

Sigma Labs, Inc. (NASDAQ/SGLB)**BUY \$0.97 Price Target: \$2.00***September 26, 2018**Barry M. Sine*

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*Sigma Labs produces quality control systems for metal 3D printers***Ensuring Quality in Metal 3D Printing**

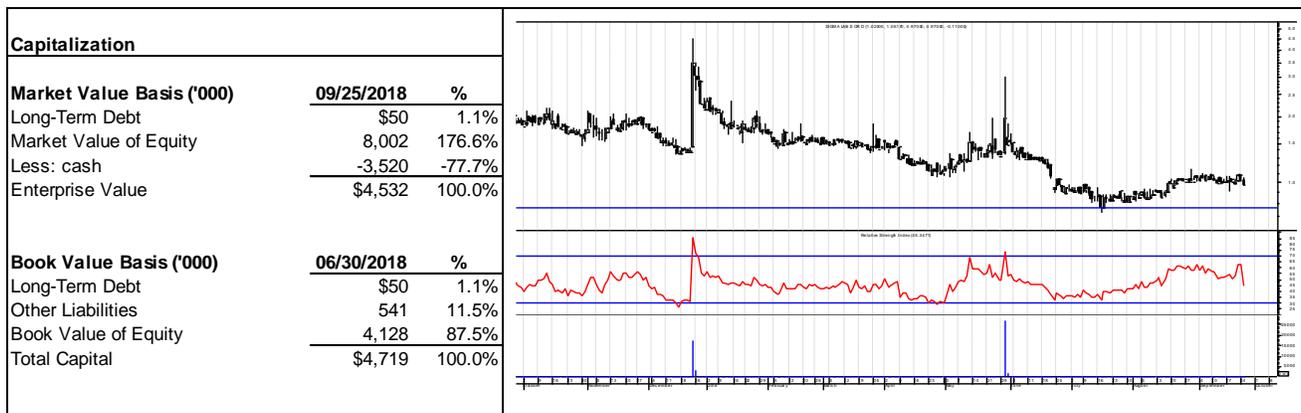
- We initiate coverage of Sigma Labs with a Buy rating and a \$2 price target.
- The company sells quality control equipment for metal 3D printers which work with printers from five major manufacturers today, but can be fitted to any 3D metal printer.
- While plastic 3D printing is commonplace, metal 3D printing is still in its infancy, with most of the roughly 10,000 printers globally used in R&D environments to print prototype parts.
- 3D printing allows for rapid, low cost printing of highly complex parts made from most metal which would be very difficult using traditional methods and likely require manufacture and assembly of multiple component parts.
- While 3D metal printing holds enormous promise, quality control is still a major issue as current methods, such as post manufacturing CT scanning, are expensive and inefficient.
- Sigma's patented solution scans the "weld pool" created by a laser melting layers of metal particles 50,000 times per second to ensure that it was properly joined.
- Its system uses off the shelf sensors and its own proprietary software algorithms in the Amazon AWS cloud data centers, to sample the enormous amount of data and confirm that a part is correctly manufactured.
- As such, we view the company more as a cloud software company, offering what we call quality as a service or QaaS.
- Sigma has recently turned its attention away from selling to R&D labs, which generally only buy one or two kits and require significant levels of support, to focus on manufacturers such as GE and Siemens that are in the early stages of setting up factories with dozens or hundreds of machines each.
- We value SGLB shares on a multiple of revenue basis, with both SaaS and industrial hardware comps trading near 10x revenue. We cut this in half to value SGLB at \$2 per share.
- This is a high-risk investment as SGLB is unprofitable and not likely to be in our forecast period through 2020, so additional, dilutive capital raises are likely.
- However, our forecast of \$2.6 million in revenue in 2020 only assumes sales of around 25 units, while 3D metal printer unit sales are in the thousands. If Sigma is successful in becoming the de facto quality control standard, revenue would be far higher.



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Rating	Buy	Earnings Per Share				
Target Price	\$2.00	Normalized to exclude unusual items				
Ticker Symbol	SGLB	FYE - March	2017	2018E	2019E	2020E
Market	NASDAQ	1Q - June	(\$0.26)	(\$0.23) A	(\$0.15)	(\$0.10)
Stock Price	\$0.97	2Q - September	(\$0.22)	(\$0.25) A	(\$0.15)	(\$0.09)
52 wk High	\$4.48	3Q - December	(\$0.27)	(\$0.16)	(\$0.14)	(\$0.08)
52 wk Low	\$0.73	4Q - March	(\$0.30)	(\$0.16)	(\$0.11)	(\$0.06)
Shares Outstanding:	8.2 M	Year	(\$1.04)	(\$0.67)	(\$0.56)	(\$0.33)
Public Market Float:	6.3 M	Revenue (\$mm)	\$641.0	\$472.1	\$1,050.0	\$2,600.0
Avg. Daily Volume	92,088	EV/Rev	7.1X	9.6X	4.3X	1.7X
Market Capitalization:	\$8.0 M	EBITDA (\$mm)	(\$3,135)	(\$3,609)	(\$3,115)	(\$1,840)
Institutional Holdings:	3.3%	EV/EBITDA	NM	NM	NM	NM
Dividend Yield:	0.0%					

Senior Executives		Common Ownership Profile		
		Shareholder	Shares ('000)	% of Total
John Rice	Chairman and CEO	Perritt Capital Management, Inc.	170.0	2.1%
Mark Cola	President and CTO	The Vanguard Group, Inc.	70.5	0.9%
Nannette Toups	Chief Financial Officer	United Capital Financial Advisers LLC	15.0	0.2%
Ronald Fisher	VP - Business Development	UBS Securities LLC	10.7	0.1%
Bruce Madigan	Chief Scientist	Merrill Lynch, Pierce, Fenner & Smith, Inc	3.0	0.0%
		Directors and Officers	787.8	9.5%



Source: Company reports, Metastock and Dawson James estimates.

Ensuring Quality in Metal 3D Printing

We initiate coverage of Sigma Labs with a Buy rating and a \$2 price target. The company provides quality assurance software and services to the 3D metal printing industry. Both the industry and Sigma are in the relatively early stages of their business plans. While Sigma traces its roots to its founding in 2006, it only turned its focus to 3D printing in the last few years. While plastic 3D printing is relatively common, metal printing is not and is still beset by difficult quality issues. Led by aerospace, the industry is in the early stages of commercial deployment. Sigma's flagship PrintRite3D product is also relatively new with version 3.02 out now and a planned enhancement recently announced that will provide a closed loop solution allowing 3D printers to correct any defects as they occur.

