit B. Harchandani>**: Okay. And secondly, in terms of just without trying to belabor too much on the point for the 30 tools, so you said that the capacity would be 30 tools and then, of course, it depends on the output for the 3400C. So would it be fair to assume that in terms of the production output or the demand that your customers are seeing out there right now, it's as strong as it was three months ago? If anything, it has gotten even stronger, which is why you're saying there's more likelihood of numbers being up than down. Would that be a fair assessment to make?

**<A - Peter T. F. M. Wennink>**: Yeah. First, there's a little correction, Amit. The capacity is indeed around 30 systems, but if you add the two, so you could do 32. But what we're saying, we are shipping 30, which includes the two that they are shifting from 2018 because the wafer capacity that customers are needing that only – because we have a higher productivity tool, that mean they need 30 units, 28 plus 2. So it's driven by the higher wafer capacity output coming out of the 3400C.

Now, that actually means that there could be, from a manufacturing point of view, there's a few one or two or three upside, but that would only materialize if we get our customers convinced that the productivity of our EUV 3400C number is good enough and is reliable enough to put them into earlier production for Memory, for DRAM in this space.

So I said it a couple of times, I hope it's clear now. But this is why I said – I don't think from a demand point of view, there is a big change. What we said before is that when we looked at the overall demand for EUV, we did include, for instance, customers like GlobalFoundries, which, of course, have fallen off. That could have driven the demand over 30 units. Now, they are not there anymore. That is consolidated into one other customer. So that's the only thing that probably changed. It's the consolidation in the industry, but it doesn't have an effect on our shipment plan.

**<Q - Amit B. Harchandani>**: And then just if I could very quickly ask, have you – because you talked about the productivity of the 3400C, have you decided what level of markup in price would you price the 3400C over the 3400B, or is that still to be fixed?

**<A - Peter T. F. M. Wennink>**: Yeah, that is still to be fixed. We're talking to a few customers on that final pricing. So let's not do the price negotiation over this conference call. We will do that in the private rooms of the customers.

**<Q - Tammy Qiu>**: The first one is, Peter, you mentioned that next year Deep UV spending is mainly skewed towards the logic foundry side. I'm just wondering, because when a logic foundry maker like TSMC move into new generation, their re-usage percentage coming as high as 95%. I'm just wondering, to what extent, you're actually reflecting high re-usage in your estimation? And also, at the same time, would you say in your backlog of EUV shipment, has anyone already got a full allocation of tools for ramping up next-generation 7-nanometer-plus equivalent or they are still ordering for that generation? And I have a short follow-up.

**<A - Peter T. F. M. Wennink>**: I think for anything beyond N7 – let's say, 7-nanometer or N7, there's still orders to be taken, so that's now easy. Reuse, you have to define reuse, what customers are mentioning when they talk about their reuse is that the existing installed base can be reused for the next node, but the next node needs more capacity. So what we're looking at for next year, for Logic, is through capacity additions, extra wafers out. And when I said 2019, I didn't say it was mainly skewed towards Logic. I said Logic is going to increase in terms of its share in the Deep UV shipment as compared to 2018. Memory is still going to be strong, but Logic is also going to be a higher component of the Deep UV shipments than it was in 2018.

**<Q - Tammy Qiu>**: Okay. Thank you. And also, you mentioned last quarter that you are accelerating your R&D process for High-NA. I'm just wondering has your accelerated R&D been impacting a number of layers EUV can be used by the time most High-NA is available.

**<A - Peter T. F. M. Wennink>**: Sorry. Could you...

**<Q - Tammy Qiu>**: So, basically, last quarter, you have been accelerating your R&D process for High-NA EUV tool, right? So I'm just wondering with your accelerated R&D process for High-NA, has chipmakers been making decision about introducing EUV for more layers when High-NA is available, because it's available short term.



