Q2 2021 Earnings Call

Company Participants

- Dan Durn, Senior Vice President and Chief Financial Officer
- Gary E. Dickerson, President and Chief Executive Officer
- Michael Sullivan, Corporate Vice President

Other Participants

- Atif Malik, Analyst
- C.J. Muse, Analyst
- Harlan Sur, Analyst
- John Pitzer, Analyst
- Krish Sankar, Analyst
- Patrick Ho, Analyst
- Pierre Ferragu, Analyst
- Quinn Bolton, Analyst
- Stacy Rasgon, Analyst
- Timothy Arcuri, Analyst
- Toshiya Hari, Analyst
- Vivek Arya, Analyst

Presentation

Operator

Welcome to the Applied Materials Earnings Conference Call. (Operator Instructions)

I would now like to turn the conference over to Michael Sullivan, Corporate Vice President. Please go ahead, sir.

Michael Sullivan {BIO 16341622 <GO>}

Good afternoon, everyone, and thank you for joining Applied's second quarter of fiscal 2021 earnings call. Joining me are Gary Dickerson, our President and CEO; and Dan Durn, our Chief Financial Officer.

Before we begin, I'd like to remind you that today's call contains forward-looking statements, which are subject to risks and uncertainties that could cause our actual results to differ. Information concerning the risks and uncertainties is contained in Applied's most recent Form 10-Q and 8-K filings with the SEC. Today's call also includes non-GAAP

financial measures. Reconciliations to GAAP measures are found in today's earnings press release and in our quarterly earnings materials, which are available on the IR page of our website at appliedmaterials.com.

Before we begin, I have a calendar announcement. We plan to host another Master Class this time on Logic technology on the June 16th at 9:00 AM Pacific Time. We hope you'll join us.

And now, I'd like to turn the call over to Gary Dickerson.

Gary E. Dickerson {BIO 2135669 <GO>}

Thank you, Mike. I'm pleased to report another record quarter for Applied Materials, underpinned by strong and broad-based demand across our semiconductor businesses as large secular trends fuel increasing consumption of silicon. I'd like to thank our passionate and hardworking team for delivering these great results and, in particular, I want to acknowledge our operations group and suppliers for successfully overcoming logistics and supply chain challenges in the quarter.

At our recent Investor Meeting, we described our thesis for the industry, laid out our growth strategy and provided our new financial and capital allocation models. Therefore, in today's call, I will focus my comments on three main topics; how we see the current market environment, how Applied is outperforming our markets today and how we're positioned to grow faster than our markets over the longer-term. Later in the call, Dan will talk about our subscription revenues, the strength in our service business and provide more color on our financial performance and outlook.

I'll begin with the industry environment. As the world starts to transition to the post-pandemic economy, demand for semiconductors continues to grow. The pandemic accelerated key technology trends that make semiconductors more pervasive and indispensable in people's lives. Current capacity shortfalls in some areas of the market show the highly efficient just-in-time supply chains that have served the semiconductor industry well for the past two decades may not be the most effective strategy going forward.

There is a clear desire for the chip industry to build more resilient and flexible supply, including more regionally distributed capacity as the strategic importance of the semiconductor supply chain is increasingly acknowledged at a national level. It's also important to recognize that we're still in the early innings of major secular trends that will play out over the next decade and drive the semiconductor and semi-equipment markets structurally higher.

At the Investor Meeting, we described five overlapping inflections; first, at a macro level, digital transformation of the economy is rapidly advancing. For individuals, companies and nations, embracing digital transformation is nondiscretionary because it changes the basis of competition. Those who quickly and effectively embrace these new ways of working will emerge as winners and those who don't or can't adapt will not keep up.

Digital transformation is driving exponential growth in data generation, which leads to the second major inflection AI computing. New computing approaches are needed to create value from these massive volumes of data. AI computing works best with workload-specific software and hardware built from customized and entirely new types of silicon.

Third, the benefits of traditional Moore's Law 2D scaling are slowing down and the semiconductor industry is transitioning to a new playbook to drive power, performance, area cost and time to market. As the PPACt playbook is adopted, it is driving a step up in investments across the ecosystem.

Fourth, there is an increased focused on ensuring that growth is sustainable and responsible as the industry scales and advancing energy-efficient computing is critical.

And fifth, there is a business model inflection as companies migrate away from products and transactions to outcomes and deeper collaborations focused on speed and time to market.

These five factors add up to strong and strengthening demand for wafer fab equipment in advanced services that we believe is sustainable well beyond 2021. For the first time, customers are providing capital spending guidance for multiple years into the future, which is a new leading indicator for demand sustainability. In 2021, we expect foundry logic to be the fastest-growing wafer fab equipment market with strong investments in both leading edge and specialty devices. DRAM is the next fastest-growing market with all major DRAM manufacturers investing in new technology and capacity. Finally, we see NAND growing at a more modest rate this year on the back of about 30% growth in calendar 2020.

More importantly, Applied is outperforming the overall market. Recent VLSI market data confirmed that our semi-equipment business grew 23% in 2020 versus market growth of less than 19%. We outperformed even though the device mix would not typically be considered favorable for Applied.

There are several reasons why I'm confident 2021 will be another strong year of outperformance. To start with our leadership areas are in the fastest-growing parts of the market. We expect CMP, Epi, Thermal and Implant to all grow more than 50% this year. Next, we're very well-positioned to serve the fast-growing specialty markets. We anticipated this market growth several years ago and formed a new group inside the company called ICAPS to focus on IoT, communications, automotive, power, and sensor applications. In addition, we have strong traction with new products especially in areas where we have space to grow share.