We value the company at 5x revenue on our 2020 estimate. While Sigma's installed solution does contain some third party off the shelf sensors, its value added is its proprietary software that scans during manufacturing, compresses the massive data stream, and then analyzes for defects. As a result, it is more of a SaaS (software as a service) company and in fact its pricing, either perpetual licensing or three-year license contracts, mimic SaaS pricing. SaaS comps trade at roughly 10x revenue, but we cut this in half to value SGLB due to the early stage and high risk inherent in this investment.

It is important to understand the risks inherent in the Sigma story. First, there is an industry risk. As noted, the industry has been slow to adopt 3D metal printing with quality control being a key issue. Unless and until there are large scale factory deployments of 3D metal printers, there will be very little market for Sigma. Then, even when 3D printers hit the factory floor en masse, Sigma still has to win adoption of its product. While we are confident that it will become the de facto quality assurance standard across printers from multiple manufacturers, the tech industry is replete with examples of inferior technologies winning market acceptance wars.

Sigma Labs was founded in 2006 by current president and CTO Marc Cola, Richard Mah, James Stout and Vivek Dave. Dave is still an adviser to the company while serving as a visiting scientist at MIT. The original name was Beyond6 Sigma –six sigma is a well-known quality methodology. They had a background in metallurgy and welding and began their company to address manufacturing issues with metal joining. In the early days, Boeing was a significant customer. In 2010, the company engineered a merger with a shell company in order to go public. The slog toward meaningful revenue and profitability has taken longer than expected, but now may be at hand.

The company is headquartered in Santa Fe, New Mexico. Santa Fe is a picturesque desert community with a population of about 60,000 about an hour north of the largest city in the state, Albuquerque. Contrary to popular misconception, New Mexico is in fact one of the 50 US states, having been admitted to the union in 1912. To the north of Santa Fe is Los Alamos National Labs, which gained fame during World War II as the home of the Manhattan Project which developed the first atomic bomb. Los Alamos is a convenient source of tech talent for Sigma, and its founders worked there before starting the company. Another convenient source of talent is the Intel facility in Rio Rancho outside of Albuquerque which once employed around 5,000 but is now down to just 1,100. The company's VP of engineering, Darren Beckett, came from Intel and has hired others from there. Sigma requires a unique mix of talent with advanced degrees in metallurgy to understand the manufacturing process, in mathematics to create the algorithms that sort the data collected to identify defects and software programmers to

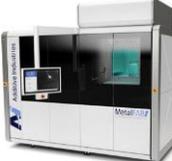
turn the algorithms into usable, user friendly code. New Mexico supplies a unique blend of talent especially suited to Sigma's needs.

A 3D printer is about the size of two refrigerators with the actual welding process contained in an area that looks somewhat like a microwave oven, including the door which opens much like those on a microwave. A thick metal base plate is installed, and the parts are welded on the plate. Layers of very fine metal powder are applied across the entire plate one by one with layers being about 20 to 60 microns thick. By comparison, a human hair is 30 to 60 microns thick. The chamber is filled with inert argon gas to prevent contamination. The laser then fires at specific spots on the layer of metal particles to begin forming the part. Layer by layer more material is laid down and fused into solid metal by the laser until a solid part is formed. In this manner, highly complex shapes can be formed which may only need final machining for high tolerance portions of the part such as gasket mating surfaces. The finished part must actually be cut from the base plate because the first layer actually fuses to or is welded to the base plate.

This process is called additive manufacturing or AM and is contrasted with the subtractive manufacturing methods in use since the first manufacturing plants were built in the industrial revolution. In typical subtractive manufacturing, material is removed from a solid block of metal the same way a sculptor sculpts a marble statue. If the original block of metal is sound and defect free, the part should be too. But this process is very wasteful and labor intensive. The material removed can and usually does exceed the material needed in the finished part. And this process is limited in the complexity of 3D parts it can make. So often a part may be composed of dozens or hundreds of other parts which are separately machined and then joined via welding or with fasteners which is again highly labor intensive. But since the current method works, and especially for highly critical applications like aircraft engines, conservative engineers at least for now are sticking with it until they know and trust 3D printing more.

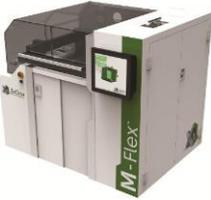
We estimate that there are roughly 10,000 3D metal printers in use around the world today, nearly all of which are used in R&D settings or to make prototype parts prior to initial large-scale production. The consulting firm Wohler Associates produces the definitive annual report on the 3D printing industry. They estimate that there were 983 3D metal printers sold in 2016, growing 80% to 1,768 in 2017 by 135 manufacturers. Their definition of the market goes down to small desktop printers used for making prototype parts with selling prices down to \$5,000. We focus on the larger machines, which are capable of mass-producing large product runs that sell for between \$500,000 to \$1,000,000. In the tables on the following pages, we identify 30 of the most significant of these companies. Two, Arcam EBM and Concept Laser, have been acquired by GE after shareholders rejected its bid for SLM. Sigma Labs sells kits for seven printers, three by EOS and one each from Additive Industries, Concept Laser, SLM and 3D Systems. Sigma owns an EOS M290 which it uses for R&D purposes. Sigma's kits retail for \$110,000 or \$45,000 per year over three years. Its kits are relatively easy to retrofit to a printer as this merely entails adding sensors. When the company unveils a later version of its product, which will provide feedback to the printer so that it can remedy any defects on the next pass of the laser, this will likely entail closer integration with the printer manufacturer to integrate with its software.

