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# EDITED TRANSCRIPT

IIVI - II-VI Inc at Deutsche Bank Technology Conference

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## CORPORATE PARTICIPANTS

**Mary Jane Raymond** *IIVI Incorporated - CFO, Treasurer & Assistant Secretary*

## PRESENTATION

### Unidentified Analyst

Great. Thank you. Good afternoon, everyone. Today, we have IIVI here with us. We recently launched coverage of IIVI. What we found most interesting about the company is that they have a very solid base business, but they are also exposed to a lot of -- maybe several very strong [separate]growth drivers that we'll -- I'm sure we'll talk about in a little more details.

So today, we are very pleased to have the IIVI CFO, Mary Jane Raymond with us. Welcome, Mary Jane.

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**Mary Jane Raymond** *IIVI Incorporated - CFO, Treasurer & Assistant Secretary*

Thank you.

### Unidentified Analyst

So maybe just to start off with, I think not a lot of -- the IIVI story may not be very well understood by investors, so maybe just start off -- for those investors who are not familiar, can you give us maybe a quick overview of the company?

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**Mary Jane Raymond** *IIVI Incorporated - CFO, Treasurer & Assistant Secretary*

Sure. So the name IIVI comes from the second and sixth columns of the periodic table because our company is fundamentally an engineered materials company. So the very first products we made came from the second and sixth columns of the periodic table. And since then, we also make components that are III-V and IV-IV. And we remain today, fundamentally, an engineered materials company.

We have 3 major core end markets and 3 growth markets. So the core end markets are: industrial, which are about -- it's about 30% of the company; optical communications, which is about 40% of the company; and then military, which is about 10%. But of the remaining 20%, we have about 5% in silicon carbide, the combination of wireless and electric vehicles; EUV, the extreme ultraviolet photolithography; and then 3-D sensing, all of those having grown quite a lot in the fiscal year '18, which ended on June 30 and for which we expect to see continuing really great growth.

During fiscal year '18, all of those end markets were strong at the same time, the first time in IIVI's history that we've had more than one end market. So that's been the case. So we crossed \$1 billion in revenue. We have 11,000 people around the world. We have a worldwide global footprint for manufacturing. And it's probably fair to say we make just about everything we do.

## QUESTIONS AND ANSWERS

### Unidentified Analyst

Excellent. Maybe before we get into the very segment, the core, the growth, one of the things I've heard from investors is that IIVI is a relatively complicated story as it touches on many different products, many different end markets. Can you perhaps help us understand, together, what are the commonalities behind all of these businesses? And perhaps you can touch on the R&D philosophy of the company as well.

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**Mary Jane Raymond** - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

Sure. So up until probably 10 years ago, every product the company made, either directed, perfected or created a laser beam, everything went into a laser application. So it was either about getting lasers to cut metal or weld, to carry a signal in optical communications, for military surveillance. And even in instrumentation for medical devices, for example, there is an increasing use of lasers for any number of things. So we were -- pretty much made materials that would do something to improve the performance of a laser beam to do some sort of work. Then 10 years ago, when we began to work in silicon carbide, that actually improves the performance of electric power because in most applications, what it's effectively doing is improving the DC-to-AC conversion. But everything we do, all the materials that we have actually do form a continuum of trying to direct a form of power, whether it's light or it's electric, to do some form of work in a more renewable and efficient way. I would say, the other thing that's probably pretty common is we don't make anything that's easy. So we don't, for example, make pure glass. I'm not sure we ever will. If there's ever an exotic glass, I guess we'd consider it. But most of the stuff that we make is actually pretty difficult, and that is usually what causes customers to ask us, "Can you do X, Y and Z?" So the engineering philosophy in the company is probably 80% on -- well, 60% on the materials side; probably 20% on the components side, getting that material into a component; and then another 20% that is actually in machine technology because we actually make the machines that grow most of our materials. And that starts from all the way back in 1971, when we were founded, when we were trying to make the optics for the first industrial lasers, and there were no machines to build it. It's the same thing with silicon carbide today, there are really no commercial makers of silicon carbide equipment. So I would say that we focus in the CTO's office at looking at materials that could have a 50-year life, and usually, that is a combination of our research on end-market uses and what materials might help and customers looking at new types of applications and thinking that there might be a material solution and asking us to begin to work on them.

