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EDITED TRANSCRIPT

ADI.OQ - Analog Devices Inc at JPMorgan U.S. All Stars Conference

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OVERVIEW:

Company Summary

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PRESENTATION

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

All right. Good morning, and again, welcome to JPMorgan's 14th Annual U.S. All Stars Conference here in London. My name is Harlan Sur, the semiconductor and semiconductor capital equipment analyst for the firm. Very pleased to have Vincent Roche, Chairman and Chief Executive Officer of Analog Devices here with us this morning.

For those of you that don't know the Analog Devices team, a leader in high-performance, mixed signal, RF analog semiconductor chips, strong position in power management, very strong position in signal chain processing, right, both analog and digital, which is the technology that bridges the real (sic) [digital] world to the physical world, best-in-class gross operating free cash flow margins, strong capital return program, very diversified business, right, Industrial, Automotive, comms infrastructure, 90% of total revenue. So Vince, thank you for joining us today.

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Thank you, Harlan. Great to be here. Same time, same place, different year.

QUESTIONS AND ANSWERS

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

Exactly. So to that point, about a year ago, at this very conference, the team was driving 25% year-over-year growth in the business, positive book-to-bill trends, but you did call out order deceleration, some pickup in cancellations, which in hindsight did signal sort of the start of the negative cyclical inflection for the ADI team, but for the industry as a whole.

So kind of take us through the dynamics over the past year and more importantly, your view on the cyclical dynamics in your business sort of going forward?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Yes. Thank you. So -- yes, we had our earnings call, third quarter earnings call just a few weeks ago. Actually, in the third quarter of '22 or fiscal '22, we did call what we thought was the peak at that point in time. And we got through the pandemic. We had a supply chain crash in FY '20, FY '21, basically, what happened across the industry as we tried to squeeze 15 or 16 months' worth of shipments into 12 months. So we're in catch-up mode.

And the shortage itself drove some panic. And we've been trying to get, so we were chasing supply for 2.5 years. I think for the next year or so, we'll be chasing demand. I mean, as we called out on the earnings call, we have a belief that what we have right now is an inventory overhang that will take -- at least, in ADI, will take us somewhere in the region of 6 months to correct. But we are seeing some stabilization. We suffered a lot of cancellations for the last 6 or 9 months. We've begun to see that moderate somewhat. So what we're getting now is our backlog into a shape that we would consider in pre-pandemic terms to be more normal.

So that's where we are. I think '24 will be a year of flushing inventories across the industry. And I believe we'll get back into a more normalized growth pattern in FY '25.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

Perfect. Looking at ours and consensus revenue profile, we are modeling, as you mentioned, right, continued softness in the business for the next 2 quarters. Peak-to-trough revenue decline of around 18%. About the same magnitude of the decline as the last cyclical downturn, 2018, 2019, yet the team is driving low 40% operating margins to the trough, right, of this cyclical downturn versus the prior 2 cyclical trough op margin levels of 37% and 28%.

So help us understand the strategic, the structural changes that are driving the continued improvements in through-cycle profitability and earnings power.

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Yes. Well, look, we have a tremendously diversified portfolio, as you pointed out in your opening remarks. We cover all the critical market sectors in advanced communications, immersive consumer, Industrial has many, many different parts of it, including digital health care, factory automation, Industry 4.0, advanced instrumentation for scientific research, automatic test equipment, and so on and so forth.

5G systems, now we're starting to get into the early stages of building 6G systems. So we're present in all the critical applications that drive modern socioeconomic life and we happen to have more than 100,000 customers in our portfolio. We've got 75,000 product SKUs with life cycles, for example, in the Industrial that are 17 years plus. So the stickiness of the franchise is really, really, really strong.

So for us, getting our products -- getting our new products designed into a customer that's where we face the price elasticity, if you like. But once we get our products designed then pricing is very, very stable and the substitution costs in our business are very, very high. So the business model has settled in such a way that we're able to capture the innovation upsides. Then we have, once we get our products established, the stickiness, the stability is very, very strong. We've also been able to steadily increase our average selling prices. So that helps, obviously, top line growth. And I think as well our additional scale on the manufacturing side has helped us to get our cost structures into a place that they haven't been.