We Count 30 Major 3D Metal Printer Manufacturers – Five of Which Have Sigma Kits Available

With Sigma Labs Kits Available	Other Manufacturers	Other Manufacturers
<p>EOS M270 M280 M290 https://www.eos.info Krailling, Germany</p> <p>Calls itself the global technology leader for 3D metal and polymer printing.</p> 	<p>RENISHAW apply innovation™</p> <p>Renishaw http://www.renishaw.com Gloucestershire, UK</p> <p>Metal 3D printers are one of seven business lines.</p> 	<p>XACT METAL</p> <p>Xact Metal https://www.xactmetal.com/ State College, Pennsylvania</p> <p>Funded by Ben Franklin Technology Partners at Penn State.</p> 
<p>Additive Industries</p> <p>Additive Industries https://additiveindustries.com/ Eindhoven, Netherlands</p> <p>Established in 2012. Produces a modular 3D metal printing system.</p> <p>MetalFab1</p> 	<p>Arcam EBM A GE Additive Company</p> <p>ARCAM http://www.arcam.com/ Mölndal, Sweden</p> <p>Acquired by GE for \$650 mm in 2016.</p> 	<p>AddUp GLOBAL ADDITIVE SOLUTIONS https://www.addupsolutions.com Cebezat, France.</p> <p>Joint venture of Fives Group and Michelin.</p> 
<p>CONCEPTLASER a GE Additive company</p> <p>Concept Laser https://www.concept-laser.de Lichtenfels, Germany</p> <p>Acquired by GE for \$800 mm in 2016.</p> <p>M2</p> 	<p>sisma</p> <p>Sisma http://www.sisma.com Pivone Rochette VI, Italy</p> <p>Focuses on dental applications</p> 	<p>OPTOMECC Production Grade 3D Printers... with a Material Difference</p> <p>Optomec https://www.optomec.com/ Albuquerque, New Mexico</p> <p>Large manufacturing, U.S. government agency and global university customer base.</p> 
<p>SLM Solutions GmbH</p> <p>SLM Solutions https://slm-solutions.com/ Luebeck, Germany</p> <p>Calls itself a technology leader in 3D printing with an extensive patent portfolio.</p> <p>SLM 250</p> 	<p>TRUMPF</p> <p>Trumpf https://www.trumpf.com Farmington, CT</p> <p>Offers both laser metal fusion (LMF) and laser metal deposition (LMD).</p> 	<p>SCIACKY INC.</p> <p>Sciaky http://www.sciaky.com/ Chicago, Illinois</p> <p>Large scale 3D printing machines.</p> 
<p>3D SYSTEMS</p> <p>3D Systems www.3dsystems.com Rock Hill, South Carolina</p> <p>Founded in 1983 as world's first 3D printing company.</p> <p>ProX DMP 320</p> 	<p>DMG MORI</p> <p>DMG Mori https://www.dmgmori.co.jp Nagoya, Japan</p> <p>Machine tool manufacturer with offices in Japan, Germany, USA and Russia.</p> 	<p>BeAM BE ADDITIVE MANUFACTURING</p> <p>BeAM https://www.beam-machines.com/ Strabourg, France</p> <p>Acquired by AddUp in 2018.</p> 

Source: Company reports and Dawson James estimates

3D Metal Printer Manufacturers Span the Globe

<p>InssTek DMT® Metal 3D Printing Specialist</p> <p>InssTek http://www.instek.com/ Daejeon, South Korea</p> <p>Established in 2001 with the Korea Atomic Energy Institute.</p> 	<p>XJET</p> <p>XJet https://xjet3d.com/ Rehovot, Israel</p> <p>Uses nanoparticles</p> 	<p>Matsuura PREMIUM MACHINE TOOL MANUFACTURER</p> <p>Matsuura http://www.matsuura.co.jp Fukui, Japan</p> <p>Dates back to 1935</p> 
<p>ExOne DIGITAL PART MATERIALIZATION</p> <p>ExOne https://www.exone.com/ North Huntingdon, PA</p> <p>Former parent became exclusive licensee of MIT 3D printing technology in 1996.</p> 	<p>VADER</p> <p>Vader Systems https://vadersystems.com/ Getzville, New York</p> <p>Uses liquid metal, not powder</p> 	<p>Aurora Labs™</p> <p>Aurora Labs http://www.auroralabs3d.com Bibra Lake Australia</p> <p>Claims that its printers are among the most affordable in the industry.</p> 
<p>DIGITAL METAL</p> <p>Digital Metal https://digitalmetal.tec Höganäs, Sweden</p> <p>Provides 3D printing services and sells printers.</p> 	<p>pollen</p> <p>Pollen AM https://www.pollen.am/ Paris, France</p> <p>Uses lower cost standard NIM feedstock.</p> 	<p>AIRWOLF3D</p> <p>AirWolf 3D https://airwolf3d.com/ Fountain Valley, CA</p> <p>Metal 3D printing for the masses.</p> 
<p>Desktop Metal</p> <p>Desktop Metal https://www.desktopmetal.com/ Burlington, Mass. Raised over \$277 million in funding from BMW, Ford, GE</p> 	<p>CYTOSURGE®</p> <p>Cytosurge https://www.cytosurge.com/ Glattbrugg, Switzerland</p> <p>Manufactures microscopic and sub-microscopic</p> 	<p>3DEO</p> <p>3DEO http://www.3deo.co Gardena, CA</p> <p>Claims its process reduces printing costs by 80%.</p> 
<p>Markforged</p> <p>Markforged https://markforged.com Watertown, Mass.</p> <p>Prints carbon fiber, titanium, aluminum, kevlar and</p> 	<p>ADMATEC Additive Manufacturing Technologies</p> <p>ADMATEC https://admateceurope.com/ Moergestel, Netherlands</p> <p>Started by Formatec Ceramics in 2012. Makes ceramic and</p> 	<p>FARSOON TECHNOLOGIES</p> <p>Farsoon Technologies https://www.farsoon.com/ Hunan, China</p> <p>Founded in 2009 by ex 3D Systems technical director.</p> 

Source: Company reports and Dawson James estimates

PrintRite3D Aspires to be the De Facto Quality Standard

The company's flagship product is its PrintRite3D quality assurance system. The product consists of several sensors which are easily retrofitted to OEM 3D metal printing machines. It currently supports five manufacturers but can retrofit the machines of the most manufacturers. The sensors feed into a local Sigma computer and there is a control box mounted near the printer. In their lab, the application we saw used a wireless Microsoft surface tablet PC to monitor the Sigma system. But the real brains and processing are in the cloud with Sigma leasing space in Amazon's AWS data centers. AWS is one of the largest data center operators globally and there are ample low latency, high bandwidth fiber connections to each of its data centers. Sigma's cloud software performs a million to one data reduction to make the analysis in real time possible. It collects over 50,000 data points per second from each laser in a 3D printer, but based on methods of statistical quality control, it can sample this data to arrive at a statistically valid dataset to analyze. The sensors it installs monitor the "weld pool" of liquid metal being welded by the laser as powdered metal is fused into solid products by the printer. By looking at factors such as temperature and comparing expected values over time to actual values, it can spot defects. If, for example, a certain area of the product being 3D printed is not hot enough during welding, the material probably did not fuse correctly leaving a weak spot.