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**Unidentified Analyst**

Great. A big part of your growth story in the past has been coming from strategic acquisitions.

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**Mary Jane Raymond** - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

Oh yes, for sure.

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**Unidentified Analyst**

And you have done more than a few M&As in the past.

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**Mary Jane Raymond** - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

Yes, [I would say].

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**Unidentified Analyst**

If you go back in history, are there 1 or 2 of these that are more transformative that you would specifically highlight how the company grew?

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**Mary Jane Raymond** - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

Well, I think there's probably 4. So the first one actually was the very first acquisition we did when we bought Laser Power optics because we bought our largest competitor. So that probably set the stage for the type of action that II-VI tends to take, which is we don't tend to shy away from things that people think we probably can't do. That was the first one. I think the second one was then, several years later, in 2010, when we bought the Photop acquisition, which gave us a footprint in China. We actually bought that to have access to the end market of China. Obviously, we make things there too, but we really saw China as an up-and-coming global market and wanted to access that for whether it was industrial or communications types of end-market demand. The next one that we did was in 2013, when we bought the Zürich fab from Oclaro where -- when

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we bought the laser diode capability. So up until that point, IIVI either made a component that was ahead of a laser beam or behind it, but we didn't make the laser source itself. Then we owned the laser diode, and that was really an exciting time that moved us, particularly in optical communications, into active opticals. But that's also a very critical component in fiber lasers, and we were starting to see the growth of fiber lasers for industrial applications starting to take more of the new laser build share in the market for laser power for industrial cutting. So that was the third one. And then I'd say the fourth one is when we bought the ANADIGICS fab to move our laser diode production from 3-inch to 6. So we are -- we still make plenty of stuff on 3-inch, particularly things that can be made on 3-inch and are of that size [or] volume. But we invested in a 6-inch gallium arsenide fab in order to expand the production capability of laser diodes in general but particularly to be able to make 3D sensing VCSELs. So that's a big leap to move from 3-inch to 4 on -- for laser diodes, but our view is that we will continue to see laser diodes more fully deployed in many, many applications, and we knew that the capacity and the ability to make that on a larger diameter was going to be important.

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#### Unidentified Analyst

That's great. Well, you mentioned China. There is clearly a pretty hot topic these days about what's going on with China. You guys have a big operations there.

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**Mary Jane Raymond** - IIVI Incorporated - CFO, Treasurer & Assistant Secretary

Yes.

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#### Unidentified Analyst

How should we think about the potential impact from all these trade tensions and other stuff?

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**Mary Jane Raymond** - IIVI Incorporated - CFO, Treasurer & Assistant Secretary

So right now, I think with the reporting also, 6/30 quarter, there's about 4 or 5 different crosscurrents with respect to China, the tariffs being one of them. I mean, I think like all of you in the room, right? There can't be any of us that are sitting here saying, "Yay, tariffs." I mean, we all think they're awful. I think what we would like to see is a more normalized kind of economic market where all of us are able to trade in a free and fair way. So we're not too totally thrilled about those, but I'm sure you aren't either. In generally speaking, the first set of tariffs did not have a huge effect on us, steel and aluminum. But the next set that is launched to be -- is scheduled to be in effect in the next, say, few weeks or months, that does include things like laser diodes. This is a little bit more troubling. I think right now, we're focused on working with our customers on what our options are. I'd say we're taking it seriously. We're looking at what is the process of establishing what the country of origin is because just because something is assembled in China does not necessarily make that the country of origin. We do have a fairly large footprint for manufacturing around the world. And we are, of course, looking at specifically what the actual importation codes are that are being regulated. But generally speaking, the optical communications market in particular is a pretty global market at this point, right? China is a big end market. The U.S. is a big end market. A lot of stuff is made in China. A lot of stuff is made outside of China that is shipped into China that is not today made in China anywhere, for example, laser diodes are not made in China today. So I think what we're all hopeful is that it resolves itself pretty well. But in the meantime, we're working hard to try and make sure we have the best defense for trying to deal with that while keeping our business fairly steady. I know there was some conversation also about whether or not the industrial market was turning down. We haven't seen that so far. And we do think, on the optical communications side, notwithstanding tariffs, that we do feel like China is getting warmer. For sure, the optical market in general is getting warmer. We saw some fantastic bookings in the 3/31 and 6/30 quarters, and we're hoping that, that begins to be what the rest of us see, too.