All that said, what we're seeing now are higher highs and higher lows as well.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

If I look back -- if we look back at the team over the past 20 years, you've grown your revenues at about a 9% CAGR, 30% faster than the overall semiconductor industry. You've grown your earnings and your free cash flow at about 11% to 13% CAGR over that period of time. Some of the growth has been organic, but most of it -- well, some of it has been inorganic, but majority has been organic, right?

On a go-forward basis at the last Analyst Day, you put out a target, revenue growth rate of 7% to 10% per year, earnings about 10% to 12% and \$15 per share of earnings power in fiscal '27. Peak of this current cycle, right, the most recent earnings cycle you're already driving \$11 of annualized earnings power. So what's the confidence level in the team attaining your forward earnings power target of \$15 in '27?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Yes. So what gives us great optimism. We are very much an innovation-driven company, and we're spending \$1.7 billion plus in R&D every year. That's always the first call on the company's capital. So our product portfolio is stronger than ever. We're investing more to get ahead of customers' needs in all these critical application areas that I mentioned.

We have also so many concurrent secular tailwinds to push us ahead. It's unprecedented, the number of secular tailwinds across the Industrial, advanced communications, immersive consumer, Automotive as well, of course, these tailwinds, we've never had such a richness of concurrent secular tailwinds in our history. And I've been in the business over 40 years now. And typically, each cycle in each decade was driven by one particular technology modality.

The early 2000s, it was Internet. 2010 plus, it was smart phone and cloud. Now we're seeing the electrification of the automobile. We're seeing more and more technology used in automobiles. In fact, cars and transportation systems are using 10% more silicon every year with more and more software. So all these things are conspiring the digitalization of society, digitalization of the economy. So we're very well positioned, as I said, from a customer perspective, from a market-dynamic perspective with a better portfolio than ever. And through some acquisitions we've done as well, we've built a very strong power management portfolio. But we are still underrepresented there. We see that as an enormous opportunity for ADI to continue to gather share, to do more attachment between our mixed-signal portfolio and our power portfolio.

So we put all those things together, we feel confident that 7% to 10%, when we get back beyond this current inventory in digestion cycle, that we'll get back into a more normalized pattern. And I suppose the big question is the rate of recovery of the China economy. So that will have some effect on the upper end of that growth expectation.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

A big part of the above-industry revenue growth profile has been obviously -- it's powered by your design win pipeline, right? Last year, fiscal '22, you grew your design win pipeline by over 10%. How is 2023 tracking so far relative to that number? And what areas of the portfolio or end market exposure is the team really seeing sort of the strongest expansion in sort of the \$4 (sic) [\$4 billion] pipeline?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Well, we continue to grow the size of that opportunity pipeline. Some of it we get from, as I said, the market trends where I mentioned earlier in the conversation here that we're getting more ASP for product now than we've ever. Every year, we increase the ASPs of our products. And that's driven by the innovation strength of the products we're developing. We're building more complete solutions for our customers. We're adding software to hardware. So all these things increase the content value of ADI's products for our customer.

So I talked about the need to be able to connect our power management portfolio more directly with the strength of our mixed signal, where we have tremendous share. So as I said, the opportunity pipeline. This year, again, in '23, it will grow about another 10% or 12%. So all that gives us tremendous confidence in the potential growth of the company in the years ahead. Paying, we focus our business development efforts on making sure that pipeline is not only growing in absolute terms, but that the conversion rates are also increasing.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

You talked about continuing to build out the power management portfolio. You've done a phenomenal job on the organic growth side. Part of that power management portfolio unlock revolves around unlocking synergies with some of the acquisitions that you've done, right, Hittite, Linear Tech. Now you're in the midst of unlocking about \$1 billion per year of revenue synergies by fiscal '27 via the Maxim acquisition, right, that you completed in 2021. And we can already see some of this unfolding right with Maxim GMSL attached to your A2B connectivity solutions. We also see it within your battery management portfolio also with your focus on factory automation. Where are you in that journey to \$1 billion with the Maxim team and your confidence level on getting there by fiscal '27?

