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AMKR.OQ - Q4 2023 Amkor Technology Inc Earnings Call

EVENT DATE/TIME: FEBRUARY 05, 2024 / 10:00PM GMT

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## PRESENTATION

### Operator

Good day, ladies and gentlemen, and welcome to the Amkor Technology Fourth Quarter and Full Year 2023 Earnings Conference Call. My name is Diego, and I will be your conference facilitator today. (Operator Instructions) As a reminder, this conference is being recorded. I would now like to turn the call over to Jennifer Jue, Head of Investor Relations. Ms. Jue, please go ahead.

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**Jennifer Jue** - *Amkor Technology, Inc. - Senior Director of IR and Finance*

Thank you, operator. Good afternoon, everyone, and thank you for joining us for Amkor's Fourth Quarter and Full Year 2023 Earnings Conference Call. Joining me today are Giel Rutten, our Chief Executive Officer; and Megan Faust, our Chief Financial Officer. Our earnings press release was filed with the SEC this afternoon and is available on the Investor Relations page of our website, along with the presentation slides that accompany today's call.

During this presentation, we will use non-GAAP financial measures, and you can find the reconciliation to the U.S. GAAP equivalent on our website. We will make forward-looking statements about our expectations for Amkor's future performance based on the environment as we currently see it. Of course, actual results could differ. Please refer to our press release and SEC filings for information on risk factors, uncertainties and exceptions that could cause actual results to differ materially from these expectations. Please note that the financial results discussed today are preliminary, and final data will be included in our Form 10-K.

And now I'd like to turn the call over to Giel.

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**Giel Rutten** - *Amkor Technology, Inc. - President, CEO & Director*

Thank you, Jennifer. Good afternoon, everyone, and thank you for joining the call today.

After a strong third quarter, Amkor delivered solid fourth quarter performance with revenue of \$1.75 billion and EPS of \$0.48, both at or above the high end of guidance. For full year 2023, revenue of \$6.5 billion was down 8% from prior year, better than the double-digit semi market decline. Weak macroeconomic conditions, excess inventory and growing geopolitical tensions made 2023 a challenging year for Amkor, but several highlights also made it an exciting year.

We celebrated our 55th anniversary and our 25th anniversary as a U.S.-listed public company. We had the grand opening of our new Vietnam factory, and we announced our plan for an advanced packaging and test facility in the United States.

In this challenging business environment, Amkor elevated its leadership position by maintaining focus on its 3 strategic pillars. Our technology leadership in advanced packaging enabled us to gain market share in premium tier smartphones and grow in 2.5D technology for AI products and in ADAS and power solutions for automotive.

Our continued investments in a global manufacturing footprint offers our customers a secure and reliable semiconductor manufacturing supply chain. And our engagements in the secular growth markets strengthened by long-standing partnerships with lead customers in key markets like AI, high-performance computing and automotive.

Now let me review the dynamics in each of our end markets. Revenue on our communication markets increased 4% for full year 2023, setting a new annual record. This record was achieved despite overall smartphone units declining for the second year in a row. Market share gains within the iOS ecosystem drove this increase by utilizing our advanced SiP technology.

Amkor holds a leading position through our premium tier smartphones, built on our technology expertise and our proven track record as a trusted partner for codeveloping innovative solutions and delivering operational excellence. For 2024, we expect a modest low single-digit increase in the phone units, with further improvement in the Android supply chain during the year.

Revenue in our automotive and industrial business declined 4% for full year 2023. Advanced packaging revenue increased 6% year-on-year, driven by ADAS and industrial applications. We continue to see growth in high-power silicon carbide solutions for electrical vehicles, utilizing our unique package capability in our Japan factory. Our qualified manufacturing lines in multiple geographies such as Korea, Japan and Portugal, and our broad technology portfolio ranging from advanced packaging, wire bond and power are important differentiators. In 2023, we continue to invest in capacity and capability in this market, specifically for silicon carbide in our Japan and Portugal factories.