Sigma Labs uses the term "In Process Quality Assurance" or IPQA to define its product category. The company believes that the inability of manufacturers to reliably and cost effectively assure the quality of 3D printed metal products is the main impediment blocking widespread adoption of this manufacturing method. For this reason it has worked with many of the early industrial leaders globally in metal 3D printing.

Sigma Labs Counts Several Leading Global Industrial Companies as Early Stage Customers

	Customer	Ticker	HQ	Market Cap	Annual Revenue	Employees
				\$ millions	\$ millions	
	Honeywell International Inc.	HON	New Jersey	123,674	40,519	131,000
	General Electric Company	GE	Massachusetts	108,291	120,468	313,000
	United Technologies Corporation	UTX	Connecticut	113,493	59,798	205,000
	Woodward, Inc.	WWD	Colorado	5,048	2,099	6,900
	Siemens AG	SIE-DE	Germany	93,568	83,049	372,000
	Aerojet Rocketdyne Holdings, Inc.	AJRD	California	2,532	1,877	5,157
	Boeing Company	BA	Illinois	211,109	93,392	140,800
	Caterpillar Inc.	CAT	Illinois	92,715	45,462	98,400

Source: Company reports and Dawson James estimates

There is also a strong argument that the industry or at least individual manufacturers should settle on a single quality assurance standard, and Sigma is the only such independent solution we are aware of. There are three categories of customers to consider. First, as we detailed, there are the printer manufacturers. Sigma has already worked with six of them to create kits to add its sensors to their products. The process of designing a kit for a new printer is relatively straightforward as it mainly involves designing custom brackets to fit the sensor to a particular printer, so they can view the laser as it welds the powdered metal. The same software can be used for any machine, although it may need to be adjusted for the unique specifications of each machine. Today printer manufacturers offer varying degrees of quality control solutions themselves and may be reluctant to endorse a third-party solution. But this is where the manufacturers of 3D printed products come in.

The second customer category to consider are the manufacturers of products themselves such as Siemens or GE. Large manufacturers tend to prefer sourcing critical machinery from multiple sources to ensure redundancy. But if a manufacturer is using printers from two or more printer manufacturers, each with their own different quality control software, how can it ensure uniform quality control such that products printed by one brand of machine don't have different quality characteristics than those from another machine?

That's where the end customer for the product comes in. Buyers of 3D printed parts, or final products such as aircraft, want quality assurances. By settling on an independent third-party solution, such as PrintRite3D, they can be assured that no matter who makes the part or what machine they use, it will have uniform quality.

With its closed loop application now in beta testing, Sigma can provide feedback to the printing machine telling it, for example, to increase the heat on the next pass over the defective area to effectively melt the prior layer and the current layer.

The PrintRite3D product is a kit that is installed on 3D metal laser printers manufactured by other companies. Presently, it is available for seven printers by five manufacturers with kits available for three different EOS models. The product sells for \$110,000 per printer or can be leased for \$45,000 annually on a three-year lease.

There are four modules to the PrintRite3D product, with at least one more planned:

- **SENSORPAK** - A kit consist of two sensors, mounting brackets, and an on site computer and control panel. The sensors are off the shelf third party sensors with one pyrometer and one photo detector. Photodetectors detect light or other types of electromagnetic radiation. Pyrometers measure temperature. By measuring the level of light and temperature directly at the weld site as the laser moves, and comparing this to the correct level, PrintRite3D can ascertain whether the metal was correctly welded or whether loose, unwelded metal particles may remain creating a weak spot in the part being printed. The sensors take 50,000 readings per second, which is far too much data to be cost effectively analyzed.
- **INSPECT** - Sigma's on site computers then do a one million to one reduction in the amount of data using statistical sampling techniques. The data is then sent over a live, high speed internet connection to Sigma computers housed in Amazon AWS data centers for analysis. Within seven seconds the results of the analysis are returned to the manufacturing site, before the laser begins it next pass over the in-process part. The data can be used to modify the process to improve quality and can be shared with customers to assure them that parts were correctly manufactured. One example of a fault INSPECT discovered was a laser that was

failing intermittently. Every once in awhile, the laser fired at a lower than set temperature, resulting in inadequate welding of the part and internal weak spots.

- **CONTOUR** - this feature is still in development but what it does is measure and ascertain that a printed part has the correct dimensions, down to 100 microns. While the INSPECT module ensures that the part is properly welded, this module ensures that it precisely meets the specifications for both external and internal measurements.
- **ANALYTICS** – looks at trends in data over time and is also still in development. It can identify changes in produced parts over time which may be caused by impending failure of a printer component, changes in the quality of the metal powder used or changes in the procedures used to load and set up the machine. Thus managers can identify and correct problems early as they are beginning to occur but before they have impacted product quality.
- **CLOSED LOOP** – is not an announced module yet, but the company has put out a press release announcing that it has been successfully tested. We are most enthusiastic about this module since, as the name implies, it closes the loop on quality control by not just identifying defects, but correcting them during the manufacturing process. It entails having the PrintRite3D software provide feedback and changes to a printer’s operating software so therefore Sigma would need to work with printer manufacturers and gain access to their software. There is enough time between each pass of a laser over an in-process part for Sigma’s software to complete its analysis and send corrective instructions back to the printer.

As noted, the data from the sensors is sent to Sigma computers in Amazon data centers for processing, and results are returned in around seven seconds noting any errors. If, for example, the weld pool did not reach a high enough temperature to weld a particular layer, the software can command the laser to increase its power setting on the next pass to effectively weld two layers – the prior improperly welded layer and the current layer. We believe that this solution will be very attractive to parts manufacturers. It’s one thing to know that some parts are defective so as not to sell them, but its far more valuable to know that impending defects were caught early and corrected so that there are no defective parts.

