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1 Executive Summary

Brösel’s engineering firm is an engineering firm that creates alternative technologies for the classroom. The company produces products for the technologically integrated classroom. The goal of the company is to make the smart classroom available to all students and teachers by producing high quality products at lower prices. The products produced are not only useful for teachers and students; they are useful for presenters and business people as well.

The products are being marketed to a wide variety of customers, primarily focusing on schools and businesses, as those are the markets that will find Brösel’s products the most useful and applicable. In order to be competitive in this market, the focus is being placed on several key areas. The goal is to use as much of the existing technology in the classroom as possible to save on waste and on purchases for the customer. The technologies that the company is producing are useable in any classroom environment that has a projector and white projection surface such as a wall, whiteboard, television or monitor, or projection screen.

Since the technology is integrable into an existing classroom, it is unnecessary to produce expensive technologies to replace other expensive ones, so the products can be sold at lower price. Along with a lower selling price, the technology combines important features together to make for fewer devices needed.

The company has a simple corporate structure. There are five main members in the company, each with many skills. Four of the five members are Electrical and Computer Engineers with minors in Mathematics or Computer Science and the last member is a Mechanical Engineer with a minor in German. All five members are confident in their abilities to produce products that fulfill a real need. Their ideas will be profitable to the capital investors as well as beneficial to customers.

Brösel’s engineering firm is requesting 600,000 dollars to begin production. This amount will cover the overhead, manufacturing, design work, utilities, and all of the start up costs through the first round of production. After this the company will begin making money and begin giving back to the investors.

2 Vision and Mission Statement

Project Brösel’s mission is to provide teachers and presenters a low-cost, portable, easy to use and set up interactive whiteboard or projection solution. This mission statement leads to the company not only kindly treating their employees, but also the end consumer. Project Brösel’s mission vision is to provide teachers with a modern interactive tool that gives every student the opportunity to a hands-on learning experience that currently comes at a very high price.
3 Industry Profile and Overview

3.1 Industry Background and Overview

The device fits primarily into the educational technology industry. This industry can be divided into hardware and software sub-sectors. On the hardware side, the industry includes equipment and technology for teachers and students that improves the experience inside the classroom and seeks to facilitate learning. Examples of this type of technology include tablets, smart projectors, and interactive whiteboards. The software sub-sector includes digital content providers, online textbooks and curriculum materials, instructional support systems which help teachers organize and plan their lessons, and administrative software which facilitates the operations of the school board and administration.

3.2 Major Customer Groups

The majority of major customers of the educational technology industry are involved with education in some form. This includes teachers, school administrators, homeschool parents, and intermediate school districts. An intermediate school district is a government agency that works at the county or multi-county level and assists school districts with various programs and services.

3.3 Regulatory Restrictions

Due to the fact that technology is improving and changing so quickly, it is difficult to create appropriate regulations without making it too broad so that it is applicable to the changing technology. Still, regulations that do exist pertain mainly to the way in which the internet is used in the classroom. Specifically, it relates to means by which to protect students from various privacy and security issues while other regulations deal with the copyright issues relating to online curriculum and virtual learning environments.

3.4 Significant Trends

As technology becomes a more prominent part of everyday life, educational technology plays an increasingly large role in society and, more specifically, in the classroom. Some of the industry-specific trends are an increase in video and an increase in virtual learning.

Videos, whether it be from YouTube, Khan Academy, or some other education-related source, are becoming more predominant in a teacher’s lesson plan as, according to a 2013 study conducted by Project Tomorrow, a national education nonprofit group based in Irvine, California, 46% of teachers use videos.

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1 http://www.datafox.co/blog/2014/04/educational-technology-industry-analysis-key-players-future-trends/
2 https://www2.ed.gov/rschstat/eval/tech/20years.pdf
3 http://www.tomorrow.org/about/mission.html
videos as part of their lessons. According to the same survey, 33% of students use online videos as a study tool to help reinforce material presented in the classroom and 23% of students access video material created by their teachers.

Virtual learning, whether in K-12 education or in online courses at the university level, is an increasingly popular alternative to the traditional classroom setting as more and more students believe that they may be able get better individualized support from an online teacher than they would through in-person learning. Math was the most popular subject to study online while foreign language was second and science was third.

3.5 Growth Rate

North America is currently the largest market for education technology as it represents approximately 60% of total revenues. However, the market in the rest of the world is expected to grow faster between 2015 and 2017 as the compound annual growth rate outside of North America is expected to increase from 24.3% in 2012 to 26.9% in 2017. In contrast, the growth rate in North America will only be 15.2% although it is expected to remain the largest market for educational technology as the industry is expected to create $89.9 billion of revenue in 2017.