In 2020, we gained 240 basis points of market share in conductor etch and 220 basis points in CVD, thanks to the momentum we have in patterning applications for DRAM and foundry logic. This year, our etch and CVD businesses combined will generate more than $7.5 billion of revenue. In Process Diagnostics and Control, we expect to grow around 50% in 2021 and generate more than $900 million of revenue from our e-beam products. Extending our leadership in e-beam has been a major focus as it is a highly strategic

capability that accelerates adoption of our differentiated semi products and integrated material solutions as well as being a key component of our actionable insight accelerator.

Finally, we are seeing increasing adoption of our integrated solutions where we're bringing together unique combinations of technologies and capabilities. In 2021, we expect to generate more than $400 million of revenue from our first integrated material solutions. In addition, revenues from our advanced packaging product portfolio are on track to exceed $800 million, almost doubling since 2019.

Looking beyond the strength in our business today, we believe we're in a great position to deliver sustainable outperformance over multiple years. As the industry roadmap transitions from traditional 2D Moore's Law scaling to the new PPACt playbook, materials engineering becomes critically enabling. This is because significant PPACt innovations in transistor and interconnect, structures and materials are taking place and these innovations are enabled by Applied's leadership technologies. We'll cover this topic in more detail at our upcoming Logic Master Class.

As we described at our Investor Meeting to serve our customer's evolving needs and maximize our growth opportunities, we've built a comprehensive strategy to position Applied as the PPACt enablement company, shift more of our business to subscription revenue and optimize our investments in synergistic adjacent markets to drive profitable growth and higher free cash flows. Our PPACt enablement strategy has three differentiated pillars; first, Applied has the broadest and most enabling portfolio of technologies spanning materials creation, modification, removal and analysis. At our recent Memory Master Class, we talked about how we're taking unique Applied technologies that were originally developed for Logic, including Black Diamond low-k materials and high-k metal gate transistors into the DRAM market, opening up new billion dollar opportunities.

Second, we can combine our technology portfolio in unique and highly enabling ways that no one else can do. A great example is our Draco hard mask material for capacitor scaling in DRAM. Draco has been co-optimized to work with Applied's etch system in a process development that we accelerated with our e-beam technology. Today, we offer a spectrum of solutions from co-optimization of processes and tools like Draco all the way to fully integrated material solutions that combine multiple processes and customized metrology and sensors within a single platform.

The third pillar is time to market acceleration. We've developed a proprietary suite of solutions to accelerate every stage of the product life cycle from R&D to technology transfer and high volume manufacturing. We call this the Actionable Insight Accelerator or AIx platform and it brings together process tools, sensors, metrology and analytics and machine learning capabilities. There is tremendous pull from customers and we already have AIx engagements with all major memory manufacturers.

One example of how we're applying machine learning in real-world applications is ExtractAI that allows us to combine the most powerful attributes of optical and e-beam inspection and provide a solution that's many times faster than traditional approaches. In

simple terms, optical inspection is fast and can find critical defects while e-beam is slower but has higher resolution to accurately classify those defects. So we use our e-beam system to train the ExtractAI engine for defect and noise classification.

As Applied's e-beam technology has best-in-class resolution in imaging, we get the most accurate classification to train our AI models. We then use inferencing to turn an unclassified map of millions of potential defects into an actionable map of thousands of yield impacting defects.

Before I hand the call over to Dan, let me quickly summarize. We see strong and sustainable demand in our semiconductor business underpinned by a wide range of macro and technology drivers. We believe that we're in a great position to outperform our markets again this year, thanks to our broad exposure to the major industry inflections, our strong portfolio of differentiated unit process products and accelerating adoption of our integrated material solutions and advanced packaging products. We feel very positive about the longer-term secular trends that are driving semiconductor and wafer fab equipment structurally higher and we're confident that we have the right strategy to accelerate PPACt and grow significantly faster than our markets.

Dan, over to you.

Dan Durn {BIO 17483115 <GO>}

Thanks Gary. Today, I'll begin by summarizing Applied's performance in Q2 then I'll recap the latest third-party data on the semiconductor equipment and services markets. I'll build on Gary's comments about the equipment demand environment and then I'll give you an update on our plans to grow our subscription business and generate incremental free cash flow in synergistic adjacent markets. I'll finish with our guidance for Q3.

Beginning with our Q2 performance, Applied delivered record revenue that was up 41% year-over-year and near the top of our guidance range. Our teams executed well delivering strong gross margins in a challenging operational environment and this led to record non-GAAP earnings that exceeded our guidance range. All three of our operating segments exceeded the revenue guidance and we continued to expect each to post higher revenue in the second half of our fiscal year.

The semiconductor systems team also delivered the highest non-GAAP operating margins in nearly 14 years, while AGS delivered the highest margins in nearly 15 years. These accomplishments helped us generate record non-GAAP operating profit and increase non-GAAP operating margin by 700 basis points year-over-year. We increased operating cash flow by 87% year-over-year delivering over $1 billion for the third quarter in a row. We're pleased that Moody's recently upgraded Applied's credit rating by a notch to A2. We also resumed the buyback program in Q2 deploying $750 million in the limited window available to us and we expect to be more active in the current quarter. Also during the quarter, the Board approved a new $7.5 billion stock buyback authorization along with a 9% dividend increase, and we announced our commitment to return 80% to 100% of free cash flow to shareholders.