Revenue from the computing end market decreased 11% year-on-year. The robust demand for leading-edge advanced packaging supporting AI and HPC applications partly offset the decreases in PC and storage applications. Amkor leads the OSAT supply chain in 2.5D technology for AI devices, integrating high-bandwidth memory and ASIC on interposers, combined with module attach on substrates. To support the strong demand for AI devices, we doubled capacity exiting 2023, and with our planned investments coming online in the second quarter of 2024, we will have more than tripled our capacity compared to the second quarter of 2023. We expect the 2.5D demand will continue to increase in 2024, and we plan to support our customers in line with market growth.

The consumer end market declined 38% for the full year. Multiple headwinds, including reduced consumer spending, excess inventory and product changeovers in the IoT wearable market drove the decline. Within consumer, we support a broad portfolio of solutions for IoT wearables as well as the traditional consumer products. We are engaged in the next-generation products with our lead customers that will ramp production in the course of 2024.

During the fourth quarter, our manufacturing organization focused on optimizing capacity for 2.5D technology in Korea and on qualifying advanced SiP and memory technology in Vietnam.

Geopolitical dynamics continue to impact the semiconductor supply chain. Globally, our customers are evaluating their supply chain strategies to reduce risk and to secure a resilient and cost-effective manufacturing base. Amkor's broad geographic footprint is a key differentiator and positions us uniquely to support our customers and to benefit from this shift in global supply chains. In Asia, we recently opened our new Vietnam manufacturing campus. In Japan, we are expanding R&D and manufacturing capability to offer a secure supply chain for automotive semiconductors, including silicon carbide.

In Europe, we are partnering with lead customers and foundries to support a seamless European automotive supply chain with investments in technology for MEMS, wafer-level fan-out, flip chip and silicon carbide-power devices in our Portugal factory. In the U.S., with support of major customers and partners, we recently announced our plans to build an advanced packaging and test facility in Arizona. We are in discussion with

the CHIPS Program Office on funding and continue to work on establishing a facility to provide high-volume, leading-edge technologies to support critical markets such as high-performance computing, automotive and communications.

Now let me turn to our first quarter outlook. We expect the first quarter to be impacted by 2 main factors. First, after a record 2023, we expect a more than seasonal decline in our iOS-related business. Secondly, we observed continued weakness in the automotive and industrial end market due to inventory corrections, specifically for microcontrollers and ADAS applications. We expect first quarter revenue of \$1.35 billion. This represents a year-on-year decline of 8%.

For the full year of 2024, we foresee the first half of the year to remain muted but anticipate a strong second half recovery with growth higher than typical seasonality. Second half accelerated growth is supported by additional 2.5D capacity coming online midyear, a meaningful ramp of a new consumer wearable program and further rebalancing of inventories within Androids, automotive, memory and PCs.

We believe that the secular growth drivers for the semiconductor industry remain in place. And with our leading technology portfolio, scale and global footprint, we are confident to accelerate as the industry exits the current cycle.

With that, I will now turn the call over to Megan to provide more detailed financial information.

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**Megan Faust** - Amkor Technology, Inc. - Executive VP, CFO & Treasurer

Thank you, Giel, and good afternoon, everyone. Fourth quarter revenue of \$1.75 billion was down 4% sequentially. This was slightly softer than historical seasonality and was driven by customer inventory control, particularly within the automotive and industrial and computing end markets. Although revenue declined sequentially, gross margin for the fourth quarter improved 40 basis points to 15.9% as a result of continued disciplined cost management. Fourth quarter gross profit was \$279 million. Operating expenses for the quarter came in as expected at \$120 million and includes onboarding costs to prepare our new Vietnam facility for high-volume manufacturing later this year.

Operating income was \$159 million and operating income margin remained flat sequentially at 9.1%. Net income for the fourth quarter was \$118 million, resulting in EPS of \$0.48. Fourth quarter EBITDA was \$326 million and EBITDA margin was 18.6%.

Now let's turn to our full year 2023 performance. Revenue of \$6.5 billion was down 8% year-on-year. While a down year, this is an outperformance compared to the semiconductor industry. Gross margin for the year was 14.5% and gross profit was \$943 million. During times of lower utilization, it is critical to manage our manufacturing costs to preserve profitability. Our disciplined approach resulted in a 10% reduction in both labor and other manufacturing costs.

