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New Rec: Protolabs, Inc. (PRLB: \$150.77) October 11, 2020

Position: Source of funds

Potential downside: 44%

\$MM	Jun-20a	Sep-20e	Dec-20e	Mar-21e	F2019a*	F2020e	F2021e	F2022e
Revs	107	104	105	111	459	431	454	484
EPS**	0.59	0.53	0.53	0.58	2.79	2.26	2.35	2.84
Y/Y Gr	-16%	-30%	-17%	-5%	-8%	-19%	4%	21%
PE	na	na	na	na	54x	66.7x	64.2x	53.1x
Cnsns Rev	na	105	108	113	na	435	464	536
Cnsns EPS	na	0.52	0.50	0.56	na	2.21	2.49	3.28

*Fiscal 2019 has 53 weeks **Non-GAAP

Shares Out: 26.7MM

Market Cap: \$4B

FYE: Dec

For more information on this name, please email brian@offwallstreet.com, or call Brian Rogers at 617 868 7880.

Concept:

1. PRLB's competitive moat appears to be eroding, as new competitors replicate its key capabilities, most significantly in its highly profitable CNC business (34% of sales).
2. PRLB's future growth opportunities may not be as large as expected.
3. PRLB's efforts to expand its services have proven more challenging than expected and risk cannibalizing its core business and reducing its profitability.

Summary: Protolabs, Inc. (PRLB), founded in 1999 and headquartered in Maple Plain, MN, offers rapid prototyping and low volume production services utilizing injection molding, computer numerical control (CNC) machining, additive manufacturing and sheet metal fabrication. The company operates in the United States, Europe and Japan.

Bulls believe PRLB enjoys a significant competitive moat in its core injection molding and CNC businesses, mainly due to its technical capabilities, which include automation of design submission, manufacturability analysis, quotation, order submission, mold design, and toolpath generation and programming. While achieving this high level of automation required sacrifices that limited the company's addressable market, historically, it allowed PRLB to offer lead times unmatched by traditional machine shops, and enabled it to enjoy very high margins. In recent years, however, new competitors, backed by venture capital and private equity investors, have replicated key capabilities, eroding PRLB's competitive moat.

This erosion seems most significant in CNC, where competitors have not only replicated, but improved PRLB's digital, automated system for design submission, manufacturability analysis, quotation and order submission. This has diminished the company's speed advantage, and has made its fast-turn niche more crowded. In injection molding (47% of sales), competitors have replicated parts of PRLB's system, which has similarly created a more competitive environment, and competitors are working to replicate the rest of the system. In additive manufacturing (13% of sales), companies advertising digital, automated front-end systems and fast lead times are widespread. This increase in sophisticated competition seems likely to lead to slower, more costly customer acquisition, pricing pressure, and gross margin degradation.

Additionally, our research suggests that PRLB's market opportunity may not be as large as expected. The company has suggested a \$10B-\$15B TAM based on its manufacturing capabilities and constraints (part size, geometry, post-processing, etc.). However, this analysis appears to be incomplete, as it does not reflect the company's competitive positioning. PRLB offers extremely fast lead times, but at very high prices. For the vast majority of orders, where speed is not the main priority, customers prefer to utilize local or overseas competitors who offer cheaper, but equally or higher quality services. As such, PRLB is primarily

competing for the small percentage of orders where a customer's desire for a fast lead time overlaps with PRLB's manufacturing constraints. We estimate this opportunity is likely to be under \$5B.

Importantly, our research suggests that broadening PRLB's part constraints and adding new secondary services is unlikely to have a significant impact on the size of its TAM. Moreover, these expansions will likely prove difficult to implement and margin-dilutive. We also note that the company's addition of new manufacturing capabilities has proven to be more challenging than expected, with limited impact on its TAM.

While even this more limited opportunity does leave the company with runway for growth, it may be challenging to capture. PRLB grows primarily by acquiring new customers and by increasing sales with existing customers. However, given that the company now faces numerous, sophisticated competitors in its digitally-enabled, fast-turn niche, we think new customer acquisition will be a slower, more costly process. Moreover, given the company's competitive positioning, we think it could struggle to increase sales with its existing prototyping customers.

This challenge may explain why the company has been refocusing its efforts toward the "on-demand manufacturing" market. While the term "on-demand manufacturing" generates a lot of excitement, and is frequently discussed alongside grand, thematic ideas like the fourth industrial revolution, mass-customization, re-shoring, etc., it is essentially another term for low volume production. Although frequently discussed in the context of additive manufacturing, our research and field work suggest it is primarily an injection molding opportunity. In essence, this is not really a new opportunity.

We think PRLB could struggle to increase sales with existing customers and to take share in the low volume production market. The company faces the same competitive pressures and dynamics as it does in the prototyping market, with no distinct advantages. While it offers extremely fast lead times, it is far more costly than the competition. We suspect this is why the company has never had much success in low volume production, despite participating in the market since it was founded. We doubt that the company's Protolabs 2.0 initiative, which is focused on back-end productivity improvements and on making PRLB's services more accessible, will change the fundamental issues.