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**<A - Peter T. F. M. Wennink>**: Okay, okay. Sorry, sorry. Yeah, I think what you will see going forward is that High-NA will be introduced in high-volume manufacturing by the middle of next decade. Then, you'll see a very clear mix of 0.33, you could sell Low-NA layers and the use of High-NA layers. They're going to be used next to each other. So High-NA is not going to cannibalize that much of the Low-NA, but they're going to address the additional critical layers of the N3 and N2 nodes. So this is how it actually works.

So, yes, on EUV, if you think about EUV in total, of course, there will be more layers allocated to EUV in a combination of Low-NA and High-NA.

**<Q - Adithya Metuku>**: I have two questions. Firstly, the clarification on the OpEx. So, obviously, your OpEx is ramping up a lot into Q4. And when we look at the run rate, quarterly run rate for 2019, should we assume that Q4 run rate would be a reasonable number? Or do you think that'll start to trickle down as we go through 2019?

And secondly, just looking at 5-nanometer demand and how the ecosystem is developing. I wondered, Peter, if you could comment a bit on how the ecosystem is progressing, especially from a pellicle and inspection tool viewpoint? Thank you.

**<A - Peter T. F. M. Wennink>**: Yeah. I can take the last question and then, Roger can take your first question. On the 5-nanometer development, that, if anything, it's accelerating. And I think the issue with pellicle is a function of defectivity. So the defectivity numbers and defectivity control is increasing significantly. So we have made a lot of progress this year, together with our customers on defectivity control.

And I think on the 5-nanometer node, the current use or the use of the current pellicles and the defectivity measures are sufficient to support 5-nanometer. That's what we believe. At 3-nanometer, which is a couple of years beyond that, we might want to look into, whether we need additional inspection tools. That is really depending on how successful we are in defectivity control at the 7-plus and the 5-nanometer node, which looks to be very good.

So whether we need that inspection tool going forward is still a question that needs to be answered and perhaps it's negative that we don't need it. That depends on the progress that we will make on defectivity with the current generations.

**<A - Roger Dassen>**: As it relates to CapEx, it's in essence the same logic as we have for R&D, which is over time and particularly when you talk about acceleration, you can see a bit of an uptick and you won't be surprised that CapEx to a certain extent correlates with R&D. So with R&D going up there is logic that certain CapEx goes up as well. So that will go hand in hand and that's something that we see in the short-term.

Medium-term, long-term, you will once again see that it models back to what we've presented to you in our 2020 model, which is 4% of CapEx, 4% of sales would be assumed in the CapEx.

**<Q - Adithya Metuku>**: Sorry, Roger apologies if I said CapEx, I meant OpEx. So when I look at Q4 2018 OpEx as a proportion of revenues, obviously when I take your guidance, you're seeing a pretty strong uptick. And the OpEx run rate is significantly higher than what consensus modeling for 2019, so I just wondered, you made a comment earlier on OpEx ticking up short-term, but coming down medium-term. So as we go through 2019, when should we expect that uptick to come down, when should we expect that down-tick?

**<A - Roger Dassen>**: You can expect that down-tick and that going back to the model that we presented to you in the course of 2019, early in 2019. So there are reasons for SG&A in particular, because I think we need to distinguish here between SG&A and R&D. I mentioned to you R&D as it relates to SG&A. You see a bit of an uptick in what we expect for Q4. You will see that come down to the 4% model that we guided for in the course of 2019.

**<A - Peter T. F. M. Wennink>**: I think you already answered it. We are driving the High-NA introduction in the 3400C, which will – means that we see an elevated level of R&D spending in 2019, which actually would give a very clear indication in Q4 of what the levels could be, but medium-term that will come down again, and where will that be? I think somewhere in the 2020-2021 timeframe you will see that, because that's when the peak of the High-NA program will have happened and because we're planning to ship High-NA starting 2022. So end of 2021, beginning of 2022. So that peak will be for the next two years and then they will level off



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