Vincent T. Roche - Analog Devices, Inc. - CEO & Chair of the Board of Directors

Yes. Well, the pipeline -- the opportunity pipeline that we have would suggest that we're well on track. I think you've pointed out the critical components of that journey in terms of the revenue synergies with Maxim. My sense is we'll probably get to the target we had a little earlier than we had expected. Of course, what happens in the economy will have some effect on that.

Harlan L. Sur - JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment

Yes. U.S. and European Chips Act bills were both past last year. Key focus right is to motivate more manufacturing in the U.S. and EU, to drive more focus on manufacturing leadership as well as for business continuity planning, in terms of supply chain diversification, geopolitical risk mitigation. You have fabs, both in U.S. and Europe. What's the status of grant disbursements, timing of incentive tax credits? And more importantly, has the team seen an acceleration in customer engagements that are looking to source more of their semiconductor value, right, from the Analog team going forward?

Vincent T. Roche - Analog Devices, Inc. - CEO & Chair of the Board of Directors

Yes. It's a very straightforward question with a very complex answer, but I'll do my best to answer it for you. So right now, we make about 50%. We fabricate about 50% of our silicon inside ADI, and we have 3 fabs in the U.S., we've 1 here in Europe, in Ireland. And then we procure another 50% of our silicon outside with partners like TSMC for example.

And that hybrid model -- that hybrid manufacturing model has been a mainstay within the company now for many, many years. In times of very, very strong demand, we are able to use flexible supply from partners, for example, we're able to get more capacity from partners. When the market is in a lull, like it is now, we can bring more of our manufacturing needs inside, which helps us manage utilization, protect our gross margins.

So over the last -- of course, one of the big questions in our customers' minds over the last 3 years has not just been kind of the tactics of supply, it's been around how do we ensure resiliency in our manufacturing operation and to be able to create some surety of supply beyond Taiwan. And so we've been on an investment track. We've massively, in our terms, increased CapEx, we have typically run our CapEx model of between 4% and 6% of revenue. In FY '22, that would have been about 12%. That's the peak of our investment cycle, for capital equipment from manufacturing. In FY '24, we'll invest about \$1 billion.

So to cut a long story short, when an advanced digital node is considered for CapEx. You're looking at \$15 billion. You're building 300-millimeter wafers, you need about \$15 billion of spend. The most popular node inside ADI today. So advanced digital is 3 nanometers today. The most popular node inside ADI today in terms of new product development is 180 nanometers. That was digital leading edge 28, 30 years ago. So the equipment we buy, the -- obviously, there's been a tremendous amount of amortization. We're using 200-millimeter wafers. So we've been able to just about double the output of our internal factories for \$1.5 billion, \$1.6 billion.

So we're well down the track. We're actually -- we've licensed technologies from our critical partner. And by the end of '24, early '25, we'll be producing volume of these products in our factories in Ireland and the U.S. So the more advanced nodes, we use 55, 40, and now there is 28 nanometers and so on and so forth. We use partners. They're obviously on 300-millimeter wafers. We use partners. So to cut a long story short, we've obviously capitalized -- we will have completely capitalized these equipment needs by the end of '24.