Finally, as we briefly noted, PRLB's efforts to add new manufacturing capabilities and expand its services have proven more challenging than expected. These expansions also risk cannibalizing its core business and reducing its structural return profile. The company's recent acquisition of Rapid

Manufacturing, for example, has been disappointing, with its sheet metal revenues actually declining since the purchase. Sheet metal fabrication is also a more commoditized, less profitable business. Similarly, PRLB’s 2014 acquisition of FineLine Prototyping moved the company into the highly competitive, lower-margin additive manufacturing business. Additive manufacturing also risks cannibalizing the company’s highly profitable CNC and injection molding businesses. While our research suggests additive manufacturing is unlikely to substantially replace CNC or injection molding in the near future, we expect it to take share over time. This has negative long-term implications for the company.

We project revenues of \$431MM, \$454MM, and \$484MM in FY20, FY21, and FY22, respectively, compared to “street” consensus expectations of \$435M, \$464M, \$536M. We forecast adjusted EBITDA of \$104MM, \$109MM, and \$126MM in FY20, FY21, and FY22, respectively, compared to “street” consensus expectations of \$106MM, \$116MM, and \$151MM. Finally, we look for adjusted EPS of \$2.26, \$2.35, \$2.84 in FY20, FY21, and FY22, respectively, versus the “street” forecast of \$2.21, \$2.49, and \$3.28. Our fair value estimate of \$85.07 is 30x our FY22 EPS estimate, in-line with the company’s 2-year average multiple.

This multiple target is substantially lower than PRLB’s current 46x multiple, but the multiple should rerate as the issues come into focus and if it becomes clear that the lofty expectations for 2022 might not be met. We also note that ETFs managed by Ark Investment Management acquired ~1.5MM PRLB shares between 3/31 and 10/9. We suspect that forced buying by these and other ETFs is an important driver of the current PRLB earnings multiple. If these passive funds are forced to sell, the shares might decline substantially before fundamental buyers step in.

Borrow information: PRLB

Supply Quantity	Shares Sold Short	Available to Borrow	Date
10.5MM	3.9MM	6.5MM	8/8/20

Background:

Founded in 1999, Protolabs, then known as Protomold, originally specialized in quick-turn injection molding for prototyping and low volume production. Over the next decade, the company introduced quick-turn CNC machining services, and expanded into Europe and Japan. In 2014, the company expanded into additive manufacturing with its acquisition of FineLine Prototyping. In 2017, the company expanded into sheet metal fabrication with its acquisition of Rapid Manufacturing.

PRLB's reportable segments are based on geographic region, consisting of the United States and Europe. The Corporate Unallocated and Japan category includes non-reportable segments, as well as R&D and G&A costs that are not allocated directly to one segment. The United States segment generated 79% of PRLB's total revenue in FY19 and 136% of total operating income. The Europe segment generated 18% of revenue and 19% of operating income. The Corporate Unallocated and Japan category generated 3% of revenue and -55% of operating income.

PRLB also reports revenue by product line. Notably, while injection and molding and CNC machining services are offered across all geographies, additive manufacturing services are available only in the US and Europe, and sheet metal fabrication is offered only in the US. In FY19, injection molding generated 47% of total revenue, followed by CNC at 34%, additive manufacturing at 13%, and sheet metal at 5%. The remaining 1% is classified as other revenue, about which the company has disclosed limited information.

Discussion:

1. PRLB's competitive moat appears to be eroding, as new entrants replicate its key capabilities, most significantly in its highly profitable CNC business.

PRLB was an early innovator in the design of software algorithms to automate the time- and labor-intensive, non-recurring steps of the quoting and manufacturing process. Specifically, design submission, manufacturability analysis, quotation, order submission, injection mold design, and CNC toolpath generation and programming. We will refer to the first four as front-end processes and the last three as back-end processes.

Accomplishing such a high level of automation required the company to limit itself to a narrow scope of materials, sizes, and geometries. However, within its scope, automation allowed the company to achieve unmatched lead times and significantly lower costs.

Traditionally, engineers would contact a local machine shop over the phone or email and submit a CAD file for their part. A machinist would then review the part, assess manufacturability, estimate the cost to manufacture and contact the engineer with a quote. This typically took 24-48 hours, but could take longer depending on a number of factors, including part complexity and shop capacity. If the part was not immediately manufacturable as designed, a back-and-forth process would begin where the shop would work with the engineer to address specific issues and make the necessary design changes. Once a manufacturable design was finalized, the shop and engineer would settle on a price, and manufacturing could

finally begin. This initial process could take anywhere from several days to several weeks. PRLB's front-end automation and digital user interface allowed it to typically complete this process in just one day.

PRLB's back-end automation also had benefits. Traditionally, a machinist would use CAM software to generate CNC toolpaths and programming code based on the customer's CAD file. If the part was to be manufactured by injection molding, the machinist would first need to design the mold. Once these steps were complete, the machinist could then set up and program the CNC machine and begin manufacturing. The time required to complete these back-end processes can vary significantly depending on the part, however, our understanding is that these processes generally take 12-24 hours. By automating these back-end processes, PRLB further increased the speed at which it could fulfill orders, and more importantly, significantly reduced its labor costs.