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#### Unidentified Analyst

Great. Well, maybe time to move on to some of the growth areas, which a lot of people here are excited about. So maybe start off with silicon carbide substrates. That silicon carbide is getting the headlines from Tesla, you can get in Model 3. I understand you are one step removed from



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the end market, but curious if you -- when you talk to your customers, how big of an opportunity is this? I guess there's a captive market, there's non-captive market. Just give us a sense how big this market could be?

**Mary Jane Raymond** - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

Oh yes. I mean, we think silicon carbide is tremendously exciting. And if you talk to our founder Carl Johnson, who's still very, very active in general, not so much in our company anymore but in general, it was a great spot by him 20 years ago to think that silicon carbide would be a critical material. At the end of 2016, our fiscal year '16, June 30, the entirety of our sales in silicon carbide were for wireless. In 2017, in the beginning, we saw a absolutely ferocious increase in the amount of interest for electric vehicles. And we ended the 2018 year here with about half of our sales now for electric vehicle design, some in the actual vehicles and some obviously for companies that are evaluating how they might do their electric vehicle line. I would say, a year ago, we thought that the substrate market, just the substrate, which is what we make today, was probably about a \$300 million opportunity in -- by 2022. But this year, we would have revised that to be somewhere between \$600 million and \$900 million for the substrate by 2024. So it's a really, really exciting market. It's a very fundamental material. Obviously, it helps with the thermal connectivity in some applications than in other applications. Like electric vehicles, it improves the DC-to-AC conversion, which will allow the car to go further on a single charge. It's obviously also used in a charging station itself. And if you think about that, if we all had half the cars on the road being electric vehicles, it wouldn't be too practical to have a charging station every 6 feet. So it's a very, very exciting opportunity. Our expectation as a company is that even though there are no formal studies on it yet, that probably the next thing we'll see written about is silicon carbide as an end -- for another end market, being the adoption in large electric motors. Again, because the use of the electricity is so much more efficient, we think that, that is very likely to be another future end market, though that's probably one that has a longer adoption cycle. People aren't necessarily going to pull out all the motors in their elevator banks just to change them to silicon carbide. But generally speaking, we really think this is a very, very exciting market, it's very sticky, it's important, and we're excited to be part of that growth cycle.

**Unidentified Analyst**

And if you have to rank order these opportunities, what are like the biggest one? And -- mention a few things.

**Mary Jane Raymond** - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

So let me see. If you ask the 3 of us, between Giovanni Barbarossa, our CTO; and Chuck Mattera, our CEO, you might get a slightly different answer. But -- so I think in terms of in the near term, if we just took the next 5 years, we could see, for example, 3D sensing being a bigger opportunity than silicon carbide. If we just take the growth markets, EUV, of our 3 growth markets, is always really going to be the smallest. We have about 1% content in the new machine value on a shipped EUV machine. And another 1%, we estimate -- don't know yet really, but we estimate in replacement parts. That's [varied paced] by the number of EUV machines, so that's probably always going to be the smallest of the 3. But I think in terms of longevity and where we could see silicon carbide being a really, really ubiquitously used material, that is really, really an exciting opportunity. It is not really subject to consumer wins. It doesn't have to do something with bank. It just does something with bank by improving just the thermal efficiency of the component that it's in. But I think those are probably the 2 most exciting ones. If we take the whole of our portfolio, it's possible that in fiscal year '19, we will see the optical communications market very, very strong as well. It looks poised to grow, and it's the largest end market we have, over \$400 million. So obviously, in absolute dollars, that could actually outpace it if it saw some nice growth. And we've seen optical growth at least in 2 of the last 4 years at 30%. So it will be an exciting time.

