

Shai Terem, President and Chief Executive Officer, MarkForged, Inc.
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Jim Ricchiuti, Analyst, Needham and Company: Good afternoon. Welcome to the fourth and final day of the 16th Annual Needham Virtual Technology and Media Conference. The following presentation is going to be a fireside chat with Markforged. Markforged is a rapidly growing supplier of metal composite 3D printers for industrial applications. We're really delighted to have with us today Shai Terem, President and CEO of Markforged. Thank you for being here.

Shai Terem: Thank you very much.

Needham: You joined Markforged in December 2019. You joined from another disruptive printing company that investors are very familiar with, Kornit Digital, which has done pretty well. What is it about Markforged that attracted you to the company?

Terem: That's a great question. I love Kornit, and I think it's a phenomenal company with great people and a great product. I would say what attracted me the most to Markforged is that this company is really reinventing manufacturing today—it's not science fiction and it's not a prototyping company. We have 10,000 very happy customers today that use our solution on a daily basis. And over 70% of them replace aluminum and steel parts on the manufacturing floor. So, for me, the ability to get closer and be part of this journey as we reinvent manufacturing was one of the key drivers.

Needham: For some people who are not as familiar with Markforged, give us a brief overview. You guys talk about the Digital Forge, which is the way you characterize the manufacturing platform that the company has developed.

Terem: The Digital Forge is a platform which combines our software, our printers and the materials. When you put all of them together in a very well-integrated way, you get the manufacturing of the future. It's connected and it can be controlled remotely. It has quality assurance. For example, the X7 can scan parts while they're being printed. It can print, in a very simple way, very robust parts. What we're trying to do is solve the problems of distributed manufacturing by putting the Digital Forge in as many manufacturing floors as needed to solve the problem of disruptions over supply chains.

Needham: Can you go into the product portfolio a little bit more: metal, industrial composite, desktop composite? It's a wide range of products. And then maybe we can talk about the number of customers and the installed base.

Terem: Let's talk about the product portfolio first. Markforged has a wide and proven portfolio of products. The Onyx One is our desktop printer that can print our Onyx material. Our Onyx material is a combination of plastic and chopped carbon fiber, which gives parts a relatively higher strength level. Going higher in the ranks is the Mark Two, which is our best seller, at a relatively attractive price of \$20,000, which allows our customers to print Continuous Fiber Reinforcement on the manufacturing floor. Next is a bigger build volume, faster and more accurate printer, the X7, which I would say is currently our flagship model in the composite world. In addition, we have our metal solutions. The Metal X, that can print a variety of metals, which we combine with the Sinter, which we developed as well. We set this up as one platform that gives our customer a one-stop shop for metal solutions.

We combine these printers with our wide range of materials, which are focused on the manufacturing world. We are focused on providing our customers functional solutions to mission-critical applications. If it's Kevlar, if it's carbon, if it's fiberglass, if it's our different kinds of Onyx materials, some are for electronics, some are for fire resistance, some are for aerospace. We have a variety of metals, like stainless steel, the super alloy Inconel 625, which is used in very high-temp environments, copper and others. And again, our objective is to allow our customers to really be able to trust a part in the most mission-critical application. If it's drones used by the Army – if it's a part that sits on the manufacturing floor, the entire manufacturing line needs to stop if it breaks, and customers really need to be able to trust our solution.

Needham: There are other solutions out on the market. How do you try to differentiate yourselves, and how do you believe you're differentiated from what's out there?

Terem: I think that the key is our Continuous Fiber Reinforcement. Our Continuous Fiber Reinforcement is a proprietary process that our founders invented. It's 25 times stronger than any average ABS plastic printed today in the additive world. This extra strength in a lightweight part gives us a huge advantage versus other additive solutions or versus traditional manufacturing, which today is centered around aluminum. The Continuous Fiber Reinforcement is also something like three times stronger than aluminum. And as a result of this, 72% of our customers today have replaced aluminum and steel parts with our composite solution, and this is where we focus. We are razor-sharp focused on helping manufacturers get the part they need at the point of need.