Next, since our last earnings call, VLSI Research published its market sizing report for calendar 2020, which is important for two reasons; one, it distinguishes front-end equipment spending from back-end assembly and test; two, it includes companies services and spares revenue in addition to equipment revenue, allowing observers to distinguish between recurring revenue and WFE. Applied Materials was number one in both equipment and services for 2020. The equipment market was $61.2 billion, up nearly 19% year-on-year. We significantly outgrew the market gaining 60 basis points of industry market share with gains in deposition, removal and process control. As Gary described, major inflections are increasing the demand for materials engineering and we're on track to significantly outperform once again in 2021.

Next, I'll discuss the demand environment. Last quarter, we indicated the equipment market would be in the low $70 billion in 2021, which was above the consensus at the time. Demand has strengthened further and we now expect equipment spending to be in the high $70 billion for the year. At the Investor Meeting, I showed you a chart with the rolling two-year sum of equipment spending, for each period since 2012 plus 2013, each successive two-year period has been higher, and I now believe that spending in 2021 plus 2022 will be greater than $160 billion.

Our demand thesis for the past several years is that data generation is growing exponentially, while 2D scaling is slowing, which means more process equipment will be needed. Over the long history of the industry, equipment capital intensity has been close to 12% on average, but because of the higher technical complexity and the slowing of 2D scaling, capital intensity is closer to 14% today. Multiple industry forecasts call for the semiconductor industry revenue to reach $1 trillion by 2030. If capital intensity stays flat from here, then WFE spending could be over $140 billion in the same timeframe.

I realize there are questions about whether the unprecedented demand we are seeing today is secular or cyclical. When I listen to what our customers say, I hear a firm belief that the data economy is real and driving secular growth well into the future. This perspective is being reinforced by plans for substantial multiyear capital investments which are needed to support demand and fuel profitable growth. Against this backdrop, we've never felt better about our opportunity to enable our customers, generate free cash flow and return cash to shareholders.

Next, as we discussed at the Investor Meeting, we're also focused on growing beyond equipment sales. The more we deliver solutions and outcomes for our customers, the more we can increase our subscription revenues which grow and generate free cash flow every year. The report I mentioned earlier shows that over 90% of Applied's reported services business is composed of recurring services and parts revenue, which is the highest amongst our peers. We generated $3.7 billion of this true services revenue in 2020 with 60% in long-term agreements and renewal rates of around 90%.

In Q2, the trend towards long-term subscriptions was even stronger, nearly 70% of our services in parts bookings were subscriptions and 50% had terms of at least three years. Our strategy in AGS, and as a company, is to combine our technologies in unique ways to create higher-value solutions and outcomes for our customers, which are best delivered under the subscription model. We also discussed our strategy to redeploy our technology

in synergistic adjacent markets, where modest investments can generate attractive supplemental free cash flow. Today, the largest example of this strategy is our display business, where our CVD, PVD and e-beam technologies have been adapted to glass substrates.

Over the past couple of years, we've strengthened our products for the next wave of OLED investments targeting foldable smartphones, notebooks, tablets and TVs. With these investments completed, our focus is on increasing free cash flow. We're committed to increasing non-GAAP operating margins from the high-teens level today to over 20% in the coming quarters and then between 25% and 30% over the target model horizon.

Now I'll share our Q3 business outlook. We expect to increase company revenue to approximately $5.92 billion plus or minus $200 million. The midpoint would be up about 35% year-over-year. We expect non-GAAP EPS to be about $1.76 plus or minus $0.06 or up about 66% year-over-year. Within this outlook, we project semiconductor systems revenue of $4.25 billion, up around 46% year-over-year. And AGS revenue of about $1.23 billion, up around 19% year-over-year. We expect Display revenue of around $415 million.

Applied's non-GAAP gross margin should be roughly flat sequentially at 47.7% or up around 270 basis points year-over-year. We plan to increase non-GAAP OpEx to $930 million. And as a percent of revenue, non-GAAP OpEx should decline by 290 basis points with nearly 70% of the spending earmarked for R&D. Our guidance assumes a non-GAAP tax rate of around 12%.

In summary, I'm pleased that Applied delivered another record quarter of performance in Q2 with strong year-over-year growth in revenue and profitability. And I'd like to join Gary in thanking our employees and supply chain partners for supporting our customers.

Now Mike let's begin the Q&A.

Michael Sullivan {BIO 16341622 <GO>}

Thanks Dan. Now to help us reach as many people as we can, please ask just one question on today's call. If you have a second question please just requeue and we'll do our best to come back to you later in the session. Operator, let's please begin.

Questions And Answers

Operator

Thank you. (Operator Instructions) First question is from John Pitzer with Credit Suisse.

Q - John Pitzer {BIO 1541792 <GO>}

Yeah. Good afternoon, guys. Thanks for letting me ask the questions and congrats on the solid results. Gary, nice to see the uptick in your forecast for WFE for the year, I'm kind of curious when you look at your ability to supply customers or the ecosystems' ability to

supply customers relative to the high $70 billion WFE, is there potential for upside this year or are you already starting to see kind of the backlog for next year fill-in just given some of the constraints and lead times on tools?

A - Dan Durn {BIO 17483115 <GO>}

Yeah, thanks, John. This is Dan. I'll jump in on this one. So what we're seeing from our own business. We talked about it in the prepared comments, we see a market that's up strong from a year-over-year standpoint, high $70 billion probably puts us up high 20%, 27.8%, 29% versus where we were last year and that's off of a baseline of $61.2 billion. What I would say is, we're planning for our business to be up second half over first half and we're also planning for our business to be up as we look into 2022.