**Unidentified Analyst**

Going back to silicon carbide, it is generally believed that the market for silicon carbide substrate has kind of supply constraints.

**Mary Jane Raymond** - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

Oh, yes.

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**Unidentified Analyst**

So the demand has been really much, much better than people thought. What are your plans to increase capacity? And I also understand you build your own equipment. You mentioned that earlier. What are the lead times for building the tools to actual -- the times between the tool -- building the tool and the actual production?

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**Mary Jane Raymond** - *II-VI Incorporated - CFO, Treasurer & Assistant Secretary*

So we make a number of the machine tools that we have in our company. So the -- if they were just doing one machine start to finish, it probably isn't that long. I mean, it might -- I don't know that I now it precisely, it might be 1 month, 6 weeks, 1 month or 2 to build it. There's a lot of demands on our machine tool builders right now because we're out of capacity on almost everything we do. But -- so let's say, in fiscal year '16, -- no, '17 and then in fiscal year '18, probably between the 2 years, we've probably effectively doubled the capacity of silicon carbide. I would expect that we would have another increment to that capacity here in fiscal year '19. And typically, when we built those machines, we build them, say, 15 or 20 at a time. As the world develops and if we really were to see a healthy chunk of that \$600 million to \$900 million, I would imagine, by that point, we might see commercial machine tool builders making silicon carbide furnaces. But for right now, our guys are pretty busy building them.

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**Unidentified Analyst**

Got you. Can you talk about the competition, the competitive landscape a little bit?

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**Mary Jane Raymond** - *II-VI Incorporated - CFO, Treasurer & Assistant Secretary*

Yes, sure. So today, there are 4 general makers of silicon carbide: II-VI; the Wolfspeed division of Cree; ROHM, which is by SiCrystal; and Dow. There are a few others that make it as well, TankeBlue, for example. We don't see them as much in the commercial market. The only real one of those 4, besides us, that sells in the merchant market is the Wolfspeed division of Cree. I would imagine that the other 2 could evaluate on their own if, as the market grows, whether or not they might serve this, the merchant market, they make good -- very good silicon carbide for themselves, and they have very good businesses and devices, but they may choose to make the material for the merchant market. I would also expect, given the development that we see in some aspects of China, that we may see a silicon carbide maker out of China, if not more, over the next many years here. It's a difficult material to make. It's a material that -- where the substrate is really important. The epitaxial layer on that substrate does not make up for a bad substrate so that -- and it's difficult to grow. It took us 20 years. It's really not going to take other people 20 years, but it could take a good long time. And you need to get the substrate to a diameter that it's worthwhile making it commercialized. It'd be awfully difficult to be a commercial supplier if you can only make a 1-inch substrate. So they need to be able to get it to a certain size. But it is an important material, and I would not be surprised if we saw a few other makers of it come into the market over time.

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**Unidentified Analyst**

You sell bare wafers only today.

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**Mary Jane Raymond** - *II-VI Incorporated - CFO, Treasurer & Assistant Secretary*

Right.

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**Unidentified Analyst**

Do you have any plans to move kind of upstream in terms of doing the epitaxial layers as well? Like Wolfspeed will be doing the power devices. I don't know if you would go stretch that far, but what is the plan for expanding this other than just do more substrate?