Net income for the year was \$360 million, resulting in EPS of \$1.46. EBITDA was \$1.13 billion and EBITDA margin was 17.4%. CapEx for 2023 was \$749 million and 11.5% capital intensity. We reduced our equipment spend by approximately 45% from 2022, while continuing to invest in our global manufacturing footprint by completing construction of our new Vietnam facility.

Our financial performance showed great resilience in 2023. We achieved record free cash flow of \$534 million, reflecting efficient operations. Our financial strength allows us to continue to invest in our future growth, both in technology development to support leading-edge advanced packaging solutions as well as our manufacturing footprint. Our geographically diversified portfolio of factories has proven to be a key differentiator in supporting regionalization of supply chains. We ended the year with \$1.6 billion of cash and short-term investments and total liquidity of \$2.3 billion. Our total debt as of the end of the year is \$1.2 billion, and our debt-to-EBITDA ratio is 1.1x.

Moving on to our first quarter outlook. We expect Q1 revenue of around \$1.35 billion, representing a year-on-year decline of 8%. With the continued industry cycle and Q1 being the seasonally lowest quarter, profitability will be constrained, given underutilization, and we expect gross margin to be between 11.5% and 14%. We expect Q1 operating expenses of around \$130 million, which includes an annual reset of employee compensation levels as well as costs to support the onboarding of our new Vietnam factory.

We anticipate a higher level of operating expense in the first half of 2024 until we begin high-volume manufacturing in Vietnam projected for the second half of this year. We expect our full year effective tax rate to be around 18%. First quarter net income is expected to be between \$8 million and \$48 million, resulting in EPS of \$0.03 to \$0.19. Our CapEx forecast for 2024 is around \$750 million. Our investments will focus on key advanced packaging technology solutions, specifically 2.5D in the computing market and Advanced SiP supporting the consumer market as well as expansion of certain factories.

We recently announced our plans to build an advanced packaging and test facility in the United States. We are in the early planning stages and do not expect a material CapEx spend for this project in 2024. We have a target to be ready for high-volume manufacturing in approximately 2 to 3 years.

We are excited to see the technology advancements in the industry and believe the secular growth drivers are intact. Amkor is a technology leader with decades of experience. Our culture of operational excellence, coupled with the broadest geographic footprint of all OSATs, positions us well to support the world's leading semiconductor companies.

With that, we will now open the call up for your questions. Operator?

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## QUESTIONS AND ANSWERS

### Operator

(Operator Instructions) Our first question comes from Craig Ellis with B. Riley Securities.

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**Craig Andrew Ellis** - *B. Riley Securities, Inc., Research Division - Senior MD, Director of Research and Senior Semiconductor & Capital Equipment Analyst*

Giel and Megan, congratulations on calendar '23's year of accomplishment. The first thing I wanted to do is just follow up on some of the communications comments regarding the above-seasonal first quarter decline. So I think a lot of us have seen data points that the Android market is starting to recover. Obviously, the iOS market faces significant calendar 1Q seasonality every year. Can you just go into a little bit more detail on what some of the puts and takes are inside of that segment and help us understand what's leading to the above-seasonal decline?

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**Giel Rutten** - *Amkor Technology, Inc. - President, CEO & Director*

Craig, yes, let me start doing that and Megan can later on give some more details. What we see in the first quarter are a couple of dynamics here. First of all, the first quarter comes on the back of a record 2023 and actually a record fourth quarter in 2023. We see a seasonal correction in the first quarter that is higher than normal but is at the same order of magnitude as what we have seen in 2023. If we take iOS and Android, I mean, both ecosystem -- revenue from both ecosystems is down, Android in line with expectation with some uptick in Q4 but still a decline in Q1.

In the iOS ecosystem, we see an above-seasonal correction. There are a couple of elements that are resulting in that above-seasonal correction in the iOS ecosystem. First of all, we had accelerated bills in the fourth quarter for some specific SiP programs, and that is corrected in the fourth -- in the first quarter. And we see some forecast corrections for system and package programs, and that results from product mix and some operational yield improvements on existing products. All in all, I think that results in an above-average correction for communication in the first quarter.