And as I look at it by reporting segment, I would say, all three of our segments are up half over half and then all three of our segments are up as we look into 2022. So I can't comment for everybody. What I would say is, we've been very aggressive in terms of managing this upward gradient of the industry. We started it several quarters ago, three, four quarters ago, you can see an uptick from an investment standpoint to make sure that we've got the infrastructure and capacity and capability. And that's not only investments from our physical infrastructure, but also working with our supply partners to make sure that we can fully satisfy all the demand that we see from our customers based on the great innovation that we're delivering to market. So we feel good about how we're positioned to outperform in this environment and as we look forward into the back half of the year and 2022, we're planning for our business to be up.

A - Michael Sullivan {BIO 16341622 <GO>}

Thank you, John.

Q - John Pitzer {BIO 1541792 <GO>}

Thank you.

Operator

Our next question comes from C.J. Muse with Evercore.

Q - C.J. Muse

Yeah. Thank you for taking my question. Just to clarify, want to make sure that you're talking about second half calendar '21 versus first half calendar '21 in terms of up half on half? And then for my main question, as I think about your operating margin for silicon at 39.1%, this was your best, for instance, I had to look back since I think June 2007 and so I guess as we think about WFE moving higher from here into '22 and likely beyond, how should we think about the trajectory there and how important was mix in hitting the numbers that you put up in April and again how should we think about it going forward? Thank you.

A - Dan Durn {BIO 17483115 <GO>}

Yeah, thanks, C.J. Let me jump in on this one again and you get a lot embedded in there. and let me try to unpack it. And if I miss something, please follow up and let me know what else I can shed some color on. So the first part of the question, second half over first half, that's both fiscal year and calendar year, and again, we're planning on being up as we look into 2022. So we've got a market that's showing signs of strength. The first half of the calendar year, when you take a look at our actual results plus our guide, our systems business is up 50% year-over-year. So we feel good about how we're positioned against this opportunity to outperform and second half over first half being up both on a fiscal and calendar year basis.

When I look at our silicon business and the performance of it, what I would say is, is as a company, gross margin for our company is up 310 basis points year-over-year. The company has got a lot of work on driving productivity gains, operating discipline, efficiency into the core of our operations. We're adopting digital capabilities inside the four walls of our company to make sure we are far more agile as a company to respond to upward and downward gradients. And there's more work to do, we'll never be satisfied with where we are, but we've got a whole host of initiatives at work to help this company become more efficient over time and you see that the profiling into the results of the company. As an overall company, you see our operating margin up 700 basis points year-over-year.

From a semi system standpoint, the margins will always be influenced to a certain extent by customer mix, product mix, factory loadings. But I think you can see on both an absolute and relative basis, this is a company that's performing very, very strong right now and I would expect us to continue a trajectory of strong performance as they go forward. And so I guess, the last thing I would say, it all starts with innovation, your ability to drive economic value accretion for your investors starts with innovation, we've got the industry's broadest portfolio of industry-leading technologies. And at our Investor Meeting, we talked about combining them in unique ways to solve really high-value problems for our customers in a way that's incredibly valuable to their roadmaps, delivery of those roadmaps from a time perspective that they can make their customer successful. So we'll continue to drive the industry's best technology, we'll drive efficiency and operating discipline while we do that and we think we've got an opportunity to create significant value over time for our investors.

A - Michael Sullivan {BIO 16341622 <GO>}

Thank you, C.J.

Operator

Our next question comes from Stacy Rasgon with Bernstein Research.

Q - Stacy Rasgon {BIO 16423886 <GO>}

Hi, guys. Thanks for taking my question. I have a question on the DRAM business within the semiconductor system. So it's the only business of yours that hasn't really inflected, both foundry and flash were up pretty decently sequentially year-over-year, DRAM was kind of down both sequentially and year-over-year and yet you're still looking for it to

grow pretty materially through the year. So I guess and we know supply in that market has been very tight. So I guess can you talk a little about the dynamics you're seeing in DRAM and maybe talk a little about the contribution of DRAM to the guide next quarter, is that primarily what's driving and is that sort of ramp more materially than some of the others into the second half or are we still waiting for it?

A - Dan Durn {BIO 17483115 <GO>}

Yeah. Hi, Stacy. Thanks for the question. So I guess the best way to start the conversation. Let's talk about 2020 and then use that as a jumping-off point for what we saw in calendar Q1, our fiscal Q2 and then what we expect for the rest of the year. So in 2020, we talked about an overall WFE market that was up high-teens. I would say, the DRAM market was pretty much in line with that may be a little better than that. Against that opportunity, our DRAM business was up over 27%, almost 28% last year and significantly outperformed others in the industry that were up a few percent and down a few percent. So we had a really strong showing in 2020.

And if you recall, three months ago on last quarter's call, we had signaled that the profile around the DRAM market, we view it as significantly back half loaded. So we expect off of calendar Q1, our fiscal Q2, momentum in that business to significantly pick up as our customers add bit supply to be more in line with that demand. And so we see that market playing out roughly in line with our expectations and how calendar Q1 played out. I would say, is pretty much in line with how we viewed the market three months ago, probably six months ago and it's playing out as expected. We see DRAM as a back half-loaded market this year.

Q - Stacy Rasgon {BIO 16423886 <GO>}

Got it. Thank you.

A - Michael Sullivan {BIO 16341622 <GO>}

Thank you.

A - Gary E. Dickerson {BIO 2135669 <GO>}

Stacy, maybe I can add. This is Gary. Relative to the major inflections in DRAM, certainly high-speed DRAM, they're going to logic like structures in the periphery where Applied has leadership, I think we talked about that in our Memory Masterclass, couple of billion-dollar opportunity as those inflections are being adopted, capacitor scaling is another one where Applied has real strength, new patterning applications. So as Dan said, we had really great performance last year and as our customers are moving to these new structures, DRAM structures, we anticipate that we'll continue to outperform.