3.6 Barriers to Entry and Exit

Some of the primary barriers to entry into the educational technology industry are the fact that some areas of the world have difficulty getting a broadband internet connection and cutbacks in government spending on education.

3.7 Key Success Factors in the Industry

In order to succeed in the educational technology industry, it is important for the technology to be easy to use and reliable. Educators do not want to spend a lot of time fidgeting with technology as it takes away from time spent interacting with students and, as such, if the technology is not easy and intuitive to use, it will not be used.

As with any industry, it is also important to differentiate your product from other products within the industry. As the global value of the educational technology industry is expected to be $220 billion in 2017, there are a good number of competitors and yet still a good amount of opportunity for entering the industry. This means that marketing and market research will be crucial to success within the industry.

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5 http://www.datafox.co/blog/educational-technology-industry-analysis-key-players-future-trends/
6 http://www.investopedia.com/terms/e/economiesofscale.asp
3.8 Outlook for the Future

The educational technology industry is still very much in its infancy as technology represents only 1.6% of the total expenditure on education. As technology improves and plays an increasingly prominent role in society, educational technology has the opportunity to become a normal and integrated part of the classroom.

4 Business Strategy

4.1 Desired Image and Position in Market

The company hopes to be perceived by customers as a caring company that will bring interactive whiteboard technology to lectures and classrooms at a reasonable price while providing a wide array of functions and features. Project Brösel will not be initially thought of as a company that provides products with new, cutting edge technology. Instead, the customers will perceive the company as an organization that finds creative and reliable solutions that integrate two very interactive computer controllers to reduce both the economic and environmental cost to current technologies on the market.

This image will mean that the company will position itself at the bottom of the market due to not having the reputation and pedigree of well established name-brand companies currently in the market. However, current solutions on the market that provide a large array of functions and features come with a very large price tag. The company hopes to provide the same level of functionality and a higher level of versatility as current solutions at half the price. This will give the company the best advantage to enter into the market. In future years when the company controls some amount of market share for interactive whiteboards, the company is looking to then start expanding into more cutting-edge solutions to interactive whiteboard technology in order to increase market share.

4.2 Company Goals and Objectives

The goal of the company is to decrease the environmental and economic costs of interactive whiteboards. To accomplish this goal, the company objectives will include creating a working prototype by May of an interactive whiteboard that will provide the same functions of current interactive whiteboards as a fraction of the cost.

4.2.1 Operational

Operational goals of the company include plans for the expansion of the company. In order to remain competitive in a relatively new and growing industry, the company must continue to innovate. In order to achieve many of the stretch goals for this year’s project, the company must expand in order to release new features and quality products in a timely fashion. This would involve the hiring of additional
software programmers, engineers, and the formation of a Research and Development Department. While this goal may be long term, the company will continually make decisions with this goal in mind.

4.2.2 Financial
The primary financial goal of Project Brösel is to start making a profit in three years. Another goal of the company is to be able to sell the final product at a discounted price to teachers and educators in order to achieve the vision of making interactive technologies available to the world.

4.3 SWOT Analysis

4.3.1 Internal Strengths
Brösel’s Engineering Firm has several advantages over the competing companies. One is that the engineering staff is new and has lots of fresh ideas on how to enter and serve the market. Another advantage is having its engineers and employees be students during this time of change in the classroom and seeing the shift to an interactive classroom. Since the employees are students, they have a strong understanding of technology’s role in education. Additionally, the company has a goal that is unique from any other company and that is to create a full service product for a dramatically reduced price.

4.3.2 Internal Weaknesses
The biggest weakness for Brösel’s engineering team is that it lacks the experience and the funds that competitors in the industry possess. It is a starting firm that does not have the resources to put into research and development. In addition, the firm’s engineering staff are recent graduates. This means there will be mistakes that are made that could be avoided should the staff have more experience.

4.3.3 External Opportunities
The market of interactive whiteboards has very little to provide as alternatives to the expensive name-brand solutions. Solutions that provide a similar suite of features do not do much to reduce the price for the solution while solutions that advertise a lower priced solution do not provide the same level of functionality as the leaders in the industry. Very few solutions aim to solve the problem of the lack of portability of interactive whiteboard solutions and those that do fall into one of two categories. Either way, they do not provide the same level of functionality or they require set ups that expose flaws in the technology. All of this provides an opportunity for the company’s product to be first in the industry that is competitive in the number of features while providing a low cost alternative.