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**Craig Andrew Ellis** - *B. Riley Securities, Inc., Research Division - Senior MD, Director of Research and Senior Semiconductor & Capital Equipment Analyst*

If I could move on and ask a longer-term question on the broader business. Encouraging to hear the team's view for the second half of 2024 being above-seasonal, but in light of what we're hearing from some analog bellwethers about murky visibility in areas like auto and industrial, can you

just list the 3 or 4 things that are giving you confidence that the second half can be above-seasonal? And are you saying that your businesses across the different end markets will be out of the cyclical correction by then?

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**Giel Rutten** - Amkor Technology, Inc. - President, CEO & Director

Yes. First, let me refer to your first part of the question is the share -- industrial and automotive corrections that we've indeed seen starting Q4 and moving further into Q1. We expect that these corrections related to specifically these 2 market segments, industrial and automotive, and then very specifically also for the microcontroller segments in both markets, we expect that to continue certainly in the first quarter and going into the second quarter.

However, after conversations with key customers on Amkor's side, we expect more balanced inventory situation going into the second half of the year. And with that balanced inventory, we expect a recovery of these businesses. Now we are not exposed to some of the more commoditized markets, so we are only exposed for our wire bond and lead frame business to -- mostly to automotive microcontrollers.

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**Megan Faust** - Amkor Technology, Inc. - Executive VP, CFO & Treasurer

So Craig, just to build on your second part of the question as far as what gives us confidence for that higher than second half growth, we are going to have incremental capacity online to support the 2.5D business so we're anticipating further growth there, as well as ramping a consumer IoT product in the second half. So those are 2 other factors that I would say, coupled with Giel's comments, as far as our anticipation that we'll probably start to see further inventory balancing within memory and PC.

And just to kind of give some context on the shape of 2024, we're expecting the second half could be as strong or stronger than 2022. So back in our peak 2022 growth year, the second half was -- had 30% growth over the first half. And given the dynamics we're seeing with a muted first half, we see the second half could be strong or stronger.

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**Craig Andrew Ellis** - B. Riley Securities, Inc., Research Division - Senior MD, Director of Research and Senior Semiconductor & Capital Equipment Analyst

That's really helpful color. If I could sneak in 1 more. Appreciated the additional disclosure in the press release regarding cost of sales breakout with respect to gross margin and how we get to levels over the last couple of quarters and last couple of years. Megan, as out of a disclosure or plan to continue to provide, and as we think about those inputs, any change to how we think about the revenue upside and downside fall-through versus prior plus and minus 40% commentary?

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**Megan Faust** - Amkor Technology, Inc. - Executive VP, CFO & Treasurer

Sure. Yes, the disclosures we've included in our press release, we would expect to continue that going forward, Craig. And I would say no change in our expectations in the financial model for generally an incremental flow-through of around 40%. Looking at full year '23, this was a bit higher on a down year. We were under pressure with increasing material content, and that's what caused that flow-through to be different.

I would point too, there was still a healthy reduction in manufacturing costs, which we would characterize as cost of goods sold less -- excuse me, materials, reducing 6.6% on a decrease in revenue of 8%. Looking at Q1, very good flow-through, less than 40% on the down revenue, which does demonstrate disciplined cost management.

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**Operator**

And our next question comes from Randy Abrams with UBS.

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**Randy Abrams** - UBS Investment Bank, Research Division - Analyst

The first question I wanted to follow up. It was good color to Craig's question on the second half, half-on-half. I was curious just between the second quarter, I think one gets the communications coming off below seasonal if you expect correction to extend in the second quarter or that starts to pick up. And then maybe just broadly on the second quarter, if you could remind us what a normal, I think there's always a range, what a normal Q2 look like, and if you see a seasonal pickup off a lower first quarter.

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**Giel Rutten** - Amkor Technology, Inc. - President, CEO & Director

Let me try to give some color on these elements. First of all, related to the second half communication business, there were identifiable, let's say, reasons for higher than seasonal correction in the first quarter. We expect that our overall position in the market is strong. We have a very strong product pipeline and deep engagements with lead customers. So in the second half of this year, with the new phone ranges coming online there, we expect an above-average growth rate because we also see that the Android market will continue to recover in the course of this year. So overall, we are very confident with the second half of this year ramp for communications.