Needham: Looking at your investor deck, you have some impressive names in terms of customers. Can we talk about who some of the bigger ones are, how they're working with you, and the ones that have been working with you the longest?

Terem: We already have 10,000 happy customers across a variety of industries. I would say the strongest segments for us are around industrial automation, aerospace, automotive, and defense. These are the key segments that we play very strongly in. The reason is that in these applications, the ability to trust the part not to break in a mission-critical application is crucial.

The second area that we have success is that most of these applications are looking for stronger materials, but they're looking to move away from metal. In the beginning, it used to be steel, after that aluminum and now it's advanced composites. So if it's industrial automation, for example, we have many customers that replace parts of robotic arms in their manufacturing facility with our composite solution. They get a part which is stronger and lighter. Their entire manufacturing line can run smoother. There's less corrosion, there's less impact, and there's less fatigue than aluminum. So we really have a strong play in industrial automation.

Military and defense. The Marines are one of our biggest partners. They have over 50 printers now. They use us as a digital tactic, a part of everything they need to combine in the battlefield. The U.S. Army is printing drones with our solution.

A recent, large transaction we did in the automotive space was with a company called Automation Alley in Michigan. They placed 300 printers into the supply chain of the automotive OEMs, built a network, which has in the center of it a digital library. They want to have the OEMs of automotive manufacturing bid into this network to get parts printed on demand. Now because everything is controlled remotely, with the click of one button, they can transform all of this network to print a protective gear or nasal swabs in the next pandemic, which is amazing.

Needham: That is the vision, isn't it, having this digital, localized manufacturing, that you can control a fleet of machines via the network?

Terem: Exactly.

Needham: What is the recurring revenue part of your story?

Terem: You can see in our financial results that about 30% of our revenue, our recurring revenue, is coming mainly from materials, service and software. We currently believe, based on our history and the growth in new accounts, that this 30% will continue into the future. So this is more or less the split in our revenue base.

Needham: So in other words, even with the high growth of the systems business, it's a function of the installed base being large and the utilization being high. That's going to keep it at those levels?

Terem: Right. I think what we will see over time is that as the adoption of additive manufacturing grows, there's more education around it. So each cohort, each year that it goes into this space with our solution has a new and higher level of normalized consumption, which is great. So we see higher consumption growing over time with our install base. As we continue to innovate and provide to our customers more and more new solutions, and they can address more applications, that consumption will increase even further.

Needham: Tell us about your technology roadmap. There will be new systems. What are you doing on the materials side? And then I'd like to touch on the software as well.

Terem: I would love to share what I can. So as you said, we have a very solid parent platform for thousands of systems, but this is just the beginning. I would say that today Markforged is selling one of the most accessible industrial grid solution, it's somewhere between \$20,000 to \$100,000, you can get a full solution that can replace metal parts. Going forward, we are pushing the envelope into higher levels of production. So you're going to see us bring in bigger systems, faster systems. With an increasing number of materials, we can address more and more applications.

Today, most of the parts being printed on our solution now are more or less at this size, if you can see it. By the end of this year, we are releasing a bigger printer, and we are talking about this larger size of the parts. You will see us in the next three years push into mid-to-high volume, mass production, and higher temperatures materials, but still, the core for us is the composite.

We recognize that there is a trend in manufacturing over time, and the future of manufacturing is much more than metal. For example, in the aerospace industry, you can see the shift from steel, to aluminum, and now composites. For example, with the 787 Boeing Dreamliner, 50% of its body frame is advanced composites. If you think about electric vehicles, the lighter the weight of the body, the longer the range it can drive. The BMW i3, for example, has a frame made of advanced composites. We are going with this trend and leading the additive manufacturing space in advanced composites, and that will continue to be the core of the solution that we offer to our customers.

Needham: As you introduce these larger machines, is the go-to market strategy going to be more reliance on direct sales? Could you share with us how much is going through distributor channels now, and how it will be as you go further into the mass manufacturing market?