While there may be other little steps PRLB has automated or improved, and likely machine shops that have made their own little automations and improvements, these are the key capabilities that form the backbone of PRLB's competitive moat in injection molding and CNC machining. Where its traditional competitors would take weeks to complete an order, PRLB could complete orders in days. While machine shops needed to employ highly-trained, high-salary machinists, PRLB required very little labor. Thus, for much of the past two decades, PRLB has operated essentially unchallenged in its digitally-enabled, fast-turn niche. This is why the company has been so successful and enjoyed such high margins. However, this dynamic is changing.

Recent years have seen the emergence of new competitors, like Xometry, Fictiv, and 3D Hubs, backed by venture capital and private equity investors. These competitors utilize what is sometimes referred to as a "digital broker" model. Rather than purchasing equipment themselves, they have developed digital platforms that connect customers with a global network of suppliers. This allows them to easily offer a wider variety of services than PRLB, with significantly less scope limitations. Just like PRLB, customers are able to access all services through a digital user interface.

For CNC services, these platforms have replicated and improved upon PRLB's front-end process automation. When a customer uploads a CAD file, these platforms analyze the part and return a quote (and any manufacturability feedback), usually in under 30 seconds. This means orders can be quoted and submitted in a matter of minutes. This is actually faster than PRLB's front-end automation and significantly reduces the company's speed advantage.

To demonstrate this, we submitted a part to Protolabs, Xometry and Fictiv. For CNC machining services, PRLB was still the only company able to offer 1-day and 2-day lead times. However, both Xometry and Fictiv were able to offer 3-day lead times, with Xometry's quote at a more than 50% discount to PRLB's. While PRLB still maintains a slight speed advantage due to its back-end automation, our conversations with engineers suggest it is insignificant. From their perspective, 3 days is still extremely fast, and 1-2 day leads times are only necessary in emergencies.

For injection molding services, neither Xometry nor Fictiv offer instant quoting, though the digital user interface and other front-end automation elements (like manufacturability feedback) remain in place. Both companies advertise quote responses in under 24-hours, comparable with PRLB, and fast lead times. A Fictiv employee noted that while the company has historically focused its quoting algorithms on CNC and additive manufacturing, injection molding will be a huge focus going forward.

Clearly PRLB is no longer unchallenged in its core CNC business and its competitive moat in injection molding appears threatened. This new, sophisticated competition may lead to slower and more costly customer acquisition, pricing pressure, and gross margin degradation. It may also push PRLB to spend more on R&D and capex. The erosion of PRLB's speed advantage in CNC is particularly critical given how highly profitable that business is. While PRLB does not disclose the profitability of individual business lines, it has indicated that CNC enjoys gross margins north of 60%. One competitor told us that CNC is PRLB's core profit engine, while it suspects PRLB's injection molding business has been losing profitability due to increased overseas competition.

Competition appears to be the primary driver behind the deceleration in PRLB's unique product developers count. PRLB primarily acquires new customers through search, which is now crowded with many companies advertising instant quotes and fast lead times. Automated, digital quoting is particularly widespread in additive manufacturing, PRLB's fastest growing segment. We also note that, not only has PRLB's competitive advantage diminished, its competitors are now sizable. Based on public commentary from Xometry's management team and "street" research, we estimate the company did ~\$100M in revenue in 2019, up from ~\$50M in 2018.

While this is the most significant change in PRLB's competitive dynamics, there have been other changes as well. For example, a new software company, Paperless Parts, seeks to provide machine shops with a complete digital, automated quoting solution for CNC services (including customizable design for manufacturability analysis). This could significantly reduce the speed advantage

PRLB has over these traditional competitors, further eroding the company's competitive advantage.

2. PRLB's future growth opportunities may not be as large as expected.

PRLB has suggested a \$10B-\$15B TAM based on its manufacturing capabilities, constraints (part size, geometry, post-processing, etc.), and the geographies in which it operates. While this estimate might seem reasonable on its surface, it fails to reflect PRLB's competitive positioning and how customers actually use its services.

PRLB has historically positioned itself as the fastest provider of prototype and low volume parts. However, this speed has always come at a premium price. We experienced this first-hand when requesting quotes from the company and competitors, as we mentioned in the previous section. In that example, the quote we received for CNC machining services from PRLB was 2.4x the price quoted to us by Xometry for the same 3-day lead time. Notably, that was the cheapest option available from PRLB, whereas several competitors offered longer lead time options at prices as much as 80% less than PRLB.

PRLB's high prices were confirmed by several PRLB customers with whom we spoke, and who all pointed out the company's high prices relative to the competition. For example, one engineer told us that, in his experience, PRLB is typically 1.5x-3x more expensive than local or overseas shops across all of its services. Because of this premium pricing, engineers only use PRLB when speed is absolutely critical. For example, one engineer stated that, ideally, he would never use the company's services, but realistically he uses them 10%-15% of the time, when he needs to get parts quickly. For the rest of his orders, he will typically utilize a local shop or overseas competitor because they are so much cheaper. We spoke with several customers who echoed this sentiment.