We Expect a Modest Revenue Pick Up Near Term, Stronger Growth in 2H19, But Continued Negative Cash Flow

In the recently completed second quarter, the company generated \$98k in revenue, down from \$291k in the year ago period and \$103k in the first quarter. The drop is mainly attributable to a decline in revenue from R&D customers, while production customers have not started to come on line en masse. The company’s burn rate is about \$300k per month, so with \$3.5 mm on the books in cash, it has until roughly 1Q or 2Q of next year before it would need funding at current rates.

There is a small interim source of revenue that we believe could modestly cut this burn rate and extend its cash stockpile. The company takes on small batch 3D printing jobs using the EOS M290 3D printing machine it has in its lab for test purposes. When the R&D boys don’t need to use the machine, the company has been taking on small outside manufacturing jobs. In some cases, R&D can use a production job to test a new method or software they are using, so they can kill two birds with one stone. These jobs typically

may bring in \$30k to \$100k in revenue, so one or two per month could cut the burn rate noticeably. The accounting department now oversees the pricing of these jobs to ensure they are profitable with a target gross margin around 50%. Since the PrintRite3D product is mainly a software as a service product, it is expected to carry a gross margin around 70%.

Our revenue forecast assumes a pickup in contract manufacturing revenue over the next several quarters, with sales of PrintRite3D kits really starting in 2H19 at one unit in 3Q and two in 4Q. For 2020, we assume that PrintRite3D sales progress obviates the need to continue taking in contract manufacturing work, with unit sales ramping to eight by 4Q. Given that a single factory would likely employ dozens of machines, and that manufacturers would most likely deploy PrintRite3D across all machines, it is entirely feasible that the company could start seeing quarters with millions of dollars in revenue and see this occurring with some regularity and significant growth. But before they can run, they must first demonstrate that they can crawl and then walk.

We spent a day at Sigma Labs Santa Fe headquarters and can assure investors that their money is being spent as frugally as they would hope. The corporate headquarters are in the Santa Fe Technology Incubator building, which is run by a local non-profit. The building is a relatively bare bones industrial looking building, but it provides Sigma with ample office space and a well-equipped lab including a garage door to the outside for loading materials such as industrial gas.

Sigma Labs employs 14 people and judging from the \$426k in salaries and benefits expense recorded in 2Q, no one is getting rich at this R&D stage of the company's development. It breaks out its investor relations costs separately, which exceed total revenue, but we view this as a worthwhile expense for a company that still needs to ensure an ample source of outside capital from well-informed investors. So, while the company is burning about \$300k per month, all expenses look reasonable.

Comps Suggest a \$4 Per Share Valuation for SGLB, Which We Haircut to \$2

As noted, we value SGLB shares at \$2 per share which is based on a multiple of 5x our 2020 revenue estimate. We use two comps groups to value the stock, both of which surprisingly trade at similar average multiples of around 10x revenue.

The first group are 3D metal printer manufacturers. None has positive EBIT and only a few positive EBITDA. The 17.1x average multiple is skewed by the 116x revenue multiple of Australian 3D printer manufacturer Aurora Labs. Excluding that company, the average is a much lower 2.9x.

3D Metal Printer Stocks Trade at 16.3x, Skewed Higher by One Outlier

Company Name	Fiscal Period	Price	Shares Outstanding	Market Value	Enterprise Value	Sales	EBIT	EBITDA	Enterprise Value/Sales
Sigma Labs	06/30/2018	\$0.97	8.2	8.0	4.5	0.4	(4.5)	(4.3)	11.3x
SGLB @ 2020E	12/31/2020	\$0.97	8.2	8.0	4.5	2.6	(44.9)	(1.8)	1.7x
SGLB @ target on 2020E	12/31/2020	\$2.00	8.2	16.5	13.0	2.6	(44.9)	(1.8)	5.0x
Aurora Labs Ltd.	06/30/2018	\$0.47	65.6	30.9	28.1	0.3	(5.5)	(5.4)	110.0x
ARC Group Worldwide, Inc.	06/30/2018	\$1.80	23.3	42.0	81.1	99.1	(9.1)	0.8	0.8x
voxeljet AG Sponsored ADR	06/30/2018	\$4.18	18.6	77.7	78.4	26.4	(9.1)	(5.5)	3.0x
ExOne Co.	06/30/2018	\$9.80	16.2	158.8	147.4	57.7	(19.0)	(12.7)	2.6x
SLM Solutions Group AG	06/30/2018	\$25.57	18.0	459.8	488.9	93.0	(5.3)	2.5	5.3x
Materialise NV Sponsored ADR	06/30/2018	\$13.75	52.4	650.7	708.5	162.5	(4.4)	10.0	4.4x
3D Systems Corporation	06/30/2018	\$19.61	114.0	2,236.1	2,130.7	646.1	(54.0)	8.1	3.3x
Stratasys Ltd.	06/30/2018	\$23.43	53.7	1,259.1	943.1	668.4	(22.4)	44.2	1.4x
Average									16.3x

Source: Company reports and Dawson James estimates

However, since Sigma Labs is primarily a software as a service company or SaaS, we also look at SaaS comps, which trade at much higher multiples due to the higher margin and higher ROI of these companies. The 14 SaaS stocks we use as comps trade at an average revenue multiple of 16.3x with a wide range between 0.8x and 110.0x. We note that all of these companies generate significantly more revenue than Sigma and are further along in their business models.

While we are going through the valuation exercise and coming up with a most likely case valuation, in our opinion the likely outcome is more binomial with a zero valuation if its quality control standards don't catch on, to a much higher valuation if they do. Assuming 10,000 printer sales per year globally, a 10% market share and a \$100,000 ASP, revenue would be \$100 million instead of the \$2.6 million we forecast. Even at the 5.0x multiple we use, this would imply a \$63 share price before expected dilution from new share issuance. We certainly do not forecast this, but this exercise gives some indication of the enormous valuation upside, which we think somewhat offsets the significant risk involved at this stage.