Terem: That's a very interesting point. Today, we're already selling globally, in over 70 countries. We have about 100 certified channel partners that sell our solution. We structure it so we have different kinds of channel partners, and we are trying to add more and more global channel partners that have a manufacturing focus. Take for example Würth, which is one of the biggest manufacturing distributors in the world, with sales of about \$15 billion. They started to work with us last year and we are expanding our global coverage with them. These kinds of channel partners have the scale to grow with us as we grow our product portfolio.

So what you're touching on is a very interesting point. As the solution becomes more complex, you need a higher level of sales. We do believe that certain of our channel partners are at the to be able to grow with us, and get us the right level of talent to sell these more complex solutions. Today, I would say 95% of our business is through our network of channel partners, through resellers. We expect to see the same order stream going forward.

Needham: Talk about what you're seeing in the market. Obviously last year was a challenging year for the industry, although, you put up reasonably good revenues with good margins. Are you seeing the recovery that other people are talking about and a pickup in demand?

Terem: I think the two trends that are very strong drivers of Markforged's growth are actually accelerating. If you look from one end of the pandemic, there was a small blip, a very short blip, in CapEx, "let's wait, let's see what's going on." But very soon after, it became, "how do we optimize our business for global supply chain disruption?" This is the bread and butter of Markforged. We have many customers that do MRO (maintenance, replacement and operation) with our solutions. We are seeing demand increasing, especially now when there is on-shoring. Each manufacturer wants to make sure that it's reducing its dependency on other countries in its the supply chain as much as it can. From that perspective, while there was a significant hit to demand in the beginning of the pandemic, we are seeing an increase over time. By now, we are past the peak level that was reached before the pandemic.

The second trend is around the move from aluminum into advanced composites. This trend is accelerating. Everyone talks about electric cars. Almost every automotive company in the world is now producing electric cars. With electric vehicles, in automotive, aerospace and defense, the lighter the parts are, the longer the range is. There's less energy that needs to be consumed. These trends will continue. To us, this is a very strong growth driver. We expect a very strong recovery in the second half of the year from that trend.

Needham: How important is software for you? How many developers do you have? Where does that fit in, in terms of the technology roadmap, as you move further into the market with more advanced equipment?

Terem: That's a great question. As you know, over 90% of our systems are connected through the cloud. We see almost all of the data that is running on these printers, with a level of balance for the security of our customers. We don't interfere with their most important secrets, but we are able to learn from their printers. The more printers we put in the field, and the more parts that are printed, the more data we get. We can then make the entire system get even smarter.

What does that mean? It means that we could make our printers go twice as fast through our software. Think if you buy a car and, with a software update, it could double its speed. We could reduce sintering time by 40%. We could increase the volume of what we print by 15%. Our software capabilities are very strong, it's a huge differentiator and

allows us to give a better customer experience to our installed base.

Going forward, we intend to continue to invest in software materially. We just launched Blacksmith for composite materials. This means that our customers can hit print and go away. When they come back, they get the part, which has already been scanned while it was being printed. They can get quality assurance for the part right off the printer. They don't need to scan it again after. We continue to improve the capabilities and the accuracy levels of what our customers are getting through software. Our intention is to bring this capability to metals as well.

In addition, we already provide enterprise software on a subscription-based model, which allows many of our customers to manage fleets. For example, if you're a global company and you want to have a centralized digital library of parts, you can control which part can be printed in which manufacturing facility, you can know the quality of these parts, and you can manage access to the printer at different levels within your organization. We are already enabling our customers to manage fleets within their organizations through software. And this is a subscription-based model.

Needham: Do you have a target in mind for how you'd like to see that software business scale over the next several years?

Terem: Yes, we have a target but, unfortunately, we will not share it today. I will definitely say that we see software as a very important, core part of our solution. We see our software offering expanding over time. We believe that it provides a lot of value to our customers and will probably increase our revenue.