We think this dynamic is critical, because, while PRLB may theoretically be capable of addressing a large market, PRLB does not appear to be competitive for the large majority of orders. Thus, to estimate the size of the market PRLB can realistically capture, we need to estimate 1) for what percentage of all orders is speed the priority, and 2) what percentage of those orders fit within PRLB's manufacturing constraints. It is obviously very difficult to precisely make this estimate. However, our conversations with engineers suggest speed is critical for 10%-20% of orders, and one competitor suggested speed-critical orders represent a ~\$5B opportunity. Thus, we think it is fair to conclude that PRLB's opportunity is likely under \$5B.

PRLB also appears to be limited in its ability to expand its addressable market. For example, the company's narrow manufacturing scope is a direct consequence of its high levels of automation. To expand beyond the common part sizes and geometries the company currently handles would require much more manual labor and intervention, which would negatively impact margins and lead times. One competitor told us that PRLB had already automated all of the easy stuff, and that he did not think the company would be able to easily expand its scope.

PRLB also may not have much room left to expand its addressable market by adding more secondary service offerings. We note the company has already significantly expanded its secondary services over the past decade to include a number of finishing and post-processing options, as well as quality documentation and inspection. This has been one of the factors driving the increasing TAM estimates provided by management over the years, but there is probably limited room for further meaningful expansion.

The other ways in which PRLB could expand its addressable market would be by adding new manufacturing capabilities or expanding to new geographies. As discussed in more detail in the third discussion point, adding new capabilities can be more challenging than expected. New geographies can also prove challenging and may not be significant opportunities. PRLB's 2009 expansion into Japan, for example, has so far not meaningfully contributed to the company's revenues. PRLB's management team has previously stated that the countries it is not already in are "not big product development markets."

There are other factors that may shrink PRLB's market opportunity over time. For example, as prices for 3D printers come down and engineers become more comfortable with the technology, some companies will likely add in-house capacity. A 2019 report from EY noted that 56% of surveyed companies expect to have in-house additive manufacturing systems by 2022. Engineers we spoke with confirmed this trend. Similarly, on a podcast in 2019, the CEO of 3D Hubs noted that companies in both Aerospace and Automotive, key industries for PRLB, were bringing more capacity in-house. He also suggested there were limited growth opportunities remaining in the rapid prototyping market.

Putting aside questions of the size PRLB's opportunity, consider the two main avenues PRLB can pursue to drive revenue growth: acquiring new customers and increasing sales with existing customers. For all the reasons we mentioned in our first discussion point, new customer acquisition may be increasingly difficult. We also note that the engineers with whom we spoke thought it unlikely that anyone in the industry was not already familiar with PRLB.

Our research and field work also suggest PRLB may struggle to increase sales with existing customers. None of the engineers we spoke with indicated any interest in using the company's services more than they already do. These customers already use PRLB or one of its newer competitors for all their rapid prototyping needs and see no reason to use them outside of that niche. One engineer complained that he is constantly harassed by members of PRLB's sales team trying to get him to use the service more.

The challenge to increase sales with existing prototyping customers is likely part of the reason why PRLB has focused so much attention on the "on-demand manufacturing" market. We are skeptical about the firm's prospects in this market.

First, while there may be some nuanced differences between on-demand manufacturing and low volume production, the company tends to use the terms interchangeably. Based on our research and conversations with competitors, we think the most accurate way to discuss the opportunity as it relates to PRLB is to refer to it as "low volume production." We also note that while the term on-demand manufacturing frequently gets used in the context of additive manufacturing, our conversations with competitors suggest that, at least for now, it is primarily an injection molding opportunity.

It seems that PRLB has probably been servicing low volume production since the company was founded, and it has yet to capture meaningful market share. The company "officially launched" on-demand manufacturing services with much fanfare back in 2017, but it's not clear there has been any significant impact since then. Excluding the company's sheet metal and other revenue line, average revenue per user has been flat since 2017. We can also divide injection molding revenues by unique product developers served to come up with a rough estimate of ARPU in that business. That figure has declined 12% since 2017. It also appears that Y/Y revenue growth in injection molding has consistently decelerated since 2017, from 10.5% to 3.3% in 2019.

It is also worth noting that the low volume production market is not insulated from the competitive pressures and dynamics we have been discussing. For example, PRLB's new digital competitors are similarly targeting the low volume production market. It is also not clear that PRLB has any distinct advantages that would help it take share from customers' existing suppliers. The company maintains its speed advantage, but the high prices it charges for that service are probably part of the reason the firm has historically struggled to take share in this market. While PRLB's ownership of its machines may be an advantage in this market relative to its digital broker competitors, this may not matter to the customer deciding between PRLB and its existing local or overseas

supplier. Similarly, while PRLB's scale may allow it to service a large number of customers, this may not be sufficient to drive a customer in an already happy relationship with their existing supplier to switch to PRLB.

While the company has suggested that its Protolabs 2.0 initiative will spur new market share gains in the low volume production market, we are skeptical. The initiative is primarily focused on back-end productivity improvements and on making PRLB's services more accessible to a wider range of users. This does not appear to solve any of the fundamental issues we have discussed.

3. PRLB's efforts to expand its services have proven more challenging than expected and risk cannibalizing its core business.

