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Are The Brains At ASML Hurting Investors With High And Ambitious R&D Costs?

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Summary

- ASML owns the Semiconductor Lithography Market.
- ASML continues to stay ahead of the technology curve and competition.
- ASML's research and development costs, as a percentage of revenue, are 8-10% higher than other first tier semiconductor equipment suppliers.

ASML a Dominant Player

Twenty years ago, ASML (NASDAQ:ASML) was in third place in the semiconductor lithography market with a 14.2% share behind Nikon (51.9%) and Canon (25.7%) based on total worldwide shipments of 1,067 units, according to The Information Network. Ten years later, in 2005, ASML took over second place with a 33.6% share on total shipments of only 464 units. In 2014, according to The Information Network's report "Sub-100 nm Lithography: Market Analysis and Strategic Issues," ASML led the market with a 71.6% share, well ahead of Nikon with a 21.0% share and Canon with a 7.4% share.

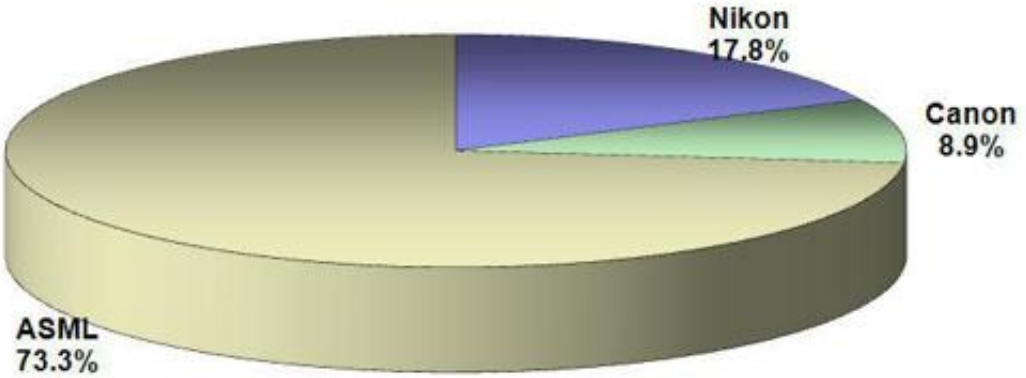
These numbers don't tell the whole story. In 1995, the predominant lithography tool was an I-line stepper, which sells for about $5 million today. In 2005, the predominant tool was a 248nm DUV scanner, which sell today for $10-12 million. When we look at market shares based on revenues, ASML held an 81.3% share, significantly ahead of Nikon with a 16.3% share and Canon with a 2.3% share. In other words, ASML sold significantly more high-end DUV tools.

In 2014, ASML improved to a 90% share based on revenues, again selling a mix of lithography tools geared toward the higher end. In 2014, the predominant tool was the 193nm immersion ((wet)) lithographic tool selling between $30 and $55 million.

The charts below show 2014 shares for 248nm DUV and 193nm DUV. ASML is the clear leader in 248nm and dominates 193nm.

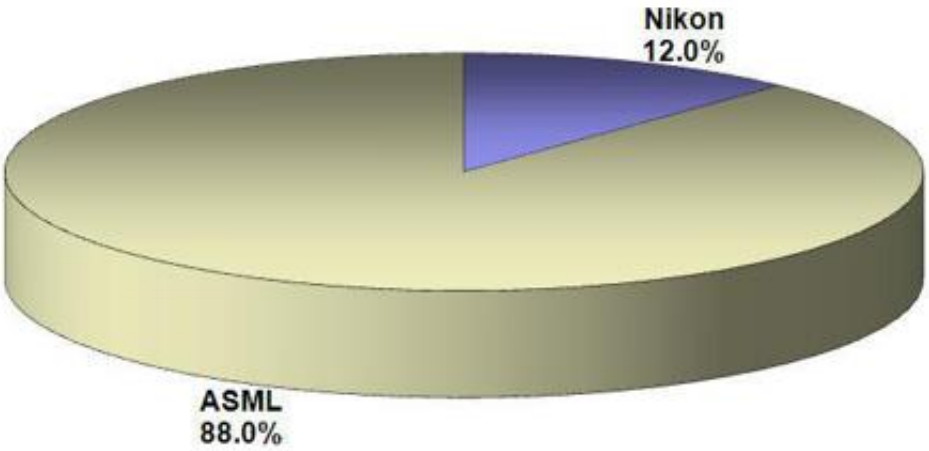
DUV (Deep Ultra Violet)