SaaS Comps Trade at an Average Multiple of 11.1x Sales

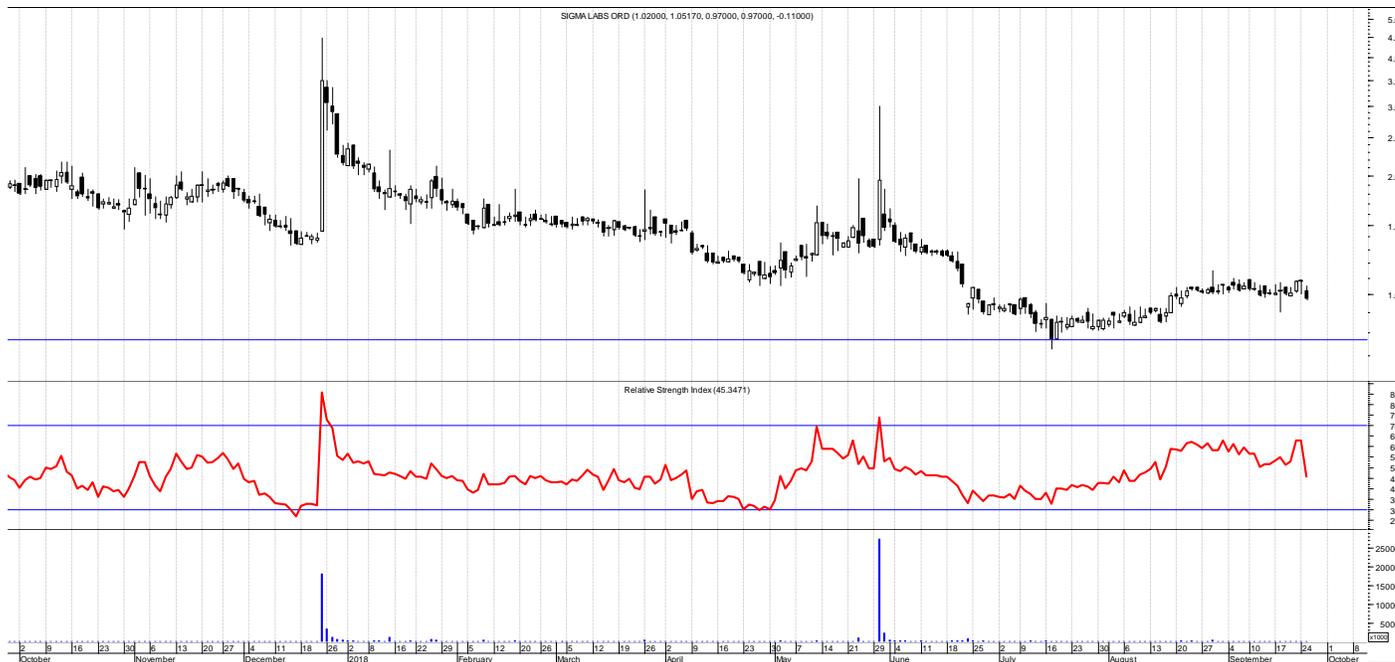
Company Name	Fiscal Period	Price	Shares Outstanding	Market Value	Enterprise Value	Sales	EBIT	EBITDA	Enterprise Value/Sales
Sigma Labs	06/30/2018	\$0.97	8.2	8.0	4.5	0.4	(4.5)	(4.3)	11.3x
SGLB @ 2020E	12/31/2020	\$0.97	8.2	8.0	4.5	2.6	(44.9)	(1.8)	1.7x
SGLB @ target on 2020E	12/31/2020	\$2.00	8.2	16.5	13.0	2.6	(44.9)	(1.8)	5.0x
Zendesk, Inc.	06/30/2018	\$71.37	106.0	7,562.3	7,324.1	430.5	(114.4)	(82.6)	17.0x
Brightcove Inc.	06/30/2018	\$8.25	35.9	296.3	268.9	155.9	(18.9)	(11.6)	1.7x
Zix Corporation	06/30/2018	\$5.51	54.2	298.4	280.8	65.7	10.7	13.4	4.3x
HubSpot, Inc.	06/30/2018	\$152.10	38.8	5,900.4	5,653.4	375.6	(40.1)	(24.4)	15.1x
Shopify, Inc. Class A	06/30/2018	\$161.11	93.7	17,152.9	15,578.7	673.3	(52.6)	(29.2)	23.1x
ServiceNow, Inc.	06/30/2018	\$197.61	177.9	35,154.8	34,256.3	1,933.0	(99.0)	13.9	17.7x
Everbridge, Inc.	06/30/2018	\$58.69	29.4	1,724.7	1,710.8	104.4	(19.2)	(9.0)	16.4x
Benefitfocus, Inc.	06/30/2018	\$41.30	31.9	1,316.9	1,392.0	256.7	(13.5)	2.4	5.4x
Carbonite, Inc.	06/30/2018	\$38.00	33.6	1,277.3	1,401.3	239.5	(5.7)	16.1	5.9x
Paylocity Holding Corp.	06/30/2018	\$81.39	52.8	4,294.7	4,157.5	377.5	18.3	48.5	11.0x
ServiceSource International, Inc	06/30/2018	\$2.83	91.8	259.9	224.7	239.1	(16.4)	6.2	0.9x
Smartsheet, Inc. Class A	06/30/2018	\$29.88	13.4	3,007.1	2,803.6	111.3	(49.0)	(44.9)	25.2x
Altair Engineering Inc. Class A	06/30/2018	\$41.95	36.7	2,932.7	2,736.9	333.3	(33.3)	(21.5)	8.2x
QAD Inc. Class A	06/30/2018	\$57.65	16.4	1,085.2	959.2	305.0	(3.1)	2.7	3.1x
Average									11.1x

Source: Company reports and Dawson James estimates

Technicals – Decline Appears to Have Run its Course

SGLB shares are trading just under the dollar mark at \$0.97. As the chart below shows, the stock is off much higher levels with intraday highs of \$4.48 in December and \$3.00 in May. The stock subsequently made a bottom at \$0.76 in July, and has modestly rebounded higher. The stock has shown the ability to trade above our \$2 price target historically, but we also note that most buying activity since then has taken place below that level. So there may be some profit taking as the stock moves up to our target, slowing the rise.