PRLB's December 2017 acquisition of Rapid Manufacturing exemplifies the challenges the company faces in expanding its addressable market by adding new manufacturing services. Rapid was a New Hampshire-based supplier specializing in quick-turn sheet metal fabrication and CNC machining. PRLB pitched Rapid as a "highly differentiated business", "digital and really focused on speed", and noted that "from a cultural fit, they match really well with us". Management's rationale for the acquisition was that it added a new manufacturing technology (sheet metal) and complementary CNC business that would broaden the company's envelope. The acquisition cost \$120M; \$110M in cash, \$10M in stock. At the time, PRLB estimated that Rapid would generate \$45M in revenue in 2017. Management specifically stated that it intended to "invest in scale in 2018, so we can capitalize on the growth going forward". However, that growth never appeared. On its Q4 2018 earnings call management acknowledged the disappointment stating, "the growth that we were anticipating there is not materializing". Sheet metal revenues peaked at \$25M in 2018 and have been declining since.

Management has attributed some of the weakness at Rapid to its own integration decisions, stating "in 2019 we moved away from some complex business which was not scalable and did not fit into the outlook of our new offer". This is not a surprising development. PRLB has always been forced to limit its scope in order to achieve a high level of automation. This is not an issue specific to sheet metal or any other manufacturing service. It is simply the tradeoff required to accomplish what PRLB wants to do. Thus, we would expect the company to face similar issues in integrating other manufacturing service it acquires. One competitor we spoke with echoed this exact sentiment. This disruption can also have longer-term negative impacts on the brand. Several engineers we spoke with have had poor experiences using PRLB's sheet metal services and do not intend to use them again. One noted that he not only received the wrong parts, but they arrived weeks after they were supposed to. Another described PRLB's sheet metal prices as "insane" and the service as "disappointing".

This is not the only issue with PRLB's expansion into new manufacturing services. The Rapid acquisition, and the 2014 acquisition of FineLine Prototyping, which brought the company into additive manufacturing, moved the firm into less profitable businesses. PRLB's core injection molding and CNC businesses boast gross margins north of 60%. In contrast, management has recently stated that its sheet metal business has gross margins in the mid-20s%. Notably, this is a substantial decline from the 40% level management indicated the business operated at prior to the acquisition, and, so far, the company has had little success in reversing the decline.

Gross margins in the company's additive manufacturing businesses are also below its core. In the US, management has stated the business has a ~50% gross margin. In its European business, which was built upon the 2015 acquisition of Alphaform, gross margin in the most recent quarter was below 10%. This is a notable decline from the 20% range that management indicated the business was operating at in 2018, and a far cry from the 50% levels management had suggested were achievable back when it acquired the business.

There are a number of factors contributing to the lower gross margins PRLB has seen in both sheet metal and additive manufacturing. However, a key factor is that PRLB does not have a significant competitive moat in either of these businesses. Additive manufacturing in particular is a very competitive business, with very low barriers to entry because anyone can buy the same printers PRLB uses. An EY survey from 2019 reported that 32% of respondents that intend to acquire an additive manufacturing business seek to become a service provider, like PRLB. As more competitors enter the space, gross margin in PRLB's additive manufacturing business may come under pressure. Additive manufacturing is also a quick-turn, digital, automated business by nature, which leaves PRLB very little room to differentiate itself. By expanding into these structurally less profitable businesses, PRLB has reduced its return profile. The impact on the company's ROIC is clear, having falling from 30% in 2014 to 15% in 2019.

Finally, we note that, while our research suggests additive manufacturing is unlikely to substantially replace CNC or injection molding in the near future, it is likely to take share over time. Engineers we spoke with noted that additive manufacturing technologies continue to improve and to become more viable throughout the product development cycle. This has negative long-term implications for PRLB, given the differences in profitability and competition.

4. Recent Results

On July 28th, PRLB reported 2Q20 earnings results that beat consensus expectations. Revenue of \$106M, -8% Y/Y, came in above the consensus estimate of \$100M. Non-GAAP EPS of \$0.59, -16% Y/Y, beat consensus of \$0.39, driven primarily by higher than expected revenues and lower than expected operating expenses.

By product line, injection molding revenues held up the best, at +4% Y/Y. However, this segment benefited from ~\$12M in non-recurring revenues related to personal protection equipment for Covid-19, without which revenues would have declined by -17% Y/Y. 3D printing revenues were down -7% Y/Y, followed by sheet metal at -15% and CNC at -26%.

By geography, PRLB's US segment fared the best, with revenue down -5% Y/Y. Europe revenues declined by -20% Y/Y, while revenue in Japan declined by -21% Y/Y.

Management guided for 3Q revenue between \$98M-\$110M, with non-GAAP gross margin between 49%-51%. Non-GAAP operating costs were guided to be generally in line with or below 2Q levels.

PRLB is scheduled to report 3Q financial results on October 29th.

5. Financial Assumptions

a) Revenue

We project total revenue of \$431M, \$454M, and \$484M in 2020, 2021, and 2022, respectively. "Street" consensus expectations are for revenue of \$435M, \$464M, \$536M, respectively.

Our revenue estimates are driven primarily by our quarterly estimates for unique product developers served. We expect Y/Y% declines in developer count to gradually moderate through Q1 2021, with the count recovering to pre-Covid levels by Q2 2021. We forecast mid-single-digit Y/Y% growth in 2022.