And we have been public with our announcement of EU funding for our operation in Ireland. We've gotten pretty significant funds from the EU for both manufacturing grants, but also for R&D grants. And that's been confirmed that we have applied for CHIPS Act funding in the U.S. as well from both manufacturing as well as R&D grants. We expect to hear where we stand with that by the end of the year, but we're optimistic about our prospects there.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

And as a part of that, we've seen whether it's the past 3 years where the entire semiconductor value chain. And the entire tech value chain went through a period of very, very tight supply in the semiconductor value chain, or obviously growing concerns around geopolitical risks and so on. We've seen a lot of your end customers, the auto OEMs, the industrial OEMs, the compute OEMs, the consumer OEMs. Talking about not so much in near term, but a long term, like 5- to 10-year plan to try to source more of their semiconductors with U.S. and European companies that have manufacturing in the U.S. and Europe. I mean, has that been a little bit of a tailwind? Has that driven more customer engagements for the ADI team?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

We're really not doing anything new in the sense that we've already got a large footprint in America. We've got a large footprint in Europe. So I wouldn't say it is necessarily a tailwind. I think what's important to remember, all of the massive capitalization activities that are underway now, all that capital needs payback at some point.

So I think on the more advanced nodes, all of the focus of the European and U.S. governments over the last 3 to 5 years, most of the attention has been paid to the really advanced nodes, 5, 3, 2 nanometers. And there could be an overinvestment there. But look, at the end of the day, we all want resiliency, but there's also -- we've got to remember the economics of the business. We've built a supply chain that has been very Asia-centric for many, many years. There's been tremendous benefit to that, cost structures, the efficiencies and it's going to take us time ever to match -- particularly in these more advanced nodes. It will take us time to ever be able to match the cost efficiencies of the Asian supply chain. Going to take time.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

Let's switch focus to kind of the near to midterm, and we will get back to discussing some of your end market focus in a little bit. But near to midterm, obviously, there's been a lot of focus on in the U.S. on the United Auto Workers strike, this weekend, ongoing negotiations with the big 3 auto OEMs. I know it's early, but has this had a noticeable impact on your auto business? What are you hearing from your Tier 1 and your auto OEM customers?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Well, there's a couple of comments I'd like to make on that. Number one, the effect on our business so far has been very de minimis. We don't expect a lot of disruption. But also once there's a customer for an automobile, there are plenty of choices. So the good news for ADI is our business is very global in nature. We have very strong content across all the OEMs actually, be it in-cabin or electrification, we actually don't, we don't supply the internal combustion engine really at all with the exception of idle start-stop control systems.

So we're not so concerned in the sense that we've got a very, very good spread across the globe with OEMs and Tier 1s. And our calculus suggest that we shouldn't see -- there will be probably some disruption, but we don't see it being a material part of our business.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

Perfect. And you did mention at the beginning of your commentary, it looks like cancellations are starting to sort of normalize or stabilize, moderate. So I would assume that means that your backlog is also starting to moderate a bit as well. Is that true?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

I think that's fair. That's a fair comment. Yes.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

Another good indicator of sort of near-term current demand trends is your turns business, right? Orders that get placed and in the same quarter, right? And I believe part of the weakness in the July quarter was lower-than-expected turns business. The team took a more conservative approach on turns expectations in this quarter's guidance. I mean, quarter-to-date, has the terms business been in line with the team's expectations?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Well, let me make a few comments. We run our company, we run our manufacturing operation on sell-through. So it's never in our interest to build products that customers don't need or stuff the channel, whatever you want to call them. So we've been watching very carefully the rate of sales, output supply of our customers to their customers. We obviously manage our -- we're looking at our inventory build or decline relative to what our customers are shipping. So we think we have really undershipped the customers' demand, if you like, over the last 2 quarters.

So my sense is, we've built a lot of inventory. We've kept a lot of inventory on our balance sheet, but our customers are depleting ADI inventory. We're pretty confident about that based on how we manage the company. So that's what gives us confidence that in the probably second quarter of FY -- fiscal '24 that we'll begin to see the inventory digestion problem behind us at the customer level that we'll be able to move back to a more normalized (inaudible) pattern.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