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**Megan Faust** - Amkor Technology, Inc. - Executive VP, CFO & Treasurer

And Randy, just as a reminder, what our typical second quarter seasonality would be, that can range anywhere from flattish to up low single digits. I would say it's pretty difficult to give that level of precision for Q2 at this time. We're not guiding second quarter, so that's why we gave the commentary on the first half, second half shape.

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**Randy Abrams** - UBS Investment Bank, Research Division - Analyst

Yes, it sounds like still conservative, given auto industrial, and usually, we get the flagship in second half, so more second half weighted. The second question I had just on the CapEx where it looks at similar levels and remaining lower capital intensity than the historical. The equipment ramp quite a bit in 2023. How would the mix shift between equipment versus construction? Do you still have ongoing Vietnam or other build-outs? Or does the shift continue to be growth in equipment within that \$750 million mix?

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**Giel Rutten** - Amkor Technology, Inc. - President, CEO & Director

Yes. That's a good observation, Randy. So for this year CapEx spend, we see a shift from the initial profile that we have in 2023 with a large part of our CapEx related to facilities and the, let's say, building of our Vietnam factory. In 2024, it will be reversed. We will significantly increase our CapEx for equipment and reduce the CapEx for buildings and facilities. So the second half, our CapEx will increase for equipment about 50% on a year-on-year basis based on opportunities that we see in the market. Megan, any share?

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**Megan Faust** - Amkor Technology, Inc. - Executive VP, CFO & Treasurer

Yes, Randy, so hopefully, that explains that the equipment portion of our CapEx spend is going to increase approximately 50% in 2024. We do have some, I would say, facility expansions that are more localized to Portugal as well as Taiwan and also expanding -- planning to expand Vietnam and an additional module. But generally, the shift, as Giel mentioned, will move more towards machinery and equipment. That will primarily be focused on advanced packaging, as we've mentioned, our 2.5D capacity coming online midyear as well as Advanced SiP.

**Randy Abrams** - UBS Investment Bank, Research Division - Analyst

And for the advanced packaging, where I think you've had that plan to triple by midyear. I'm curious if you're getting any indications for further capacity increase. So once you bring that on, the lead times are quite long. So are you making -- do you see any need for a further step-up to continue to ramp beyond that tripling or do you think we're catching up to demand and starts to stabilize?

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**Giel Rutten** - Amkor Technology, Inc. - President, CEO & Director

No, we have a fairly strong product pipeline, a project pipeline for 2.5D diversifying our customer base but also our service portfolio going into the year. So we expect after the tripling of capacity that will come online by the end of the second quarter, that we will continue to invest in line with market demand. And like we normally do, we have all the elements in place in order to ramp up where needed and as needed without being too specific here at this point in time.

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**Operator**

(Operator Instructions) Our next question comes from Ben Reitzes with Melius Research.

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**Benjamin Alexander Reitzes** - Melius Research LLC - MD & Head of Technology Research

Giel and Megan, if the second half of the year ramps to be like 2022, is there anything that would impede you from getting to similar gross margins as that time in the second half of 2022 this year if it's a similar type of performance?

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**Giel Rutten** - Amkor Technology, Inc. - President, CEO & Director

Well, Ben, let me hand that question to Megan, making 1 remark on that. I mean, I would say the fundamentals are still in place to get back to that level. Our profitability and gross margins are very much determined by utilization of our lines, but currently running at the utilization level, let's say, below 65%. And with business coming online, we expect that, that could go back to 2022 levels when we were running at 85% utilization levels. But now let me hand over to Megan to give her view.

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**Megan Faust** - Amkor Technology, Inc. - Executive VP, CFO & Treasurer

Yes. Ben, so as far as the second half ramp, we would expect to have our financial model of incremental flow-through to gross margin and possibly expect a better flow-through, given we've been really tightening up during this cycle. So as far as Giel mentioned, it will depend on how the utilization progresses in that second half. I wouldn't expect that we would be at the same levels of utilization at the second half of '24 compared to the second half of '22.