We project injection molding revenues of \$213M, \$218M, and \$231M in 2020, 2021, and 2022, respectively. This compares to consensus estimates of \$215M, \$232M, and \$258M. We expect implied injection molding ARPU to stabilize around pre-Covid levels by Q1 2021, as competitive pressures and marginal share losses to additive manufacturing are offset by improvements in PRLB's low volume production offering.

For CNC machining, we forecast revenues of \$134M, \$145M, and \$152M in 2020, 2021, and 2022, respectively. This compares to consensus estimates of \$135M, \$150M, and \$175M. We expect implied CNC machining ARPU to rebound modestly in the near-term but gradually decline over the long-term due to competitive pressures and marginal share losses to additive manufacturing.

We project 3D printing revenues of \$61M, \$66M, and \$73M in 2020, 2021, and 2022, respectively. This compares to consensus estimates of \$61M, \$67M, and \$75M. We expect implied 3D printing ARPU to continue its upward trajectory, albeit at a more modest pace than pre-Covid due to competitive pressures.

We project sheet metal revenues of \$20M, \$21M, and \$23M in 2020, 2021, and 2022, respectively. This compares to consensus estimates of \$20M, \$21M, and \$24M.

b) Gross margin

We forecast gross margin of 49.8% in 2020, improving to 51% by 2022. We expect this expansion to be primarily driven by a recovery in volumes, as well as minor productivity improvements, offset by pricing pressure and negative mix effects. By comparison, consensus estimates assume gross margin expands to 52% by 2022.

c) Operating expenses

We forecast elevated marketing and sales expense going forward, at 16% of total revenues through 2022. Our R&D estimates are generally in line with consensus in 2020 and 2021, though our 2022 figure falls below the “street.” Our G&A forecasts are slightly higher than the “street” on a percent of sales basis through 2022, primarily a function of our lower revenue expectations.

d) Other items

We forecast a tax rate of 22% in the remaining quarters of 2020, as well as in 2021 and 2022, in line with “street” expectations. Our share count assumptions are in line with consensus at 26.8M in 2020, 26.7M in 2021, and 26.6M in 2022. Finally, we expect non-GAAP diluted EPS of 2.26, 2.35, and 2.84 in 2020, 2021, and 2022, respectively, versus the “street’s” forecast of 2.21, 2.49, and 3.28.

6. Valuation

At \$150.77, PRLB shares trade at 46x the 2022 consensus EPS estimate of \$3.28. Our fair value estimate of \$85.07 implies a forward multiple of 30x our 2022 EPS estimate of 2.84, in-line with the company's 2-year average.

This multiple target is substantially lower than the current multiple, but we think the current level should not be maintained, for several reasons. It is somewhat puzzling that PRLB's multiple would be near all-time highs given decelerating growth rates and diminishing returns. We expect investors to rerate shares of PRLB lower as these issues become clear and as investors realize that the expectations for 2022 may be far too high. .

We also note that ETFs managed by Ark Investment Management collectively acquired ~1.5MM PRLB shares between 3/31 and 10/9. As ETFs gain assets, they buy the components of the ETF without regard to price or valuation. We suspect that forced buying by these and other ETFs is an important driver of the current PRLB earnings multiple. The problem of high passive investor ownership is that when the ETFs are forced to sell, the share price might have to decline very substantially before fundamental buyers step in to stem the decline. This should be especially true for a very high multiple company like PRLB.

7. Risks

There are several risks to our thesis. The primary risk is that PRLB's competitive moat is more significant and durable than we expect, insulating the company from its new competitors. Its competitors could also lose momentum and fail to capture further market share, for any number of reasons.

A secondary risk is that PRLB's market opportunity is far larger than we expect, blunting the impact of any competitive pressures. The company could also have more success in expanding its addressable market than we expect, through organic growth or by acquisition.

Finally, macroeconomic conditions could rebound substantially faster than is currently expected.