You did mention that -- you talked about chip pricing, right, and your overall pricing or ASPs are more than 4x higher than what we track, right, in the industry SIA data. And your blended average pricing trend, as you've mentioned, have been moving higher over time, right? And so I wouldn't think that cyclical dynamics like the current downturn impacts pricing for the team all that much because your products are really the key performance differentiators in all of your customers' applications, right? But can you just comment on pricing trends on existing and more importantly new customer and opportunity engagements as the team has moved through this sort of weaker period of time?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Yes. Well, that's exactly the right way to think about it. Once we get a product established the substitution costs -- in other words, we've gotten over the design phase the product goes into the customers' manufacturing system. The ASPs are rock solid. And as I said, in the Industrial sector, we have average lifetimes of over 17 years. In Automotive, it's somewhere in the region of 7 to 10 years. And consumer tends to be a more rapid cycle of innovation. So we tend to see 3, 4, 5 years of product life in the consumer product. But the substitution costs are very, very high in our business. We're never a long pole in the customer's tent when it comes to bill of materials costs on an individual product basis. So our customers are always more concerned about being able to get, particularly in the industrial space, get supply of a product with very high quality for decades at a time. And that is one of the reasons that we control our manufacturing internally particularly in those less advanced nodes that are really important to our Industrial customers, these are performance products, but on very, very well amortized silicon nodes.

So once we get the product established, the economics of the business are very, very stable, where we have to fight like Blazers, is at the pre-design phase because we're not the only show in town. We are the highest performance supplier in the world of analog and mixed signal and power. But that's where the pricing dynamics are most intense. It's at the pre-designing phase.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

And so as you've looked at either a very similar socket with the same customer and obviously, you have engagements within customers over multiple years, right? And so is the team's focus to try to drive higher ASP per socket or -- and/or sort of higher dollar content overall per customer engagement? Or is the combination of both?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

It's really both. I mean every new product that we bring to market has some level of increased power efficiency, but more performance per unit area of silicon, probably more software with it as well. And the software is giving us a chance to make the products more sticky, get more ASP value as well. So our focus tends to be in the critical big applications in Industrial and Automotive, for example, it's to develop anchor products that are very application-specific and then we pull the catalog or the kind of more generic products around that. So that's how we approach that business.

So it's about increasing value per application as well as bringing more innovation value per new product generated to our customers. And I will tell you as well that, I mean, over the many, many years I've been in the business, the dependence of our customers on external analog skill is becoming more and more intense. The analog craft now tends to be really in the hands of a very few big semiconductor suppliers. So our customers are more reliant on us to solve that problem for them between the physical and the digital world. And scarcity drives value. And that's one of the reasons that we've got so much optimism about our business. Customers want more. There is a need for more and more performance, more innovation. And we've got an R&D footprint and a portfolio footprint now bigger than we've ever had. So we're really optimistic about this.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

Before I dive into some of the product segments, I wanted to see if we can open it up to the audience to see if there are any questions. Just raise your hand and we can get a mic over to you. Got one in the back there.

Unidentified Analyst

Sorry, just -- please excuse the ignorant question, but you mentioned that CapEx would end up being \$1 billion and come from the peak of 12% normalized. But then you said that the majority of your -- majority of your sourcing at more of the sort of lower end node would be still from Asia, by and large. So you're not expecting to continue to build sovereign CapEx to secure customer demand going forward? It just seems a bit of an oxymoron to me.

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Okay. Thank you. Yes, within ADI, we -- more than 70% of our revenue is produced on process nodes that are 180 nanometers and above. We will have the capacity internally to more than double the output that we have been doing over the last several years. When it comes to 19 nanometer, 55 and below, we intend to use external sources for that. So we -- if we wish by -- to the end of the decade and beyond, we -- if we choose, we could be self-sufficient on 180 nanometers and above, but we will be partnering with key providers of process nodes below that.

Unidentified Analyst

Building CapEx elsewhere?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Yes. That's right. Yes. I mean I said during the commentary here that one of the big concerns is that all the attention around Chips Acts and resiliency has really been a kind of 7, 5, 3 nanometers, 2 nanometers at some point in time and not enough attention has been paid to the older nodes. But we've been able to obviously invest in our own needs, but also convince some of our partners with more capacity in play, okay?