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**Mary Jane Raymond** - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

Sure. Well, I mean, I can certainly say this. I mean, first of all, we do epitaxial today, right? So we do epitaxial for VCSELs. And in some of our other components, epitaxy is 1 of the 3 major forms of chemistry we do: one is the material itself, the grow material itself; the other one is coatings, which typically make [sell-throughs]; and then the third one is epitaxy. So I would imagine that across our road map, we would potentially be looking to do epi on silicon carbide.

**Unidentified Analyst**

Okay. Maybe moving on to VCSEL, and obviously, 3D sensing is a big part of it. In the past, your business is primarily VCSELs for the Datacom business, the Datacom application. But really, the big opportunity is coming from 3D sensing.

**Mary Jane Raymond** - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

Right.

**Unidentified Analyst**

Maybe as a start, can you help us understand how -- what's the size of this VCSEL -- the VCSEL market today and maybe what it could be in 5 years?

**Mary Jane Raymond** - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

Sure. So actually, we do make VCSELs for Datacom, but the largest end market that we made VCSELs for actually was the laser mouse. We had over 80% share of the laser mouse. We also had a very, very significant share in the VCSEL that -- so if you guys remember your BlackBerry, underneath that rollerball was a VCSEL. We had a very, very large share of that, too. And what's important about that, even though those are not such the hot topics of use today, is that both of those were unpackaged VCSELs. And that is very important in the 3D sensing VCSEL array is that it's unpackaged because an unpackaged VCSEL, obviously, is then more sensitive to very extreme in temperature, whether it's cold, or it's hot, right? And chances are, you're going to have your phone up at Whistler, or you're going to have your phone at the beach. So the ability to make an unpackaged VCSEL that can withstand those variations in temperature is actually kind of important. So the 3D sensing VCSEL is a really, really exciting opportunity where you'll be able to see, for the first time, a widespread -- potentially a widespread use of lasers in a consumer device that's affordable. I'd say, when the first study came out in 2015, the VCSEL usage for consumer was about -- estimated at about \$600 million. I think today, there's a few studies out there anywhere from \$1 billion to \$3 billion, and that's it moving to several different kinds of consumer, not just, say, a handheld device but also used in automotive, et cetera. And I would say, if you remember nothing else from this conversation, if you leave behind the concept that the only 3D sensing opportunity is a phone, you will do yourself a great favor because, obviously, that's the one that gets talked about the most, but that is -- this is a big market. We would expect to see 3D sensing not only in handheld devices, but we could potentially see them in professional uses of handheld devices. We would -- there are several applications of them in automotive, whether it's just a rollerball on the steering wheel, which is just a sensing application, not necessarily 3D, that would eliminate your hands needing to come off the wheel for the buttons on your dashboard, the ability to detect whether the driver's falling asleep, and over time, you would have light or in various forms of things that would allow for autonomous driving. There are actually a lot of really great applications in industrial as well, whether it's surface polishing or the most boring of them all. But I sometimes say, you can't get a grocery cart through a revolving door, so most grocery stores or big box, their doors still open like this. And in a cold or a hot climate, that's not the best HVAC management. It would be great if it could detect 2 eyes were coming at it versus your ear. Today, if you walk past it, it opens. It would only open if you were walking in it. So that's an extraordinarily pedestrian type of application, but it would be one that has some economic payback to it, and we expect that this would be a really, really exciting market. So today, there are not a lot of makers of the device, a couple of reasons, whether it's price point, the ability to have a world-facing view, which is what is needed for augmented reality. That's probably the more cool thing, being able to interact with -- hold up your phone to a restaurant, and it gives you the menu, have it put in your phone that you're gluten free, and it find you all the gluten-free restaurant. I think that will be really exciting. I



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also think that various makers of handheld devices want pretty broad path between their IP and somebody else's. And it's a very -- in a small place, it's difficult to orient a laser device, they're fairly complicated, but generally speaking, it's an exciting market, and we're excited to be in it.

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**Unidentified Analyst**

You have talked about you're working with, I think, more than 10 customers or maybe 10 applications. What is that -- I assume there's a lot of them that is not related to smartphones.