248nm DUV Shares - 2014



SOURCE: THE INFORMATION NETWORK (WWW.THEINFORMATIONNET.COM

193nm DUV (Wet) - 2014



SOURCE: THE INFORMATION NETWORK (WWW.THEINFORMATIONNET.COM

According to ASML's Q2 2015 Earnings Call Transcript, Wolfgang Nickl - Chief Financial Officer noted:

> *You see in our press release for instance, the tool, 1980 provides for a 30% improvement in overlay and holds a better throughput of 10% to 275. That significant value to the customer and as like we always do, we share that value and so you should assume that that tool has a higher ASP, a few million than the 1970.*

The 1980 he is referring to is the NXT:1980 immersion product which will begin shipping in 2015 (although CEO Peter Wennick refers to it as the NXE:1980 it may be a typo in the transcripts). A 10% increase in throughput means the previous 193nm DUV version (NXT:1970) has a throughput of 250 wafers per hour.

Nikon's NSR-S630D ArF immersion scanner has a throughput of 250 wafers per hour. In 2014, Nikon sold 10 immersion scanners compared to 73 by ASML. Going back 2 years, Nikon sold 14 scanners while ASML sold 69.

Technology moves forward and companies cannot stand still. Nikon introduced the NSR-S630D in early 2014, so ASML is introducing its NXT:1980 in anticipation of Nikon's next immersion stepper. So, even while Nikon's NSR-S630D generated sales in 2014, ASML continued to gain market share in the immersion scanner sector.

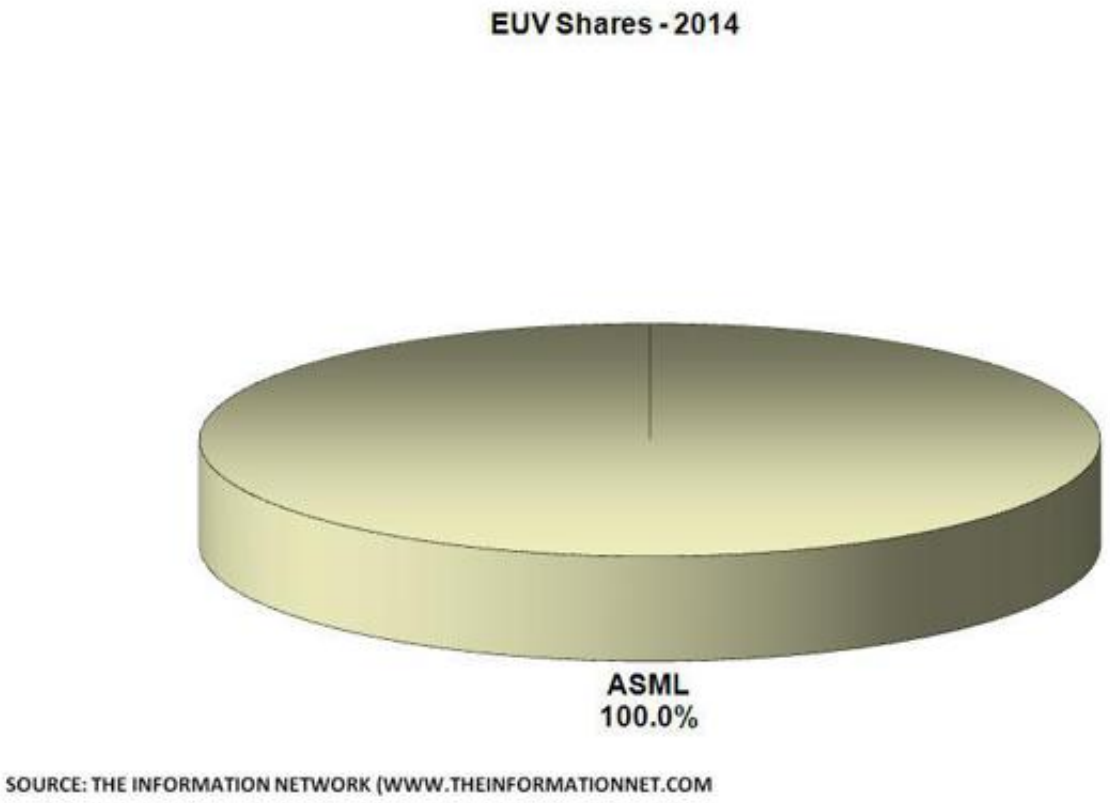
ASML gave guidance of R&D spending of 275 million Euros in 2015. While much of this spend is toward EUV, clearly tens of millions of Euros were spent on R&D for its NXT:1980. Yet, the company, as noted above, plans to add a few million Euros above the price of the 1970.