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

Any other questions? Maybe to follow up on that, Vince, you've been taking down your utilizations, wafer starts at your external partners, been taking down your internal utilizations. And your hybrid manufacturing model, as you mentioned, has allowed the team to maintain higher internal utilizations versus, let's say, what your peers call sort of hybrid manufacturing models, right? So there is a big difference, I think, between your model and your peers' model.

So take us through the difference between ADI's manufacturing model because it is allowing the team to sustain higher utilizations, but it is also the engine that is helping the team to maintain greater than 70% gross margins, right, sort of trailing 12 months, even here through the weakest part of the cycle.

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Yes. So obviously, in the nodes that are -- the minority nodes in the company that are more advanced like 90, 55 and so on and so forth, we are dependent on our external suppliers for that. What we are doing with 180 nanometers and above, when the demand drops, we bring more and more of that manufacturing back into ADI. So we keep the utilization levels as high as we can. And that helps us sustain the -- as I said, even in a down cycle, the pressure on pricing for ADI, it's normal. We don't see a degradation in our prices whatsoever.

So we have stability on ASP. So it's about how we manage the unit volume. And we're able -- as I said, we have the flexibility to bring more and more of our manufacturing home, if you like, until we run out of capacity when there is upswing again and then we can -- we have the benefit of being able to use external sources.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

I think -- but I think one of the other differentiators with the hybrid strategy is you are able to replicate both your internal proprietary processes at your foundry customers as well, right? I mean isn't that a -- just a big differentiator on the hybrid strategy I think, relative to your peers.

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Yes, the recipes are replicable in 2 places, both inside as well as outside, yes. So the recipes, very often, we more than -- more often than not, we license our supplier's recipes and bring them inside ADI so that we get direct replication and substitutability.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

Perfect. Turning over to your product segments. So Industrial, your business -- Industrial business composed of a very diversified set of businesses across many different end markets, factory automation, health care, instrumentation and test, energy infrastructure, aerospace and defense, right? Help us understand how we should think about the different subsegments as the team moves through this current period of weakness. But more importantly, what subsegments are likely to continue to remain resilient going forward?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Yes. There's 2 ways I like to talk about that. Number one, we play a long game as a company. All of these sectors that we're looking at, like the grid transition -- energy grid transition, the Gigafactory, electrification of the vehicle. These are all trends that we've been putting more and more R&D into over the last 3 to 5 years. And so we view them very much as a critical part of ADI's growth story. Digital health care, we've got to digitalize the health care system. We've got to make health care -- it's got to be more prescient. We've got to put technology into place to enable us to be able to recognize and diagnose diseases before they become chronic.

And that business, by the way, has been growing at double digits for the past 7 or 8 years, that whole digital health care is about \$1 billion now for ADI in revenue. We have very, very strong expectations in that area as well over the while.

When we talk about resiliency in the shorter-term view, we just look at demand, my sense is that we'll see some pause in factory automation, though there is a burning need to be able to bring manufacturing closer to points of consumption. I mentioned Gigafactory. That's an area where we're seeing more sensing, more precise actuation and there's a whole range of technologies that we bring to solving that problem.

But I think we've seen a pause as well in instrumentation, really the ATE part of instrumentation but the scientific discovery bench instruments for supporting the IT industry. We're seeing that business remain quite strong. And so if I think through the next year when we think about demand, the parts of industrial that I think will be strongest will be Gigafactories, digital health care, aerospace and defense, needless to say, is -- has been very, very strong. I expect that to remain strong. In fact, we are supply -- more supply limited than demand limited in the aerospace and defense area right now.

And as long as -- in the automobile sector as long as SAR, the movement of cars and lots remains at the current rate even. What we would expect is that, that business is capable of growing low double digits over the last -- the next 12, 18 months because there's more and more content being used in cars. So I think the content story is what is driving the semiconductor industry in the automobile sector.