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**Mary Jane Raymond** - *II-VI Incorporated - CFO, Treasurer & Assistant Secretary*

Oh yes, sure.

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**Unidentified Analyst**

When do you think those applications will start to generate revenue?

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**Mary Jane Raymond** - *II-VI Incorporated - CFO, Treasurer & Assistant Secretary*

So I think what's interesting with 3D sensing is that, unlike silicon carbide, where we have a really interesting ecosystem developing around silicon carbide, right, so Germany deciding that it might outlaw combustion engines, that's kind of a big deal for a maker -- or 4 makers of cars and 6 makers of trucks. China, becoming more concerned about its air quality and potentially developing its Western products, is totally on electric vehicles. All of those create kind of an ecosystem, right but in addition to the consumer demand for an electric vehicle, drive demand for development of electric vehicles. On the 3D sensing side, we don't really have an insurance company saying, "Yes, yes, I want that VCSEL in there to tell if the driver is falling asleep, or I want it on the edges of the car to make sure that you never run into a deer again." So that sort of larger ecosystem developing, I think, is really part of what's important. For the auto side, I mean, we think that's probably a 2021-type application because there's obviously a lot more regulations involved in that and a lot more integrated into the design of the car. With respect to other handheld device makers, I think you guys can obviously read the newspaper on, but current devices perhaps had maybe a little bit less volumes sold than the original designer of the device expected. That's got to be a little bit of a read-through to the next guy that could be causing them to be a little bit more cautious about what the design is that they might want to use. And I would say, over the course of time here, we'd probably don't see only one design from some people who are looking to incorporate 3D sensing.

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**Unidentified Analyst**

And that's specifically a comment related to smartphones?

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**Mary Jane Raymond** - *II-VI Incorporated - CFO, Treasurer & Assistant Secretary*

Not necessarily. No, but I think, on just general consumer devices, we don't necessarily see just one design as people look at kind of how they might come at the market.

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**Unidentified Analyst**

Got it. You guys have spent quite a bit of resources, in the last couple of years, of inventory build -- sorry, build-up capacity and a lot of R&D. Are you at a point where you are at now, you should be seeing the leverage when the revenue comes in? Or do you continue -- do you expect to continue to invest in this business?

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**Mary Jane Raymond** - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

So I would say that, certainly, we have capacity and that we would -- or are very much looking forward to seeing volume come across. So -- but I also think that as the designs evolve and, for example, if you had a world-facing view on some handheld device, it's a different depth, right? It's a different distance you're trying to detect than just from your hand to your face. So that probably has some development associated with it. And I would expect that it's probably a market that has ongoing developments since it's so very, very young. But I think at least for -- there's a good amount of capacity that's in place that, from a volume point of view, I think as I said, we're looking forward to seeing more volume across those machine tools.

**Unidentified Analyst**

Okay. Maybe switching over to the core segments. I think we just -- we talked about EUV a little bit, so I'm going to skip that. But in terms of core segments, I think about industrial lasers, big part of your business, seems to be more resilient than most investors think. There's a clearly shift from CO2 lasers to fiber -- the fiber laser in the marketplace. Can you help us understand your position in both of these segments? And longer term, how should we think about the growth rate of industrials -- industrial lasers? Is it more GDP growth? Is it more than that?