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**Benjamin Alexander Reitzes** - Melius Research LLC - MD & Head of Technology Research

I'm sorry, I missed that at the end. You would think you would be or would not be at the same?

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**Megan Faust** - Amkor Technology, Inc. - Executive VP, CFO & Treasurer

Yes. So you're pointing to our '22 gross margin of 18.8% and that implied, as Giel said, peak utilization levels that we were experiencing at the height of our growth. So depending upon how the '24 year shapes up and where we're starting at in the first half, I wouldn't anticipate that we would be achieving an 85% utilization by the second half of '24.



**Benjamin Alexander Reitzes** - *Melius Research LLC - MD & Head of Technology Research*

Okay, I got it. Sorry to make you repeat it. The other question is around your CHIPS Act pre-application and potential application. Is there any news around that? I understand that you mentioned that you may have -- you're not going to spend a lot on the announced facility. But is there a chance that we get some news around CHIPS Act and their ability to help you guys out with the domestic supply chain here in the U.S.?

**Giel Rutten** - *Amkor Technology, Inc. - President, CEO & Director*

First, to your second part of your question, Ben, we are continuing full speed with preparation for the U.S. facility, specifically optimizing the factory design, aligning with our customer base on loading and technology requirements and working with contractors to plan out the building cycle. So it's not that nothing is happening there on the execution side.

With respect to the CHIPS offers, I think we're going there after the pre-application. We're preparing the final application. We're working closely with the CHIPS offers where we have multiple communication points on a weekly-by-weekly basis. So we expect that full application will go in soon.

**Operator**

And our next question comes from Tom Diffely with D.A. Davidson.

**Thomas Robert Diffely** - *D.A. Davidson & Co., Research Division - MD & Director of Research*

Giel, maybe first, when you look at 2024, below-seasonal first half, above-seasonal second half, what's kind of the view for the full year on a year-over-year basis at this point?

**Giel Rutten** - *Amkor Technology, Inc. - President, CEO & Director*

Well, Tom, that is not so easy to answer because there are certainly in the first half, and Megan already alluded to that, we see still significant uncertainties. We don't guide for the second quarter, for example. But the second half of the year, we clearly see significant opportunities for further ramp-up. Megan already gave them. We have 2.5D capacity coming online with a full pipeline of products. Also there, we have a new customer for the share on wafer, let's say, portfolio.

We have a meaningful ramp for new IoT wearable programs in the second half. And we definitely expect that Androids, memory, PC and automotive will be back on stream in the second half of this year. So to quantify that and to give a full year outlook, I mean, in general, we are confident with our product portfolio, with our customer engagements that we should, let's say, grow with or above the market.

**Thomas Robert Diffely** - *D.A. Davidson & Co., Research Division - MD & Director of Research*

And then when you look at the -- what's driving the weakness in the first quarter between iOS and the automotive inventory, did anything change over the last month or 2? Anything gotten worse or just kind of the view you've had for a little bit here coming into the new year?

**Giel Rutten** - *Amkor Technology, Inc. - President, CEO & Director*

I mean, at the end of the year, in general, I think that's the end of the first ramp-up in the iOS system. You generally see that stock is taken on the performance, so there are always some corrections. So the corrections may be a little bit higher than normal seasonality. But I already indicated earlier that it's not in the same order of magnitude as in the first quarter of 2023. So nothing extraordinary from our perspective.

**Megan Faust** - Amkor Technology, Inc. - Executive VP, CFO & Treasurer

And just to give some color, Tom, on automotive specifically, what we experienced in Q4, I would say order of magnitude is what we're seeing kind of going into Q1. So we haven't seen anything, I would say, recently that suggests it's deeper. We saw this coming in Q4.

**Thomas Robert Diffely** - D.A. Davidson & Co., Research Division - MD & Director of Research

And then Megan, to follow that up, could you maybe provide a few more specifics on what drove the cost savings, the cost management you referred to earlier?

