

3D Printers for the Consumer Market



FSL3D is the newest division of the Las Vegas based laser engraver manufacturer Full Spectrum Laser. Located in Las Vegas, NV, Full Spectrum Laser (FSL) is an advanced engineering and manufacturing firm founded by a Stanford PhD grad. FSL employs around 25 staff (including 3 Stanford PhDs) with offices in the USA, China and Mexico. Our primary business is building computer controlled lasers and 3D printers. As a cross disciplinary company, we have a wide range of engineering needs from pure R&D to manufacturing.

Interview conducted by: Lynn Fosse, Senior Editor, CEOCFO Magazine

Henry Liu - CEO

CEOCFO: Mr. Liu, what is FSL3D?

Mr. Liu: FSL3D produces 3D printers, using laser technology for the consumer market.

CEOCFO: What sets FSL3D apart and makes it better, cheaper, faster, and easier?

Mr. Liu: We offer superior quality. 3D printers in the past have usually been very poor quality in the low cost markets below 5,000 dollars. At the same time, we offer better pricing and more features than our competitors.

CEOCFO: What is involved in the quality that makes it different?

Mr. Liu: We use lasers. Most 3D printers are like a hot glue gun; they move a hot glue gun around. Instead of a hot glue gun, we use a laser and our laser has better quality because it has smaller spot size. It has all the advantages of a laser as apposed using a hot glue gun. We have better optics and algorithms compared to our competitors that might also use lasers.

CEOCFO: What was the challenge in putting the technology in place?

Mr. Liu: A 3D printer is a multi disciplinary device, so there are electrical engineers, programmers, imbedded programmers, chemists and physicists. Developing all the technology together is the challenge.

CEOCFO: Are you able to patent protect what you have done and do you need to?

Mr. Liu: We certainly have some unique IP and both patents and patent pending applications on file.

CEOCFO: Is Pegasus Touch available today available today? Where are you in the process?

Mr. Liu: We are currently taking pre orders on our website right now for July deliveries of your Pegasus Touch product. We sold \$820,000 of pre-orders on a Kickstarter. We are starting to ship in April, so just in a few weeks. Everything is in production and you can buy it now but there is a waiting list.

CEOCFO: Who is the typical customer?

Mr. Liu: We try to sell to just about everybody, so certainly entrepreneurs that are working out in their garage, engineering firms or even medical research firms. Really anyone that has to make something is interested but one of the biggest markets that we are expanding into is the average home user in a garage that might have an idea to build something will now have the ability to do so, using a 3D printer.

CEOCFO: How does it work?

Mr. Liu: We have a laser and the laser is directed by two mirrors. We have a special liquid ink and when the laser hits the ink, it hardens the liquid, creating a layer. We do this multiple times, which creates a 3D object from multiple 2D layers.

CEO CFO: *If I wanted to make something, how would I go about it?*

Mr. Liu: The software allows you to import 3D models, so you can draw a 3D model and that would allow you to print anything you could design. We also have a 3D printing app store, so you could download models from other users and print those without having to design your own.

CEO CFO: *What is the practicality for home users?*

Mr. Liu: We have those advanced features and starting features. If you just wanted to print something without designing yourself, you would just use the 3D app store, browse the catalogue, you would hit one of the buttons and it would print out immediately to whatever you want it to print out. You do not have to design anything, use a computer or anything like that. It is really just like ordering from a catalogue.

CEO CFO: *Do you see it as something for that fun and novelty over and above its practical uses or where do you see the mindset in the market?*

Mr. Liu: I guess if you want to make something and now you have the ability to do so at a very high quality. Maybe you want to make something for homework for kids or you want to make a prototype that you can sell as an entrepreneur to raise money for funds. If I have an idea like a new toothbrush for example, how do I create a prototype? I can just do that at home now with limited resources as compared to having someone else do it or creating a mold with thousands of dollars in costs. We think art is a new market. If you see a cool figurine from Disney for example, I could just print that out immediately without having to go to the store and buying one. We see all sorts of applications for 3D printing.