8. Financial Statements

a) Annual projections

<i>(thousand USD)</i>	2018	2019	2020e	2021e	2022e
GAAP					
Injection molding	210,523	217,415	212,701	218,377	231,098
CNC machining	153,521	155,473	133,590	144,828	152,472
3D printing	53,342	61,352	60,721	65,996	73,328
Sheet metal	24,998	21,000	20,032	21,221	22,812
Other	3,212	3,488	3,866	4,000	4,000
Total revenue	445,596	458,728	430,910	454,423	483,710
Cost of revenue	206,917	223,438	216,524	224,939	237,018
Gross profit	238,679	235,290	214,385	229,483	246,692
Marketing & Sales	68,533	72,976	69,011	72,708	77,394
R&D	28,735	32,692	34,792	38,172	38,697
G&A	52,513	49,766	51,527	54,985	50,790
Operating income	88,898	79,856	59,056	63,619	79,812
Other income, net	2,757	1,337	2,271	2,000	2,000
Pretax income	91,655	81,193	61,327	65,619	81,812
Income Taxes	15,067	17,538	12,639	14,436	17,999
Net income	76,588	63,655	48,688	51,183	63,814
Diluted Shares	27,279	27,049	26,823	26,745	26,630
Diluted EPS	2.81	2.35	1.82	1.91	2.40
% of sales					
Gross margin	53.6%	51.3%	49.8%	50.5%	51.0%
Marketing & Sales	15.4%	15.9%	16.0%	16.0%	16.0%
R&D	6.4%	7.1%	8.1%	8.4%	8.0%
G&A	11.8%	10.8%	12.0%	12.1%	10.5%
Operating margin	20.0%	17.4%	13.7%	14.0%	16.5%
Tax rate	16.4%	21.6%	20.6%	22.0%	22.0%
Non-GAAP					
SBC	10,928	10,781	13,272	12,000	12,000
Amortization expense	3,233	3,482	3,008	3,000	3,000
Acquisition costs	-	-	-	-	-
Asset impairment/facilities charges	-	-	-	-	-
Non-GAAP EBIT	103,059	94,119	75,336	78,619	94,812
Non-GAAP EBIT margin	23.1%	20.5%	17.5%	17.3%	19.6%
Unrealized FX loss	(380)	677	(936)	-	-
Disposal of business/legal settlement	(671)	-	-	-	-
Non-GAAP Pretax income	104,765	96,133	76,671	80,619	96,812
Income tax adjustments	(6,875)	(3,225)	(3,444)	(3,300)	(3,300)
Non-GAAP net income	82,823	75,370	60,588	62,883	75,514
Non-GAAP diluted EPS	3.04	2.79	2.26	2.35	2.84
Non-GAAP tax rate	20.9%	21.6%	21.0%	22.0%	22.0%
Depreciation expense	23,521	27,383	28,947	30,400	31,000
Interest income adjustment	(1,704)	(2,095)	(1,928)	(2,000)	(2,000)
Non-GAAP EBITDA	126,582	121,421	103,690	109,019	125,812

Y/Y%	2018	2019	2020e	2021e	2022e
GAAP					
Injection molding	8.3%	3.3%	-2.2%	2.7%	5.8%
CNC machining	48.0%	1.3%	-14.1%	8.4%	5.3%
3D printing	23.1%	15.0%	-1.0%	8.7%	11.1%
Sheet metal	1314.7%	-16.0%	-4.6%	5.9%	7.5%
Total revenue	29.3%	2.9%	-6.1%	5.5%	6.4%
Cost of revenue	37.4%	8.0%	-3.1%	3.9%	5.4%
Gross profit	23.1%	-1.4%	-8.9%	7.0%	7.5%
Marketing & Sales	20.5%	6.5%	-5.4%	5.4%	6.4%
R&D	22.0%	13.8%	6.4%	9.7%	1.4%
G&A	27.5%	-5.2%	3.5%	6.7%	-7.6%
Operating income	23.1%	-10.2%	-26.0%	7.7%	25.5%
Other income, net	24.8%	-51.5%	69.9%	-11.9%	0.0%
Pretax income	23.1%	-11.4%	-24.5%	7.0%	24.7%
Income Taxes	-33.5%	16.4%	-27.9%	14.2%	24.7%
Net income	47.9%	-16.9%	-23.5%	5.1%	24.7%
Diluted Shares	1.6%	-0.8%	-0.8%	-0.3%	-0.4%
Diluted EPS	45.6%	-16.2%	-22.9%	5.4%	25.2%
Non-GAAP					
EBIT	23.2%	-8.7%	-20.0%	4.4%	20.6%
EBITDA		-4.1%	-14.6%	5.1%	15.4%
Net income	44.2%	-9.0%	-19.6%	3.8%	20.1%
Diluted EPS	42.0%	-8.2%	-18.9%	4.1%	20.6%