Needham: Let's talk a little bit about the financials. How do you see the business scaling, and how are you balancing the need to invest as you scale the business with continuing this relatively high level of profitability?

Terem: We were able to increase our gross margins materially over the last year and a half. Last year, we finished with 58% gross margins and in Q1 we finished with 61% gross margins. We believe we can maintain that level of about 60%. We'll be able to do this thanks to very strong innovation and engineering teams that are able to develop the product. This gives a lot of value to our customers, but we're able to control the cost.

As the platform is maturing, we get much more operational leverage from how we build the solution. We do want to see some of them, especially the more mature ones, move from a contract manufacturer here in New England and potentially to south of the border, so we can save on the building cost of the printers. At the same time, we intend to continue innovating and releasing more and more products almost every year. It takes time for each product to mature to the level to have optimized margins. This is why we believe that growth in gross margins will be small and linear over the next few years.

Needham: How should investors think about the way you're investing, building your infrastructure, and the level of R&D that you're going to be using to support the business?

Terem: As shared in our forecasts in the SPAC process, we intend to invest about \$150 million over the next three years, the majority of which will go into accelerated product development. Markforged has been very efficient, and has used about \$80 million of investment to produce about \$72 million of sales. Going forward, we expect to complete this transaction with \$400 million of cash on our balance sheet. \$150 million of this cash is dedicated to accelerated product development.

We did one product at a time in the previous phase of the company's history. Going forward, we intend to do four products at the same time. That requires a significant investment. The reason we do this is that we have 10,000 very happy customers. They've told us exactly what they're looking for in order to continue or go deeper with their adoption of our solution. We created a very aggressive product roadmap that we intend to execute upon and deliver in the next few years.

Needham: The timeline to go public is sometime this summer, right?

Terem: Correct.

Needham: The decision to go public in this fashion probably takes some of the uncertainty about remaining private and considering the traditional IPO route. Based on the opportunities that you see, this is going to provide the resources for you to move forward at a quicker pace.

Terem: Exactly. What we saw with this SPAC is a great opportunity to go through a fairly efficient process, a short and more controlled way to secure the funds that we need in order to invest into the future of our company, and in our customers' future, of course. This is why we chose this path. We hope that by mid-summer, the process will be completed successfully. But we have already started our investment, as you can probably see in our Q1 results. The intention here is to accelerate product development with the funds that we are securing, to make sure that we are investing into the future and accelerating the growth of our company in the next few years ahead.

Needham: What's the headcount right now at Markforged?

Terem: We have passed 300 people. It's an organic growth. Year-to-date, we hired, between full-time and temporary employees, over 90 positions already. We're really accelerating the growth of the company.

Needham: As you continue to staff up, tell us about the areas where we'll see the biggest investment. Presumably it's going to be in engineering and R&D, as well as sales and marketing?

Terem: Correct. It's fairly diversified across the company. Of course, R&D is the biggest focus area. But as we see sales increasing, manufacturing and operations is another big focus area for us. And of course, for marketing and sales, we continue to invest in brand awareness and optimizing our demand generation engine and, at the same time, build the segments that will be targets for our next set of products, which will be aerospace, automotive, defense, and education.

Needham: If you look out over the next couple of years at vertical markets, which ones in particular do you see as the biggest opportunities based on your roadmap?

Terem: I think it will be aerospace and defense, automotive, and every place that you are trying to reduce weight in order to save energy, but where you also need strong parts for mission-critical applications—this is where you need Markforged, and this is the path for us.

Needham: Some of your industry peers that have become public are figuring mergers and acquisitions into their plans. What is Markforged thinking about along those lines?

Terem: We think there are some interesting opportunities, but we are more focused on technologies that are complementary to our product roadmap, technologies can help us accelerate our product roadmap rather than us trying to buy revenue. There are some interesting opportunities but I don't think that, for us, M&A will be one of the main pillars for growth.

Needham: Geographically, what kind of balance do you see for the business looking out several years, and where is it today?