**Mary Jane Raymond** - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

Okay, so -- sure. So first of all, our company, when it started, our very first product was the optics for enabling laser power in industrial setting, and we are very committed to that space, the welding, cutting, brazing, all uses of lasers in industrial uses. So when new laser builds started to move more toward fiber, which, as many of you know, has a better wall plug efficiency than CO2. Also driven by the fact that on more composite materials, as people made cars out of [center] metal, tables out of not exactly wood anymore, you didn't really need a CO2 laser to cut that, right? You would cut up, crawl the edge because it's like way too much power. So fiber lasers were particularly well suited to that. That is an important market for us, CO2 lasers. So today, 14% to 18% of our revenue was in CO2 components and 14% to 18% of our revenue, the same amount as in fiber laser components. The dynamics today are -- I'd say, probably 2 or 3 years ago, there were probably somewhere between 4,500 and 5,000 new lasers built a year. In 2018, it's 7,000 new lasers. So one of the things is the uptick in industrial activity in China and Europe, with the U.S. not really having declined too much over the last few years. As all that industrial production has increased, the demand for new laser systems has increased. It's about 80-20 fiber and CO2. So in new laser builds, definitely, there are more fiber lasers being built in CO2. Our sense at this point is it doesn't look like that CO2 component is going to 0, but for sure, there's less. However, in the installed base, there are still about 75,000 CO2 installed lasers in the world. And what drives revenue for us because the components are replaced is those lasers being used. And the key driver to watch there is really GDP. So when the GDP is strong, the laser is more in use, the optics are replaced more frequently. There are probably about 10,000 or 15,000 of fiber lasers in the world. They have a longer replacement cycle, so most of our revenue there is more on new laser builds than in the aftermarket. But it has been a very resilient market for us. And a number of things drive that. In industrial GDP, which we just talked about, the conversion of what has not really been laser power in the past to laser power, the best example being arc welding. I mean, the vast majority of the world's welding is still done with the torch, right? And then laser marking and engraving, and finally, in the EUV, which we talked about, the actual laser power in EUV machine is a CO2 laser, it's a bank of CO2 lasers that shoot the 10 droplets to create the plasma that creates the extreme ultraviolet wavelength. So that's a little bit of a renaissance for CO2 lasers. So it's been a really, really robust market. We saw 18% growth on our industrial business last year, a business that, I think, we thought for the longest time wasn't ever going to crack mid-single digits.

**Unidentified Analyst**

Great. Maybe switching to communications a little bit. There seems to be a number of upgrade cycles that has been working in your favor for -- and whether it's China broadband, the Metro upgrade and whatnot. How should we think about the sustainability of these drivers going forward?



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**Mary Jane Raymond** - IIVI Incorporated - CFO, Treasurer & Assistant Secretary

Well, it's interesting, I think 2016 was a really, really strong year. And the beginning of our fiscal year '17, which was the back half of calendar '16, really, really good for communications. But for the rest of the world, we saw quite a slow down with a lot of inventory build in China that started to affect us from the beginning of calendar '18 -- calendar '17. That didn't really affect us too much. We saw growth in quite a few of those quarters. Though, obviously, our communications business grew, setting aside silicon carbide, grew the least of all of our end markets last year. So depending on who you ask, some people would say, "Communications has been dead for a year." But I would say, from what we're seeing, our first and second quarter, the 9/30 and 12/31 quarters of '17, we're pretty flat, honestly, to the prior year. But the 3/31 quarter and the 6/30 quarter picked up really, really nicely, and we've seen some very, very strong bookings there. I've already had questions about whether we think that's an inventory build, which is pretty funny, just at the end of getting through an inventory build, people think we're already building another one. I don't know that I see that. I mean, certainly, if China really wants to move its country to more of a knowledge economy, it really needs to start to move broadband into the hands of its -- [at] a larger portion of its citizens and much farther out than its main cities, right? We see a resumption in the U.S. Metro here. That's why we think that it is really possible we could see an uptick in optical communications in this coming fiscal year.

**Unidentified Analyst**

Got you. One product that you guys have highlighted is the ROADM [line cards]. Can you give us an idea how big this ROADM market is?

**Mary Jane Raymond** - IIVI Incorporated - CFO, Treasurer & Assistant Secretary

That's probably one that I'm not going to be the best -- I mean, half of our revenue goes into ROADM line cards. And with the WSS switch that we just acquired with CoAdna that closed on September 1, we will have potentially as much as anywhere from 50% to 70% of a ROADM line card content, having -- and having been 20% to 40% before. I'm not sure I'm in a good position to say how big just the ROADM market is. But certainly, it is not inconceivable that at least for our company and our content, as I say, we could see as much as 30% growth on that. I'm not saying precisely for '19, but I'm saying, in '16 and in '17, we did see numbers of that size. And that tends to be the way it goes. It's a lot of growth, and then it's smaller growth, and we just try and hold it so that it's not declined.