b) Quarterly projections

<i>(thousand USD)</i>	Q2 20	Q3 20e	Q4 20e	Q1 21e	Q2 21e	Q3 21e	Q4 21e
GAAP							
Injection molding	57,894	50,147	49,884	53,407	54,963	54,886	55,122
CNC machining	28,760	33,301	33,644	34,722	36,288	35,899	37,920
3D printing	14,236	15,167	15,370	16,171	16,567	15,849	17,409
Sheet metal	4,669	4,752	4,962	5,790	5,136	5,085	5,210
Other	1,016	1,000	1,000	1,000	1,000	1,000	1,000
Total revenue	106,575	104,367	104,860	111,090	113,954	112,718	116,661
Cost of revenue	54,119	52,705	52,692	54,989	56,407	55,796	57,747
Gross profit	52,456	51,662	52,168	56,100	57,547	56,923	58,914
Marketing & Sales	16,936	16,907	16,987	17,774	18,233	18,035	18,666
R&D	8,648	8,558	8,599	9,332	9,572	9,468	9,799
G&A	12,521	12,420	12,478	13,442	13,788	13,639	14,116
Operating income	14,351	13,776	14,104	15,553	15,954	15,781	16,332
Other income, net	767	250	200	500	500	500	500
Pretax income	15,118	14,026	14,304	16,053	16,454	16,281	16,832
Income Taxes	2,511	3,086	3,147	3,532	3,620	3,582	3,703
Net income	12,607	10,941	11,157	12,521	12,834	12,699	13,129
Diluted Shares	26,761	26,820	26,780	26,730	26,790	26,700	26,760
Diluted EPS	0.47	0.41	0.42	0.47	0.48	0.48	0.49
% of sales							
Gross margin	49.2%	49.5%	49.8%	50.5%	50.5%	50.5%	50.5%
Marketing & Sales	15.9%	16.2%	16.2%	16.0%	16.0%	16.0%	16.0%
R&D	8.1%	8.2%	8.2%	8.4%	8.4%	8.4%	8.4%
G&A	11.7%	11.9%	11.9%	12.1%	12.1%	12.1%	12.1%
Operating margin	13.5%	13.2%	13.5%	14.0%	14.0%	14.0%	14.0%
Tax rate	16.6%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%
Non-GAAP							
SBC	3,639	3,600	3,000	3,000	3,000	3,000	3,000
Amortization expense	754	725	775	750	750	750	750
Acquisition costs	-	-	-	-	-	-	-
Asset impairment	-	-	-	-	-	-	-
Non-GAAP EBIT	18,744	18,101	17,879	19,303	19,704	19,531	20,082
Non-GAAP EBIT margin	17.6%	17.3%	17.1%	17.4%	17.3%	17.3%	17.2%
Unrealized FX loss	(139)	-	-	-	-	-	-
Disposal of business/legal settlement	-	-	-	-	-	-	-
Non-GAAP Pretax income	19,372	18,351	18,079	19,803	20,204	20,031	20,582
Income tax adjustments	(987)	(952)	(831)	(825)	(825)	(825)	(825)
Non-GAAP net income	15,874	14,314	14,101	15,446	15,759	15,624	16,054
Non-GAAP diluted EPS	0.59	0.53	0.53	0.58	0.59	0.59	0.60
Non-GAAP tax rate	18.1%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%
Depreciation expense	7,143	7,250	7,350	7,450	7,550	7,650	7,750
Interest income adjustment	(368)	(500)	(500)	(500)	(500)	(500)	(500)
Non-GAAP EBITDA	26,147	25,101	24,929	26,753	27,254	27,181	27,832

Y/Y %							
GAAP							
Injection molding	4.4%	-9.1%	-3.1%	-2.5%	-5.1%	9.5%	10.5%
CNC machining	-26.0%	-17.2%	-12.6%	-8.4%	26.2%	7.8%	12.7%
3D printing	-6.7%	-4.6%	-2.2%	1.4%	16.4%	4.5%	13.3%
Sheet metal	-14.7%	-10.0%	-5.0%	2.5%	10.0%	7.0%	5.0%
Total revenue	-8.1%	-11.1%	-6.3%	-3.5%	6.9%	8.0%	11.3%
Cost of revenue	-2.8%	-8.9%	-4.7%	-3.5%	4.2%	5.9%	9.6%
Gross profit	-12.9%	-13.3%	-7.8%	-3.4%	9.7%	10.2%	12.9%
Marketing & Sales	-12.2%	-4.0%	-3.0%	-2.2%	7.7%	6.7%	9.9%
R&D	5.9%	2.4%	5.5%	3.8%	10.7%	10.6%	14.0%
G&A	-5.2%	0.3%	9.9%	-4.7%	10.1%	9.8%	13.1%
Operating income	-26.7%	-35.2%	-27.9%	-7.6%	11.2%	14.5%	15.8%
Other income, net	-31.8%	9.6%	-187.3%	-52.6%	-34.8%	100.0%	150.0%
Pretax income	-27.0%	-34.8%	-26.0%	-10.2%	8.8%	16.1%	17.7%
Income Taxes	-44.6%	-34.5%	-24.1%	-9.3%	44.2%	16.1%	17.7%
Net income	-22.0%	-34.8%	-26.5%	-10.5%	1.8%	16.1%	17.7%
Diluted Shares	-1.0%	-0.7%	-0.6%	-0.7%	0.1%	-0.4%	-0.1%
Diluted EPS	-21.2%	-34.4%	-26.1%	-9.8%	1.7%	16.6%	17.8%
Non-GAAP							
EBIT	-21.6%	-28.6%	-16.8%	-6.4%	5.1%	7.9%	12.3%
EBITDA	-15.5%	-22.4%	-11.9%	-2.8%	4.2%	8.3%	11.6%
Net income	-17.0%	-29.9%	-17.3%	-5.2%	-0.7%	9.1%	13.8%
Diluted EPS	-16.2%	-29.5%	-16.8%	-4.5%	-0.8%	9.6%	13.9%

c) Financial metrics

<i>(\$millions)</i>						
Price	150.77					
MV	4,027					
Net Cash	175					
EV	3,851					
BV	22.47					
TBV	17.06					
	2018	2019	2020e	2021e	2022e	
Non-GAAP EBITDA	127	121	104	109	126	
Operating cash flow	123	116	105	108	121	
Capex	(87)	(62)	(65)	(70)	(75)	
Free cash flow	36	54	40	38	46	
EV/EBITDA	30.4	31.7	37.1	35.3	30.6	
EV/FCF	107.5	71.6	96.5	102.5	84.1	
EV/Sales	8.6	8.4	8.9	8.5	8.0	