Q - Stacy Rasgon {BIO 16423886 <GO>}

Got it. Thank you, guys.

Operator

Thank you. Our next question is from Vivek Arya with the Bank of America.

Q - Vivek Arya {BIO 6781604 <GO>}

Thanks for taking my question. I wanted to revisit this cyclical versus secular aspect, but I think Gary or Dan mentioned, is WFE elevated right now because of capacity shortages, which would be more of a cyclical driver or is it elevated more because of secular reasons which would be rising complexity, et cetera. I wanted to get your perspective on that because when we ask the semiconductor companies, they say the shortages are perhaps not as much on the foundry side, they are more on the back-end. So I just wanted to get your perspective that what we are seeing right now, is it cyclical thing or is it more of a secular aspect?

A - Dan Durn {BIO 17483115 <GO>}

Yeah, thanks, Vivek. I appreciate the question. Here is our point of view on this. What we see is we are in the very early innings of a multi-year secular growth trend around this industry. And I think we've been talking about it for a couple of years and now we see it really hitting its stride. When we think about the general consensus from third-party research, you're right about a trillion dollars of semiconductor revenues by 2030. The demand driving that is broad-based, you're seeing a hand-off from consumer-oriented devices to something that's far larger and more substantive around this fourth wave of compute, the data economy. By 2025, machines will generate 99% of the data, humans will generate 1%.

You're seeing a decoupling of semiconductor demand for the first time in the industry's history from population and population growth in consumer behavior, content is increasing across devices, servers, autos, handsets. So what we see are strong secular growth drivers and we're in the early innings of that playing out. And I would say that that is more of what is driving our end markets today than anything else. And so when I look at that backdrop combined with things like an upper bias over time of capital intensity. I think the opportunity for our markets going forward is quite attractive and given what we talked about with the new playbook at our Investor Meeting, our opportunity to outperform as we drive those key inflections with our customers, our opportunity to outperform against that multiple-year secular growth tailwind around this industry, we think is quite substantial.

A - Gary E. Dickerson {BIO 2135669 <GO>}

Let me just add that certainly today we hear a lot about supply chain issues from an automotive perspective, but really we're -- as Dan said and as we talked about in our Investor Meeting, we're in the early innings of every industry being transformed and the fundamental nature of competition being completely different. So semiconductor content is going to be at the foundation of that infrastructure. Certainly, the way we work, the way we learn, the way we shop, transportation, healthcare, today we're talking about automotive but content is going to increase more, I believe, than what anyone can see today and it's really about who delivers power performance and cost faster than others and enabling that infrastructure that is the basis of competition of every single industry.

So and then from an Applied standpoint, as we've talked about classic 2D Moore's Law really ended a few years ago. And the foundation for the ships from the edge, the trillion edge devices to the high-speed computing in the data center is really about new materials, new structures, new ways to connect chips together, new architectures and new ways to shrink and Applied is just in a really tremendous position when you think about, again the basis of enabling a competitive advantage, time-to-market on all of that is incredibly important for the entire global economy, and certainly from a country standpoint, countries are starting to recognize the importance of semiconductors as a foundation for competition. So, definitely, we see this as a secular change and I really do believe people don't understand the magnitude of this yet.

A - Michael Sullivan {BIO 16341622 <GO>}

Thank you, Vivek.

Q - Vivek Arya {BIO 6781604 <GO>}

Thank you.

Operator

Thank you. Our next question is from Toshiya Hari with Goldman Sachs.

Q - Toshiya Hari {BIO 6770302 <GO>}

Hi. Thank you for taking the question and congrats on the strong results. Dan, I wanted to double-click on your NAND business. It was up significantly in the quarter both sequentially and year-over-year. At the same time, I think it was Gary, you talked about having relatively modest expectations for WFE for calendar 2021. So I guess the question is, are you guys gaining share or is the expectation for NAND to be first half weighted this year or is it a little bit of both? And kind of related to that, Dan you talked about more than $160 billion in WFE for this year and the next year combined. Within that sort of context, how are you thinking about NAND? Thank you.

A - Dan Durn {BIO 17483115 <GO>}

Yeah, thanks Toshiya. Here's our perspective on NAND. If we were to go back three months to last quarter, we said that NAND was the one segment that was first half weighted versus second half. In the subsequent three months, that brings us to today, I would say, our perspective on NAND, it's strengthened a little bit but of the three segments, we've seen foundry, logic strengthen quite a bit, DRAM strengthened quite a bit and NAND strengthened a little bit. And while foundry, logic and NAND, we view as second-half weighted from a segment standpoint, I think there's a question mark on NAND where we sit today, is it first half weighted or second-half weighted? It's too early to tell and so we got out of the gate very strong in calendar Q1 on NAND. So we expect the growth rate to moderate quite a bit as we go throughout the year. And from a first half-second half weighting again, I think it's too early to call.

When I take a step back and I think about the combination of 2021 plus 2022, what I would shape from an expectation standpoint around 2021. Foundry logic is greater than

55%, NAND is less than 45%, I'm sorry, foundry logic is greater than 55%, memory less than 45%. I think that construct still holds in 2022. As we think about a market that's up high 20% range in the current year, we think about foundry logic significantly outgrowing the industry average, DRAM being in line plus or minus with the industry average, NAND growing but significantly below the industry average. I think all three of those markets are strong levels of spend next year and we have an upward trajectory on the overall industry, but I think it's too early to shape expectations by device type. Let's some more time elapse, let's crystallize the contours of the industry this year and assess how our customers are going to invest to drive even higher returns for their investors in a few quarters. I think we'll have more to say in a few quarters from now.