“We’re bringing manufacturing back to the US and empowering entrepreneurs. One of the most popular applications that I see is creating a home based business. If you are a home engineer, you can make parts, sell those parts, you can make architectural models if you are an architect and you can just use the 3D printer for fun.” - Henry Liu

CEO CFO: *How have you been marketing and how do you continue to market?*

Mr. Liu: We have a fund raising campaign on Kickstarter and many people have found us through that. We go to tradeshow. We went to CES, we went to 3D printing world in Burbank and we will continue to go to trade shows as well as online marketing.

CEO CFO: *Do people understand the difference in what you are able to offer, compared to the competitors?*

Mr. Liu: If see pictures, then you will see the quality difference. It is really the difference between something that is unusable versus something that is a practical tool. We show comparisons on our website for what you would get using other 3D printers and what you would get with our printer. It is certainly night and day. If you go to a trade show and you hold it in your hands, there is no comparison. We really think this is the best quality for a 3D printer available today.

CEO CFO: *Where would people buy the ink?*

Mr. Liu: The ink is proprietary and only we sell the ink.

CEO CFO: *What is your business model?*

Mr. Liu: We sell both consumables; we sell the ink and the machines. We can support our customers better by continually making profits on the ink. If your machine broke down, we have an incentive to fix your machine because you are continuing to buy consumables from us. The business model is twofold; we sell the consumables, developing materials and improve the software. There is an ongoing relationship between the customer and our company.

CEO CFO: *What are the quantities of ink that are involved and how often would people need to purchase it?*

Mr. Liu: Ink is dependent on how big your model is. We basically charge 100 dollars per kilogram when purchased in bulk, which is about 100 dollars per milliliter. If you weighed it and it was like 2.2 points, that would be a hundred a la cart. It all depends on how much it weighs and how much ink you would need. Our

Eiffel Tower print that is about 9 inches tall is about 8 dollars in ink. It depends on what you are making but you can figure it out by how it weighs.

CEO CFO: *What is the status of the industry in general?*

Mr. Liu: 3D printing is certainly a growing market. I have some numbers from a report done by a research firm. They predict 100 to 200% growth every year for the next 2-3 years. In the past, it has grown up to 400% per year for the consumer markets. It is a billion dollar industry now and it continues to grow. There are estimates that it will be an 8-10 billion dollar industry in 2 or 3 years.

CEO CFO: *What surprised you as you have developed the product and grown the business?*

Mr. Liu: We are always fascinated by the different applications people come up with for the products that we make. It is very popular in jewelry and dentist markets but I guess we did not know about that when we first started out. Just like the amazing things people can make is the thing that has surprised us the most and certainly pieces of art that are very complex and certain models that are very beautiful. We create the best tool possible but the content and the things that people make always surprise us.

CEO CFO: *Are you able to ramp up production as needed if the world wakes up tomorrow and tons of people want the product? How are you planning for that?*

Mr. Liu: Certainly FSL3D has a large manufacturing expertise from making laser system in the past and we are able to ramp up very quickly so we can product tens of thousands of units per month if needed.

CEO CFO: *Put it together for our readers, why should pay attention to FSL3D today?*

Mr. Liu: The 3D printing market is something that is hot and new. It is interesting when we take these interviews and we go into it assuming people already know what 3D printers are used for and it is interesting to always answer who your customers are and what are they used for. Our emphasis when we started was actually always to sell a better 2D printer and we assumed that people that are buying already knew what they were going to use it for. As the market increases, there are more opportunities both to make things yourself as well as developing 3D printing technology. We're bringing manufacturing back to the US and empowering entrepreneurs. One of the most popular applications that I see is creating a home based business. If you are a home engineer, you can make parts, sell those parts, you can make architectural models if you are an architect and you can just use the 3D printer for fun. We see people just making more things and having the ability to express their ideas in the 3D world. We think that is a very powerful tool for people to have in their hands.

BIO: Henry Liu is founder and CEO of Full Spectrum Laser and its subsidiary FSL3D. He started Full Spectrum Laser in his garage in 2010, and has grown the company into a well-known brand with over 25 employees and \$7 million in sales for 2013. Henry holds a PhD from Stanford University.



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