Decline Has Ended, and SGLB Found Support in July



Source: Company reports and Dawson James estimates

Sigma Labs, Inc. Income Forecast

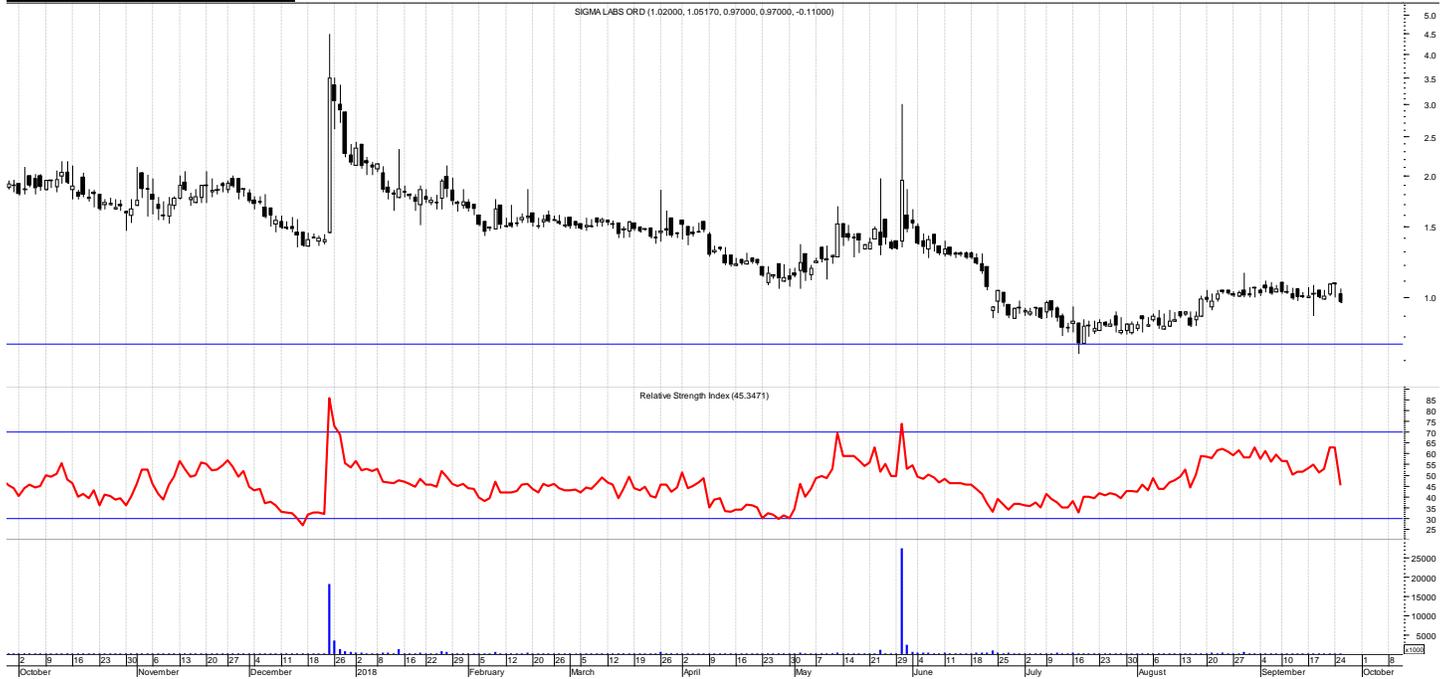
Dollars in thousands, except per share data