Q - Toshiya Hari {BIO 6770302 <GO>}

Thank you.

A - Michael Sullivan {BIO 16341622 <GO>}

Thank you.

Operator

Our next question is from Atif Malik with Citi.

Q - Atif Malik {BIO 7312618 <GO>}

Hi. Thank you for taking my question. I have a question on Display, LCD spending mix has benefited during the pandemic and at the recent SID Display Conference Supply, you talked about the future OLED waves and micro-LED, curious if you can update us on the green shoots commentary you made 90 days ago and what's outlook for display for next year?

A - Dan Durn {BIO 17483115 <GO>}

Hi, Atif. Let me take a crack at this. So I think the display industry this year is going to play out very much in line with our expectations from our business perspective. We're well penetrated in the segments we participate in, we've got a good read on the market and we see our business in calendar or in fiscal 2021 being very similar to fiscal 2020. We talked about the environmental's strengthening, we still see older generation capacity coming out of the LCD market, we see increased consumer demand, a combination of that is leading to increased panel pricing, spot pricing in the panel market is going up and that's leading to increased profitability. So there's goodness there. We continue to see average area size increase. OLED screens are continuing to penetrate 5G handsets and OLED penetration of handsets in general is on an upward trajectory. The next leg of OLED growth into the IT market and the TV market and foldable phones becoming more widely-adopted from a consumer standpoint, all of that is intact. So we see an increase in the levels of investment as we go into next year, we feel good about that.

The other thing I'd offer here is, we talked about an investment profile and our products to deepen our moats around our market position and get our product portfolio ready for the next leg up from an OLED investment standpoint. Exiting the year, the vast majority of

those investments will be in the rear-view mirror and you're going to see us start to reposition this business for enhanced cash flow and profitability. We'll get into the low 20%s and then by 2023 and 2024, we'll be consistently operating this business with an operating margin between 25% and 30%. So we feel good about market development revenue growth as we look into 2022 and then complementing that with an enhanced level of profitability to drive value for investors.

Q - Atif Malik {BIO 7312618 <GO>}

Great. Thank you.

A - Michael Sullivan {BIO 16341622 <GO>}

Thank you, Atif.

Operator

Our next question is from Krish Sankar with Cowen and Company.

Q - Krish Sankar {BIO 16151788 <GO>}

Yeah, hi. Thanks for taking my question. I had a kind of a long-term question for Gary. Gary, when you look at some of the technology inflections like gate all around coming up, it seems like the critical technologies of the horizontal and vertical FTE, selective removal and conductor etch. Just wanted to find out from your advantage point what are the important technologies and more importantly can you help quantify the dollar opportunity it means for AMAG?

A - Gary E. Dickerson {BIO 2135669 <GO>}

Yeah. Thanks for the question. So all of our customers are focused, as I said earlier, to deliver lower power, higher performance and better cost ahead of others. And we talked in the Investor Meeting about wiring innovations we're driving, improving wiring 50% and gate all around that's another very important technology if you look at the overall ecosystem. So that opportunity, I think we've estimated around $1 billion incremental opportunity and you think about the key enabling technologies certainly epitaxial deposition and selective removal are very important. We're working with every one of the leading customers on gate all around technologies.

The other thing, I would say, that's important is our -- and there are a number of other technologies where we have very strong positions, leadership position, so that will all ramp when gate all around goes into high volume manufacturing. But time to market is also important, the T of the PPACt and our e-beam technology leadership is really fundamental whether it's in the transistor, the wiring, the Draco, in memory or any of these different innovations, it's really mapping out and fingerprinting those processes because they're so complex with so many different variables and then being able to tune those recipes and the process knobs as fast as possible.

So gate all around certainly is one of those cases where seeing things like residual germanium or seeing in those structures incredibly important and having enough of a picture across the chip whether you have isolated or dense structures across the wafer. But that's speed in the learning rate is very fundamental. So we have leadership in some of these foundational technologies for gate all around, but also our leadership in e-beam is really important for gate all around and other key inflections in the industry.

Q - Krish Sankar {BIO 16151788 <GO>}

Thanks Gary.

Operator

Thank you. Our next question is from Harlan Sur with JPMorgan.

Q - Harlan Sur {BIO 6539622 <GO>}

Hi, good afternoon. Great job on the quarterly execution and results. On the mature foundry logic and specialty manufacturing segments of the market, your ICAPs business, I think you guys had said last week, you expected this business to be $3 billion plus business for the team this year. But since then, I mean the supply-demand gap for the analog, microcontroller, power, MEMS guys has actually widen to somewhere around 20% to 40% in addition to the secular content gains that you guys talked about in auto and industrial and some of these customers are saying that they can't get two deliveries on orders placed today till next year. So do you guys have a revised estimate on your ICAPs business this year and similar to your overall business, do you guys expect ICAPs to grow in 2022?

A - Dan Durn {BIO 17483115 <GO>}

Thanks Harlan. Let me jump in and see if Gary wants to offer additional color after I take a crack at this. So we saw this trend towards more robust spending from a trailing node geometry, a specialty node geometry several years ago, we reorganized the organization, we've got leadership, driving this group and the company is performing incredibly well against this opportunity. We talked about this segment of our business being greater than $3 billion. We don't want to be more specific than that for competitive reasons, but it's much greater than $3 billion, but we'll just leave it at greater than $3 billion for now. Company has got great technology, great leadership positions. And then from a margin structure standpoint, it's accretive to the overall company margin and so as this business continues to grow for us and we'd be -- continue to outperform. We think it's going to be value accretive for our investors. And so we feel good about how we're positioned and our ability to drive this market.