The 30% improvement in overlay of the NXT:1980 is an important factor. ASML's NXT:1970 has a Single Machine Overlay (SMO) of ≦ 2.0 nm and a Matched-Machine Overlay (MMO) of ≦ 3.5 nm. A 30% improvement means SMO: ≦ 1.4 nm, MMO: ≦ 1.5 nm for the NXT:1980. In comparison, Nikon's NSR-S630D has a technical specification of SMO: ≦ 1.7 nm, MMO: ≦ 2.5 nm.

Unfortunately, according to my arithmetic, increasing the throughput 10% means that 10% fewer tools could be sold. With 73 scanners sold in 2014, that could equate to 7 scanners NOT sold. At a price of approximately $50 million, that means revenues of $350 million NOT made but instead "a few million" x 7 equals $20 million MADE.

EUV (Extreme Ultra Violet)

As shown in the chart below, ASML owns the EUV market, generating revenues on 5 tools sold in 2014.



Nikon makes no EUV tool and instead touts its NSR-S630D immersion lithography equipment as superior to EUV systems for the 14nm, 7nm and future process nodes.

Back in 2012, Intel (NASDAQ:INTC), Samsung, and TSMC (NYSE:TSM) joined ASML's Investment Program with a 15%, 3%, and 5% stake in ASML. These companies will be the driving forces for EUV. When they get into production is a moving target with no production dates and technology nodes set in stone. Bear in mind that in 2000, Intel announced it expected EUV to debut at the 65nm node in 2004 or sooner! In fact, I remember in 1977, when I was working for Bell Labs, we had discussions about what technology would replace optical - and we are still using optical.

Nikon's approach is to use immersion along with a multiple patterning techniques. Double and quadruple patterning are being used to compensate for limitations in optical lithography, creating smaller features than would be possible from single patterning. A combination of lithography/etch/deposition steps are used to achieve the desired dimensions.

When EUV enters production, it will have a negative impact on etch and deposition equipment suppliers, primarily Applied Materials (NASDAQ:AMAT), Lam Research (NASDAQ:LRCX), ASM International (NASDAQ:ASMI), and Tokyo Electron.

High R&D

ASML's R&D expenses increased from 15.5% of revenues in 2012 to 22.1% in 2013 to 25.3% in 2014.

R&D costs increased mainly due to the acceleration of certain R&D programs, primarily EUV and next-generation immersion. In 2013, R&D spending mainly increased due the additional investments in EUV source development as a result of the acquisition of Cymer and further investments in our other strategic programs (Immersion and holistic lithography).

By way of comparison, Applied Material's, which like ASML dominates the PVD (physical vapor deposition) had 2014 R&D

Also, KLA-Tencor, dominant in the process control sector, had R&D expenses of 18%, 17%, and 14% in 2014, 2013, and 2012, respectively.

Lam Research, another dominant semiconductor equipment supplier spend 15.6%, 19.0%, and 16.7% in 2014, 2013, and 2012, respectively. The company did note that the increase in R&D spending during fiscal year 2013 compared to fiscal year 2012 reflects a full year of combined operations with Novellus. Increased R&D expense included $111 million in salary and benefits mainly due to higher headcount, $46 million in supplies, $26 million in depreciation and amortization due to new product development.

My Analysis

Clearly high-tech companies need to devote large sums of money for research and development. But R&D affects the bottom line, which impacts shareholders and investors. ASML is spending 8-10% as a percentage of revenue more than other 1st tier semiconductor companies. To make matters worse, in my opinion, ASML owns the market, particularly 193 immersion DUV and EUV, and has no strong competitors. DUV will eventually run out of steam as new technology nodes are reached, demanding additional and more expensive multiple patterning techniques to compensate. Remember that when we speak of lithography tool usage, these high-end products will be used in only critical mask sets, demanding the highest resolution. Scanners for non-critical mask sets will continue to be sold.

On the DUV side, I'm sure ASML sales people would have wind of a new scanner coming from Nikon. But without personally knowing when, the enhancements to ASML's NXT:1980 over the 1970 are significantly greater than the Nikon's NSR-S630D in throughput and Matched-Machine Overlay for a machine that was only introduced a little more than 1 year ago, particularly when the older NXT:1970 is already outselling the newest NSR-S630D.

Also, raising the selling price of the 1980 over the 1970 by a "few million Euros" could result in missed earnings of 350 million Euros per year. The costs of R&D to develop the NXT:1980, as well as continued R&D costs for EUV are directly impacting ASML's profitability.

Yes I can understand ASML's efforts to optimize EUV, particularly since they already sold many units and customers are waiting and they won't pay until they are up and running. But ASML's overkill in technology can be extended backward as well as forward. The company didn't need to initiate and accelerate the EUV program when it did.

Disclosure: I/we have no positions in any stocks mentioned, and no plans to initiate any positions within the next 72 hours.

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