Fiscal years ended December 31

	2018E					2019E					2020E				
	1QA	2QA	3Q	4Q	YEAR	1Q	2Q	3Q	4Q	YEAR	1Q	2Q	3Q	4Q	YEAR
Revenue	103,415	98,663	120,000	150,000	472,078	150,000	150,000	250,000	500,000	1,050,000	500,000	600,000	700,000	800,000	2,600,000
YoY grow th	-9.7%	-66.0%	53.8%	-5.0%	-26.4%	45.0%	52.0%	108.3%	233.3%	122.4%	233.3%	300.0%	180.0%	60.0%	147.6%
Seq grow th	-34.5%	-4.6%	21.6%	25.0%	314.7%	0.0%	0.0%	66.7%	100.0%	210.0%	0.0%	20.0%	16.7%	14.3%	325.0%
Cost of Goods Sold	73,795	68,568	84,000	105,000	331,363	90,000	90,000	125,000	200,000	505,000	150,000	180,000	210,000	240,000	780,000
As a percent of revenue	71.4%	69.5%	70.0%	70.0%	70.2%	60.0%	60.0%	50.0%	40.0%	48.1%	30.0%	30.0%	30.0%	30.0%	30.0%
Gross Margin	29,620	30,095	36,000	45,000	140,715	60,000	60,000	125,000	300,000	545,000	350,000	420,000	490,000	560,000	1,820,000
As a percent of revenue	28.6%	30.5%	30.0%	30.0%	29.8%	40.0%	40.0%	50.0%	60.0%	51.9%	70.0%	70.0%	70.0%	70.0%	70.0%
Salaries and benefits	398,657	426,049	400,000	400,000	1,624,706	400,000	400,000	400,000	400,000	1,600,000	400,000	400,000	400,000	400,000	1,600,000
As a percent of revenue	385.5%	431.8%	333.3%	266.7%	344.2%	266.7%	266.7%	160.0%	80.0%	152.4%	80.0%	66.7%	57.1%	50.0%	61.5%
Operating R&D costs	121,977	95,045	100,000	100,000	417,022	100,000	100,000	100,000	100,000	400,000	100,000	100,000	100,000	100,000	400,000
As a percent of revenue	117.9%	96.3%	83.3%	66.7%	88.3%	66.7%	66.7%	40.0%	20.0%	38.1%	20.0%	16.7%	14.3%	12.5%	15.4%
Investor and public relations	180,399	103,197	100,000	100,000	483,596	100,000	100,000	100,000	100,000	400,000	100,000	100,000	100,000	100,000	400,000
As a percent of revenue	174.4%	104.6%	83.3%	66.7%	102.4%	66.7%	66.7%	40.0%	20.0%	38.1%	20.0%	16.7%	14.3%	12.5%	15.4%
Legal and professional fees	138,423	177,929	150,000	150,000	616,352	150,000	150,000	150,000	150,000	600,000	150,000	150,000	150,000	150,000	600,000
As a percent of revenue	133.9%	180.3%	125.0%	100.0%	130.6%	100.0%	100.0%	60.0%	30.0%	57.1%	30.0%	25.0%	21.4%	18.8%	23.1%
Office expenses	95,106	110,936	125,000	125,000	456,042	125,000	125,000	125,000	125,000	500,000	125,000	125,000	125,000	125,000	500,000
As a percent of revenue	92.0%	112.4%	104.2%	83.3%	96.6%	83.3%	83.3%	50.0%	25.0%	47.6%	25.0%	20.8%	17.9%	15.6%	19.2%
Other	33,725	38,035	40,000	40,000	151,760	40,000	40,000	40,000	40,000	160,000	40,000	40,000	40,000	40,000	160,000
As a percent of revenue	32.6%	38.6%	33.3%	26.7%	32.1%	26.7%	26.7%	16.0%	8.0%	15.2%	8.0%	6.7%	5.7%	5.0%	6.2%
Operating cash expenses	968,287	951,191	915,000	915,000	3,749,478	915,000	915,000	915,000	915,000	3,660,000	915,000	915,000	915,000	915,000	3,660,000
EBITDA	(938,667)	(921,096)	(879,000)	(870,000)	(3,608,763)	(855,000)	(855,000)	(790,000)	(615,000)	(3,115,000)	(565,000)	(495,000)	(425,000)	(355,000)	(1,840,000)
EBITDA margin	-907.7%	-933.6%	-732.5%	-580.0%	-764.4%	-570.0%	-570.0%	-316.0%	-123.0%	-296.7%	-113.0%	-82.5%	-60.7%	-44.4%	-70.8%
Stock based compensation	161,522	423,067	200,000	200,000	984,589	200,000	200,000	200,000	200,000	800,000	200,000	200,000	200,000	200,000	800,000
Depreciation and amortization	47,321	48,253	50,000	50,000	195,574	50,000	50,000	50,000	50,000	200,000	50,000	50,000	50,000	200,000	
Operating income	(1,147,510)	(1,392,416)	(1,129,000)	(1,120,000)	(4,788,926)	(1,105,000)	(1,105,000)	(1,040,000)	(865,000)	(4,115,000)	(815,000)	(745,000)	(675,000)	(605,000)	(2,840,000)
Operating margin	-1109.6%	-1411.3%	-940.8%	-746.7%	-1014.4%	-736.7%	-736.7%	-416.0%	-173.0%	-391.9%	-163.0%	-124.2%	-96.4%	-75.6%	-109.2%
Interest income	13,167	3,719	-	-	16,886	-	-	-	-	-	-	-	-	-	-
State incentives	-	-	18,750	18,750	37,500	18,750	18,750	18,750	18,750	75,000	18,750	18,750	18,750	18,750	75,000
Change in fair value of derivative	-	-	-	-	-	-	-	-							
Exchange rate gain	-	1,304	-	-	-	-	-	-	-	-	-	-	-	-	-
Interest expense	-	(1,411)	(1,500)	(1,500)	(4,411)	(1,500)	(1,500)	(1,500)	(1,500)	(6,000)	(1,500)	(1,500)	(1,500)	(1,500)	(6,000)
Debt discount amortization	-	-	-	-	-	-	-	-							
Loss on disposal of assets	(36,733)	-	-	-	(36,733)	-	-	-	-	-	-	-	-	-	-
Pretax Income	(1,171,076)	(1,388,804)	(879,000)	(870,000)	(3,628,610)	(855,000)	(855,000)	(790,000)	(615,000)	(3,115,000)	(565,000)	(495,000)	(425,000)	(355,000)	(1,840,000)
Taxes	-	-	-	-	-	-	-	-							
Net income	(1,171,076)	(1,388,804)	(879,000)	(870,000)	(3,628,610)	(855,000)	(855,000)	(790,000)	(615,000)	(3,115,000)	(565,000)	(495,000)	(425,000)	(355,000)	(1,840,000)
Net income margin	-1132.4%	-1407.6%	-732.5%	-580.0%	-768.6%	-570.0%	-570.0%	-316.0%	-123.0%	-296.7%	-113.0%	-82.5%	-60.7%	-44.4%	-70.8%
Diluted shares outstanding	4,997,534	5,572,015	5,572,015	5,572,015	5,428,395	5,572,015	5,572,015	5,572,015	5,572,015	5,572,015	5,572,015	5,572,015	5,572,015	5,572,015	5,572,015
Seq change	4,997,534.0	574,481.0	-	-	-	-	-	-	-	-	-	-	-	-	-
EPS diluted	(\$0.23)	(\$0.25)	(\$0.16)	(\$0.16)	(\$0.67)	(\$0.15)	(\$0.15)	(\$0.14)	(\$0.11)	(\$0.56)	(\$0.10)	(\$0.09)	(\$0.08)	(\$0.06)	(\$0.33)

Source: Company reports and Dawson James estimates

Important Disclosures:



Source: Metastock

Price target and ratings changes over the past 3 years:

Initiated – Buy – September 26, 2018 – Price Target \$2.00

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VALUATION

Our \$2 price target is based on a multiple of 5.0x our 2020 revenue estimate.

RISK FACTORS

1. Sigma Labs is presently a development stage company. While it does offer a marketable product, it is still in the process of adding important new features to it.
2. The company is unprofitable and we forecast that it will continue to be unprofitable, requiring outside capital through our 2020 forecast horizon. We would expect additional, dilutive equity offerings.
3. While Sigma Labs aspires to become the de facto industry standard for 3D metal printing quality control, should its technology fail to gain acceptance with printer manufacturers and/or printer users, financial distress and or bankruptcy is possible, which would, in our opinion, eliminate all or most shareholder value.

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- 2) **Neutral:** the analyst believes the price of the stock is fairly valued for the next 12-18 months;
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The following chart reflects the range of current research report ratings for all companies followed by the analysts of the Firm. The chart also reflects the research report ratings relating to those companies for which the Firm has performed investment banking services in the last twelve months.

Ratings Distribution	Company Coverage		Investment Banking	
	# of Companies	% of Total	# of Companies	% of Totals
Market Outperform (Buy)	27	90%	7	26%
Market Perform (Neutral)	3	10%	0	0%
Market Underperform (Sell)	0	0%	0	0%
Total	30	100%	7	23%

Analyst Certification:

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