Like we talked about, we're planning for our business to be up second half over first half. We've got an ability to continue to drive output and delivery of technology to customers. So we feel good about how we're positioned in this market as a key enabler of our customers to be able to satisfy their customers. So again, we saw this trend early and it's going to be a really value accretive part of our business, nice piece of our business going forward.

Q - Harlan Sur {BIO 6539622 <GO>}

Absolutely. Thank you.

A - Michael Sullivan {BIO 16341622 <GO>}

Thanks Harlan.

Operator

Thank you. Our next question is from Patrick Ho with Stifel.

Q - Patrick Ho {BIO 5499707 <GO>}

Thank you very much and congrats on the nice quarter and outlook. Gary maybe for you in terms of the process control business, you have overall good share or actually great share in the e-beam marketplace given the gains you've made with the Pro Vision tool yet recently you've introduced the new optical inspection kind of a hybrid tool with AI capability. Can you discuss where the future lies between e-beam versus optical inspection and how are your customers, I guess receiving the feedback in terms of the different technologies?

A - Gary E. Dickerson {BIO 2135669 <GO>}

Well, thanks for the question, Patrick. So maybe first let me start with our top level PDC business and then I'll get into this optical e-beam question. So really there is two major focus as far our PDC business. Certainly, this is a growth opportunity, but also what is increasingly important is PDC accelerating billions of dollars of Applied-enabled PPACt inflections. I talked about earlier gate all around in the wiring, in the memory and all of these different areas, and we have the highest resolution e-beam platform in the industry, we're probably 50% higher resolution. So we can see things that other platforms cannot see. We also have an advantage and the speed of imaging. So mapping out these fingerprints to dial-in these processes faster with bigger process margins that synergy Applied is the only company in the industry that has that combination of the unit processes, integrated material solutions and leading e-beam technology. So that is strategically important, and I think that really we see a great opportunity to accelerate our PDC revenue going forward. We talked about 50% growth this year on the top of 25% last year, but also that pull in the synergy with the rest of Applied Materials is incredibly valuable and very important.

Relative to optical inspection, we did introduce this new platform the Enlight. We see very strong pull and adoption especially in leading foundry. And the combination of these technologies, basically you have optical inspection system that is incredibly cost-effective for line monitoring types of applications and certainly in the discussions that I have with many of the R&D leaders, tremendous pull for that technology but also combining that with industry-leading resolution to accurately classify defect and then having that capability to combine with AI gives customers a better overall performance in finding yield limiting defects. So we're seeing definitely strong adoption of this concept with customers, but the key thing for me really is the e-beam leadership that is fundamental, where more than five times larger than our overall largest PDC competitor. We have clear

imaging leadership, we will be introducing a new imaging technologies that will further strengthen our leadership in that part of our -- in that part of PDC and the synergy in the T for PPACt is very, very, very important.

A - Michael Sullivan {BIO 16341622 <GO>}

Thank you, Patrick.

Operator

Thank you. Our next question is from Quinn Bolton with Needham and Company.

Q - Quinn Bolton {BIO 3192909 <GO>}

Hey, guys. Just wanted to ask about the China business, China looks like it was a record on the dollar basis and about a third of revenue, did that business skew a little bit more to NAND, given the NAND strength, are you still seeing that being pretty broad-based?

A - Dan Durn {BIO 17483115 <GO>}

Yes, thanks, Quinn. As we look at our China business, it was a strong performance in the most recent quarter, but it's in line generally with the historical profile of that business over time, some quarters will be a little better than others, but certainly in line with the historical profile on a percent of our overall business. As I take a look and double click at the China domestic market and think about the levels of investment there, I would say, that there is slow steady development of the ecosystem. I see investments from a 200-millimeter and 300-millimeter standpoint. And then within the 300-millimeter geometries, we see investments across all device types, we see NAND, we see DRAM, we see foundry logic. So I wouldn't say it's driven by one specific market, one specific customer. It's really broad-based both from a customer perspective as well as a market perspective. We feel good about how we're positioned against this opportunity and we'll do well over time as that business continues to grow.

A - Michael Sullivan {BIO 16341622 <GO>}

Thanks Quinn.

Operator

Thank you. Our next question is from Pierre Ferragu with New Street Research.

Q - Pierre Ferragu {BIO 15753665 <GO>}

Hi. Thanks for taking my question. So Dan you mentioned that if we give it some time and if we believe in industry heading towards the $1 trillion, we could have like with we've been spending in $140 billion. So let's say over five years or maybe a bit more, we could still see WFE doubling? And then Gary, you talked a lot about like this upcoming inflection points to reach, we feel very close now, where materials is almost taking a revenge of a critical dimension rejection. And so my question was, in a world in which the industry spends $150 billion more or so in equipment spending the incremental $70

billion that would be spend compared to what is spend today, where would that go, if you could give like what in your view would be this most significant drivers of growth for the industry over that kind of long time period where we double again spending?

A - Gary E. Dickerson {BIO 2135669 <GO>}

Yes, thanks for the question, Pierre. So for me, I spend a lot of my time with customers across our entire or all the different market segments. The leading customers, ICAPs I spent a tremendous amount of time there more than ever. And I have a very strong perspective and we can see things that we can't talk about publicly relative to where customers are going, but I really believe that we're at the point where we have the biggest economic competition of our lifetime with technology transforming every industry and semiconductors are part of that key-infrastructure, the data economy going forward and it really is about power, performance and cost from the edge to the cloud and everything in between.