**Unidentified Analyst**

Right. The -- one of the challenges, I think you just touched upon it a little earlier, is that both the industrial market and the communications market tends to be pretty lumpy. And again, depends on which -- where is your starting point, are there any areas that you are particularly watching out for in terms of maybe specific regions, things [maybe] building up a little bit more, maybe double order activities, lead time stretching, kind of thing that we as investors want to know that -- what are telling signs [about this]?

**Mary Jane Raymond** - IIVI Incorporated - CFO, Treasurer & Assistant Secretary

I would say that in our company -- because we're sold out on at least 5 of our major products, if not really most of them, I would say, first of all, we tend to watch and work with customers pretty closely when it comes time for capacity expansion. And I wouldn't say that we ever would have perfect knowledge of whether or not they're building up inventory in some faraway place that we can't really see. But particularly in optical communications because it is the most known lumpy market we have, sequential increases in capacity, we start to get very, very tight on what the payback time is. So we successfully avoided inventory build. In the last round -- because we told our guys they needed a year's payback on the capital when we were extending it for the second year in a row, and they went and work with customers on how real the demand was and being sure that, that -- if we increase that capacity, they were taking that volume. So while, of course, it's not perfect, I would say that we do try and be pretty careful about that. And when we're looking at [our] capital budget this year, somewhere between \$140 million and \$170 million, that's still a lot of money for us. And we have fights for capital among all our division leaders, and we try very hard to be sure that we're not building capacity into something that's just an inventory build or a bubble. And so we like to understand where the components are going, and fortunately, we've had a lot of our customers for a long, long time, and we have some good relationships with them. And usually, they're willing to engage, and how -- where their strategy is, what their current demand is but also what their next generation of product is. And we have those conversations with



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nearly every customer we have, which gives us a little bit of insight into what they're seeing. And to try and at least not overcapacitize and head into a huge speed bump, I would say, it's not perfect, but we're certainly trying to avoid them.

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#### Unidentified Analyst

Got it. Well, that's my last question. You kind of answered it. But if there's all these -- all the shortages you're seeing in your various market, how do you think about capacity additions? It sounds like -- you said \$140 million to \$170 million is a lot, but then market opportunity could be quite a bit bigger then.

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#### Mary Jane Raymond - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

Oh yes, sure. So I would say, obviously, there's 3 things we normally do in the evaluation of increased capacity. One is performance, right? Are we getting maximum performance out of the factory in terms of process methods, growth method, yield, et cetera? I mean, Chuck Mattera would say this today if he were here, we have a yield improvement plan in every single factory we have, including the one we've had since 1971. So that's the first thing we do, make sure we're getting a lot out of machine tools. And then after we get that, we'd push them a little bit more. So we really test the limits of the capacity. Just because it's never run that many parts before doesn't mean it can't, right? And usually, we push that a little bit. But then we look at innovations on growth recipes on diameter expansion. That's why you will often hear us talking about increasing the diameters of certain material. That is really important because at some point, you just don't have enough space for more machines, right? And then the last one is trying to understand how we would innovate on back-end methods. For example, new products sometimes are tested, every single one. You would look, as you get an increase in the statistical data, to look at, okay, what has really been the failure rate in the testing, what's been the failure rate in the field? Can you innovate on your testing method so that your throughput is higher? So I would say that the first thing we don't do is start building more machines. We actually first work on the process to try and get more yield out of the existing line.

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#### Unidentified Analyst

Okay, great. I think we are out of time. Thank you very much for coming.

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#### Mary Jane Raymond - II-VI Incorporated - CFO, Treasurer & Assistant Secretary

You're welcome. Thank you for having us.

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