An area that will probably be in somewhat of a doldrum, I think, for the next -- maybe the period of '24 is wireless communications, the base station infrastructure market there, simply because that's a very highly leveraged business. Interest rates are high. So carriers are going to be protecting free cash flow. They return trying to make sure that the ROICs are respectable. So I expect that being a more muted sector in our business over the next 6, 12 months or so.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

So maybe to follow up on that on the comms business, you talked about weakness in wireless comm infrastructure, but I the team has a very strong position on the wired communications infrastructure part of your business, right? You've got a strong position in cloud and hyperscale data center optical connectivity, strong position in accelerated compute and AI power management, so how does this particular subsegment, wired, look like as you think about sort of the next few quarters?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Well, the wired business, as you pointed out, Harlan, and we have really 2 or 3 big technology plays there. One is the control of the optical modems, we have multiple generations of traction there. So big data center companies are enormous users of that technology. And there, spend in the data centers has been down for the last few quarters. We expect it to pick up in '24. So that should bode well for that part of our portfolio.

And obviously, power management, there's -- in the computing world these days, performance equals power, power equals performance. So there's more and more focus on energy -- efficient energy usage, and that's a place where our power management portfolio is more and more important. So our expectation is in FY '24, we'll see the wired part of our business do quite well, particularly driven by advanced computing, cloud and so on and so forth.

So -- and then once this AGI thing moves out of the realm of hype and really becomes -- when natural language processing becomes a very natural -- very naturally used technology. That bodes as well very, very well for our portfolio for the long term.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

We had the opportunity to come to our Wilmington headquarters, and we hosted a deep dive with Martin's team into, as you mentioned, ADI's opportunity in Gigafactories, right? This is a few months back. Martin noted more than 190 new Gigafactories plan worldwide that would drive roughly 10 factories per year, \$45 billion of annual CapEx by -- spending by 2030. These Gigafactories will be driving demand for your industrial

automation, your electronics test solutions. As Martin had pointed out, right, there are 9 major process steps in a Gigafactory each of them creating an opportunity for ADI silicon capture. Just wondering if you can walk us through areas within these Gigafactories, where the team is seeing strong demand pull for your solutions?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Well, there's -- these Gigafactories are putting more and more automation into play. So you want the automation systems to be more precise, so performance is increasing. I'm talking about robotic systems, for example, you want them to be more precise, but you also want to be able to -- 40% of the entire electrical grid, for example, is consumed -- the energy is consumed by industrial motors, putting intelligence around these motors, the motor architectures themselves won't change, but the intelligence around these motors will.

So more precision, more energy focused on reducing energy by, we think, by putting more intelligence in motors that we can reduce the grid load by around 10% to 12%. Just given the burden that industrial motors place in the grid, there's more and more instrumentation being used in the steps, for example. When you're building the demand for electric vehicle batteries these days is going through the roof. But managing the electrochemical process very, very accurately is really important. So there's more and more instrumentation being used in the batteries, in the formation process, in the deployment process, through the life of the battery.

So those are 2 or 3 areas where we see the precision of the portfolio that we have, being in more and more demand, to be able to improve the accuracy and efficiency of the process but also the energy consumption.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

On Automotive, last year at this very period -- at this same conference, right? I believe the 3 large Automotive subsegment drivers for the team, electrification, connectivity, audio processing combined accounted for back then, 35% of your Automotive revenues. These 3 segments have continued to grow strongly, right, even through a weaker macro environment. So currently, what percentage do these 3 segments sort of represent of the total the auto franchise today? And your confidence on -- I know you said longer term, right, Automotive, low double digits sort of CAGR, but your confidence on driving year-over-year growth in the auto franchise, even if auto trends continue to weaken, let's say, into fiscal '24?

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Yes. So in-cabin, the in-cabin is probably somewhere in the region of 40% of our total revenue, this is 40%, 45%. And that's things like high quality audio, we're putting more and more road noise active, road noise cancellation content to these applications as well. Our A2B bus, which moves the media, the audio media around the car. Virtually all the OEMs now are using our A2B technology.