And I do believe it and we can see it when you go from 5 to 3, 3 to 2 and what's going beyond that that the playbook that we discussed before and you even see customers supporting this view that the classic 2D Moore's Law will not enable the future infrastructure. I think that is crystal clear and it really is, certainly there is going to be shrink as part of that 2D shrink, but that's not going to enable power and performance across the whole infrastructure for the future. So it's about the new materials, it's about the new structures, the gate all around, 50% reduction in wiring, high-speed memory for a number of different applications, we're adding logic to the periphery, shaping the chip architectures in a very different way. And the other thing and we talked about -- I talked about this earlier on the call, packaging is, I think, underappreciated and very important. This year packaging will be over $800 million for us and you think about connecting chips or chiplets or IP blocks that is going to be an enormous opportunity going forward and Applied is in a great position. We have very strong products in PVD, CVD, CMP, plating, this new hybrid bonding technology where you can bond two chips together. We're the only company in the industry that has a full flow advanced packaging lab.

So Pierre, I think there is going to be tremendous innovation that's happening there and again, that's another segment of the industry where I think people underappreciate how important from a competitive standpoint and in a PPACt enabling standpoint that's going to be. So again, those are the things that that we see as we go forward. It's really about those five elements of the new playbook and the other aspect is time to market, that's where we're focused with AIx and especially our industry leadership in e-beam to drive the T.

A - Michael Sullivan {BIO 16341622 <GO>}

Thank you, Pierre.

Operator

Thank you. Our next question is from Timothy Arcuri with UBS.

Q - Timothy Arcuri {BIO 3824613 <GO>}

Hi, thanks. Dan, I guess I had a two-part question just about WFE and your share. So you gave a 2020 WFE number from VLSI that's like $61 billion and you did $12.1 billion in SSD last year so that's about 20% WFE share. Then, if I take your July SSD guidance, we know that you're doing about $8.2 billion in the first half and you're saying that it's going to be up in the back half so that's like $16.5 billion to $17 billion for the year, which off of your high $70 billion WFE number is like 21.5% WFE share. So that's up like a 150 basis points this year. So I guess my question is where is that share coming from, can you sort of double-click on that. I know you highlighted process control, but I'm wondering if you can kind of double-click on that? And then the second part of question was for domestic China, you had talked about $10 billion WFE this year, is that still the thinking? Thanks.

A - Dan Durn {BIO 17483115 <GO>}

Yeah. So Tim, thanks for the question. I think it's important to really get the facts on the table for 2020. If you look at our semi systems business in calendar 2020, it's up 26.5% against the market that was up high teens and so significant outperformance, we view it as gaining 60 basis points of share, so we ended 2020 at 20.5% WFE share. And so your reference to 21.5% share in 2021, we think we're going to significantly outperform this year. You saw us grow almost two to one in foundry logic last year, you saw us significantly outperform peers in 2020 in the DRAM market and we showed strength in our NAND business. And when I look at the customers, node over node whether it's memory or foundry logic, our opportunity is going up. When I look at the end-market profile, we talked about its strength in foundry logic, DRAM, strong business in NAND. So we feel good about the market perspective. And then when I look at the product portfolio, we showed share gains and deposition and removal and process control, Gary talked about packaging, we talked about 240 basis points of conductor etch, 220 basis points of CVD, we talked about strength in PVD, epi, thermals.

2021, I would expect to do even better across that product portfolio. We talked about the new PPACt playbook, we talked a lot about the enabling technologies at our Investor Meeting, we've held one Masterclass, we've got an upcoming Masterclass on foundry logic. We see these inflections is real. We've got the industry's broadest portfolio of industry-leading technologies and we've got unique abilities to combine those technologies and bring them together in a way to solve our customers highest value problems. And so we feel good about our position, our momentum and our ability to outperform in these markets. And so from a -- I'm sorry, Tim, your second question.

Q - Timothy Arcuri {BIO 3824613 <GO>}

Sorry, again, thanks. Yeah, I was just asking about domestic China WFE, I thought you said something like flat year-over-year around $10 billion this year. I was just kind of wondering if you had an update there?

A - Dan Durn {BIO 17483115 <GO>}

Yeah. So what we said on the last earnings call as we see it up several billion on a year-over-year basis. And as more of the year progresses, I think what we see is domestic China maybe profiling in line with the overall WFE markets and we'll keep an eye on it

and we'll keep updating each and every quarter, but we kind of see it up in line with the overall market.

A - Michael Sullivan {BIO 16341622 <GO>}

Okay, great, operator. So I think we're at the end of the hour. So Dan would you like to help us close off the call.

A - Dan Durn {BIO 17483115 <GO>}

Yeah. Sure, Mike. Thanks. So what I'm really struck by this quarter. It's just a broad validation of the trends. We've been talking about for quite some time from the data economy and the opportunity that it creates for the semi industry and that's at virtually every node to the challenges that Gary talked about with 2D scaling. The industry just needs new ways to deliver the PPACt roadmap. Our customers are committed to very large multi-year investments, but they're also coming at it from a position of financial strength, which is really great and bodes well for the industry long-term. We're going to fully support them with the R&D investments that we make, that'll drive the roadmap, solve our customers highest value problems. We're going to generate profitable growth and we're going to return a lot of cash to shareholders over time.

Gary and I hope to see many of you at the Virtual conferences in the next few weeks. And then, I hope you'll join us and our technical leaders on the Logic Masterclass that we're going to have on June 16. Mike let's go ahead and wrap up the call.

A - Michael Sullivan {BIO 16341622 <GO>}

Okay, great. Thanks Dan. And we'd like to thank everybody for joining us today. A replay of our call will be available on our website by 5:00 PM Pacific Time. Thank you for your continued interest in Applied Materials.

Operator

And this concludes today's conference. Thank you for your participation and you may now disconnect.