Terem: The majority of our sales are coming still from the Americas, after that EMEA and after that Asia-Pacific. We do see EMEA strengthening materially, which is interesting, but I believe the balance will remain more or less the same. Especially now, with new initiatives around infrastructure in the U.S., I think we're going to see big growth in the U.S. as well.

Needham: We're all hearing about a tipping point, but as you know this industry has seen points when people thought that we're going to make this transition to final part production. What are you hearing from your customers that gives you the confidence that this is going to happen sooner rather than further out?

Terem: In our Analyst Day yesterday, we shared a video from one of our customers, who said that this feels like a tipping point because they finally have functional parts at a very accessible price. So I think we definitely see it. We see it with more and more of our customers are using us for mission-critical applications with functional parts, not for prototyping.

It's very different than what it used to be seven, eight years ago in the previous phase. Most people realize now that we're not going to have one technology that can print a hamburger and a gun in the same solution. It's not going to happen. But there are multiple technologies, each one of them has advantages and disadvantages, and we are all pushing the envelope to make sure that we help our customers address more and more applications, far and above just prototyping.

Needham: How closely do you look at the metrics around new customer wins or customer additions? How important is that? It's great to add more machines with existing customers, but what are you seeing in terms of adding new customers?

Terem: We see a significant amount of our business coming from new customers, which is great. In more than half of our quarters we see of new customers. I think this trend will continue. The market opportunity is so large and we're still so small. We currently have 10,000 customers. We want to go up to 100,000 customers in the next five years. There's about 10 million manufacturers out there looking to optimize their supply chain, they're looking to optimize their parts, their manufacturing lines. So the opportunity is huge. I think this trend will continue, and we're going to see a significant portion of our business coming from new accounts.

At the same time, extension within existing accounts is getting easier and easier, as we shared in one of our examples with Frito-Lay. They are starting to do MRO (maintenance, replacement and operation) with our solution in one manufacturing facility. They saw that it's going really well. The ROI was there, it paid back in nine months. And they leveraged it to all their manufacturing facilities in America. So they moved from one to 35 solutions in one-year, which is a great example of expansion opportunity within its existing accounts.

Needham: That is exciting, and I assume there are other use cases like them where you're seeing that kind of acceptance, which, in the past, has been one of the challenges for the industry. In terms of investor perceptions, as you've talked to investors, what is it that is least understood about the trends in additive manufacturing from the people outside the industry?

Terem: The biggest bottleneck that we have in additive manufacturing is still education. When we go to talk to our customers, the biggest competitor we have is "still do nothing," meaning, "let's keep the traditional manufacturing path." Now it's changing. This younger generation of engineers is growing differently and has many more tools versus existing, more experienced engineers.

For example, my daughter is going to high school next year. She asked me, "Dad should I present with CAD software or SolidWorks." She already has 3D printers at school. She's already thinking additive versus subtractive. There's a new generation of engineers that have been educated differently because there are more technologies, more tools out there. The next time they design a part, they will not design it for a CNC machine. They will not design it for subtractive manufacturing. They will design it for additive manufacturing, because they will know how to capture the advantages of additive versus subtractive.

That will be the biggest inflection point. We are not there yet. I think we will start to see it with a new generation of engineers. But if you think about most manufacturing students, it's still very, very traditional. What we are not understanding is how big this change will be the next few years and decades.

Needham: On the heels of your Investor Day, your earnings report, the fireside that we've had today, what's the one or two point takeaway that you feel investors should really think about when they think about Markforged?

Terem: From my perspective, it's that Markforged is not science-fiction, it's not something that will happen in the future, and it's not a prototyping company. We are, today, already reinventing manufacturing with our customers, with 70% of them moving from traditional manufacturing to advanced composites. We are just scratching the surface and it's a long journey, but we are here to be one of the leaders in this space.

Needham: Thank you for spending time with us today.

Terem: Thank you very much, and I'm looking forward to the next time.