**Megan Faust** - Amkor Technology, Inc. - Executive VP, CFO & Treasurer

Sure. So as far as our approach to cost management, especially in times of temporary declines that we're experiencing now, it's very much ensuring that we don't structurally change such that we're not able to support significant ramps, whether that's seasonal ramps or coming out of the cycle where we want to be ready to capture that future growth. So the types of programs centered around our labor cost are very intentional as far as monitoring overtime and ensuring in certain locations, where appropriate, we can extend furloughs to manage that cost. On the other manufacturing costs, there's strict work happening in areas such as energy usage as well as monitoring repairs, maintenance and supplies such that we're being very prudent without sacrificing quality.

**Thomas Robert Diffely** - D.A. Davidson & Co., Research Division - MD & Director of Research

Maybe just last question. Are you guys getting the atmospheric river coming your way? Or is that not that...

**Megan Faust** - Amkor Technology, Inc. - Executive VP, CFO & Treasurer

We're holding, we don't have any windows here so we can't look outside, but thanks for the warning.

**Operator**

Our next question comes from Craig Ellis with B. Riley Securities.

**Craig Andrew Ellis** - B. Riley Securities, Inc., Research Division - Senior MD, Director of Research and Senior Semiconductor & Capital Equipment Analyst

I just want to try to connect some dots and clarify a few comments that I heard. So repeatedly, there were comments on expecting strength later this year as 2.5D capacity opens up, and I'm interpreting that as more server GPU-related. And then Giel, I think you mentioned that part of the expectation for the back half of the year is more of a recovery in PCs. And so I really wanted to dig into the PC comment. Is that PC comment something that you see as being driven more cyclically, which is what we've seen in much of the market? Or is it really something related to more AI-optimized PCs that have been discussed for the last couple of quarters by folks like Dell and others that might have different packaging types that would stretch capabilities and needs into the 2.5D realm? Any clarification there would be appreciated.

**Giel Rutten** - Amkor Technology, Inc. - President, CEO & Director

Well, we expect the second half, let's say, recovery on the PC side, mostly as it impacts Amkor, mostly for the ARM-based PCs and then peripheral devices for the x86-based PCs. There's a memory component to that also, so we see multiple components that we package assembly -- package and test that go into PCs. But I would say the most prominent delta would be in the ARM-based PCs.

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**Operator**

And our next question comes from Joe Moore with Morgan Stanley.

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**Joseph Lawrence Moore** - *Morgan Stanley, Research Division - Executive Director*

In terms of the HPC AI part of the business, I know there were some news recently that there might be a third supplier of the advanced packaging there. Can you just talk about whether that has any impact on you? And just is there a market share assumption that's kind of underlying your expectations there?

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**Giel Rutten** - *Amkor Technology, Inc. - President, CEO & Director*

Joe, with respect to the market, I think the capacity and the demand are still in on balance, so there's more demand than capacity in markets, multiple parties bringing capacity online. I don't know exactly which news source you referred to, but what I can say is that our customer portfolio for 2.5D packaging is increasing. We have 2 more customers, let's say, ramping up by the end of this year. By the second quarter of this year, we also start our, what is called our own substrate business with a new customer, and that adds also significantly to our revenue in the second half of the year. So there are multiple elements that contribute to a ramp in the second half. It's a dynamic environment, but there's a consensus that demand and supply will be out of balance for a longer period of time.

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**Operator**

At this time, I'm showing no further questions. I would like to turn the call back over to Giel for closing remarks.

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**Giel Rutten** - *Amkor Technology, Inc. - President, CEO & Director*

Well, let me recap the key messages here. After a strong third quarter, Amkor delivered solid fourth quarter performance with revenue of \$1.75 billion, above the high end of guidance. For full year 2023, we met a cyclical downturn, Amkor outperformed the semiconductor industry. For the full year of 2024, we foresee the first half of the year to be muted but anticipate a strong second half with growth higher than typical seasonality, driven by expanding AI engagements, a new consumer wearable program and further rebalancing of inventory within Android, automotive, memory and PCs.

Amkor has continued to elevate its leadership position by executing on its 3 strategic pillars: advancing our technology leadership, expanding our broad geographic footprint, and strengthening engagements with lead customers in growth markets. Thank you for joining the call today.

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**Operator**

Thank you. Ladies and gentlemen, this concludes today's conference call. You may now disconnect.

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