On the safety side of things, our multi-gigabit serial link, GMSL, is kind of the adopted technology now for moving media from cameras for example, we're looking to bring more and more rich content, more image content from the outside to help us really solve the safety problem in ever increasingly useful ways. So we've as a -- so, we've built a huge franchise in that.

And the electrification side of things, the fastest-growing part of our Automotive business today is the electric vehicle, the electric -- the battery control circuitry. And we have -- we have a very large share there. And as long as the demand for electric vehicles continues to increase, we see that business being a very strong franchise, strong double-digit growth for several years to come.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

So the combination of those 3 segments is what, maybe half of your Automotive franchise today?

Vincent T. Roche - Analog Devices, Inc. - CEO & Chair of the Board of Directors

It's much higher. It's probably 80%.

Harlan L. Sur - JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment

Okay. Perfect. And then to follow up on that, in terms of the new product pipeline in Automotive, team talked about a new onboard charging application, right, silicon-carbide based, which has the potential to drive another \$50 of content increase in EVs on top of the strong dollar content capture, you guys currently enjoy today. What's the team's view on the potential revenue opportunity and attach rate of these new sort of onboard charging solutions?

Vincent T. Roche - Analog Devices, Inc. - CEO & Chair of the Board of Directors

Yes. Well, it's very, very early stages at this point in time. Again, what we do with the silicon carbide, we need the silicon carbide capability to do the high-power delivery. But it's the intelligence that we provide around that. It's the system knowledge of -- the application system knowledge. So I mean that's that could be -- over the next 3, 4 years could be a very, very high growth driver and perhaps getting over the \$100 million barrier in a reasonable period of time. I think it's still very formative. So it's hard to be precise about the expectation.

Harlan L. Sur - JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment

Any questions from the audience? We're just about out of time, but I do want to ask a question around when we think about ADI, we tend to think about strong leadership in analog, strong leadership in power. But the market often, I think, forgets that the team has a very, very strong position in digital signal processors, right? In fact, you're still a top supplier of stand-alone DSP processors. Many of your mixed-signal RF solutions have embedded DSP capabilities with a lot of software programmability. So help us understand how critical DSP and software plays in being a strong differentiator for your solutions? And maybe just give us a few examples where you have integrated, mixed-signal, analog and DSP/software?

Vincent T. Roche - Analog Devices, Inc. - CEO & Chair of the Board of Directors

Yes. So maybe I'll just use one example to describe the state of play for ADI in the world at the intersection of digital and analog. If you take a 5G radio transceiver, a base station transceiver. So we're able to concurrently process multiple carriers, multiple channels at a single time. We have in many these chips we're building, we might have 25 or 30 micro-control units, ARM processors, for example. We would also have some what we call fixed function digital signal processing, so to be able to accelerate algorithms. And so when we bring that chip to market, we also have algorithms that are harmonized. So the software algorithms are harmonized with our hardware, and the customers a choice. They can buy the hardware stand-alone, use their own out or they can use ADIs, hardware and algorithms.

And sometimes, those algorithms will add between 25% and 50% more ASP in a given product. So I think that's a good example of state of the art. We're on 14-nanometer technologies today. 14, 16 nanometer. And so digital is something that is, I think, in the minds of investors, not synonymous with ADI. We sell multiple hundreds more than \$0.5 billion worth of standalone digital products every year. And it's been an important part of the evolution of the company as well. And by the end of this decade, most of what we do will be software enabled and software-defined.

Harlan L. Sur - JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment

Perfect. Well, we're just about out of time. Vince, thanks for the insights today and looking forward to a continued strong financial performance from the ADI team into fiscal '24.

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Great. Great -- thank you very much. Thank you, Harlan.

Harlan L. Sur - *JPMorgan Chase & Co, Research Division - Executive Director and Head of U.S. Semiconductor & Semiconductor Capital Equipment*

Thank you. Thank you.

Vincent T. Roche - *Analog Devices, Inc. - CEO & Chair of the Board of Directors*

Thank you.

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