4.3.4 External Threats
Possibly the largest threat to the company is the competitive advantage of the existing companies. The large companies in the existing market have wide customer bases and they have the trust of those customers. Getting a corner of that market will be difficult for the company but through differentiation, product integration, and a lower cost, the company hopes to gain a following and a portion of the market.
Another threat is to achieve the goal of being portable and having a wide range of features. To achieve this goal, the product has to come in three or more pieces. Other solutions could boast fewer components in their system that provide benefits such as, less battery levels to manage, a lower set-up time, or more user-friendly and intuitive system.

4.4 Competitive Strategy

The strategy to get a foot in and succeed in this market is to focus on the potential interactive whiteboard customers that cannot afford the technology at the going rate. Many educational institutions could debate for extended periods of time to make the decision of whether or not to buy an interactive whiteboard solution. In most cases, the majority of the debate comes down to the overall cost of the investment and if the benefits and rewards of the technology outweigh the risk and cost.

4.4.1 Cost Leadership

The company will differentiate its product through pricing. The product will reach its customers by providing an inexpensive product compared to what is currently on the market. The company will also differentiate itself by quickly delivering the product as the product will require minimal setup time.

4.4.2 Differentiation

Differentiation is of utmost importance in this market. If the company cannot provide a product that stands out in a crowded market, customers will default to the well established name-brand competitor. The company looks to differentiate itself through providing a product that leads in being versatile and portable while containing a large suite of features. The primary focus in the differentiation is to provide a solution that not only works on whiteboards, but can be easily modified to interface with projection screens as well as computer monitors through an intuitive magnetic clip system.

4.4.3 Response

Project Brösel also looks to compete on response. The company plans on doing this once the product is initially released. In many industries, a slow response to bugs, flaws, or customer feedback can ruin a company or product. The company looks to not only respond to customer feedback quickly but to also take that feedback and provide new quality features at a rate faster than that of the competition.

5 Company Products and Services

5.1 Description

As previously described, the product is a computer interface system that simulates a virtual whiteboard. Essentially, the user will hold a device which will act as a pen and the user will be able to simulate the
act of writing, through motion tracking technology. Software will take the user’s input movement and convert it into a live update in the form of virtual ink or the motion of the mouse on the computer.

Even though there are solutions similar to the device being produced by Brösel, the device is unique in ways that make it a viable product. The main differences are the price, the portability, the minimization of hardware, and the ease of installation and use. Current solutions, such as the SMARTBoard®, require the installation of a large board. Brösel, on the other hand, consists of only small peripheral sensors, a pen, and the wireless communication with the computer.

The benefit of this hardware minimization is a product that is much simpler to both install and use. Customers who come from schools with low classroom budgets will benefit from this product since they will be able to get the same functionality of a SMARTBoard® at a fraction of the price.

Fully confident in their product, the management of Brösel is willing to extend a two-year warranty to anyone who purchases their product. If the device stops functioning within two years, Brösel will replace the product with no questions asked on the condition that the user ships back the old product.

5.2 Patent or Trademark Protection

In order to protect the intellectual property of Project Brösel, a request for a design patent should be placed on the system. While this has an application cost of approximately $1,500, the return on investment would be substantial as Project Brösel would have the sole rights to manufacture and sell the system for fourteen years. With the growth of the educational technology industry, it is not unreasonable to think that a competitor may wish to design a similar system to the company’s but, by placing a patent on it, Project Brösel is ensured that they will receive all revenue from sales of the system.

5.3 Future Product or Service Offerings

The current model of Project Brösel allows for the functionality of one writing device per sensor network. Future models may be developed to accommodate for the use of multiple writing devices being used simultaneously. Another possibility of the system which may be incorporated in a future version is the option for remote partnership. What this means is that the Brösel design may be able to link up with another school who, using their own Brösel system, will be able to communicate back and forth via messages written on the board.

6 Marketing Strategy

6.1 Target Market

This device is targeting the educational system or any institution ranging from kindergarten to a university level. This means that the product must appeal to three different groups: administrators,
teachers, and students of various ages. The administrators are the customers with whom the company will be dealing. They are the ones that control what the school will buy for the classrooms. In addition to the administrators, targeting the teachers will help convince administrators to purchase products from Brösel. The students and the teachers are the final consumers or the ones using the product. Marketing directly to them will help convince the administrators to purchase Brösel products.

6.1.1 Problem to be solved or benefit to be offered

Brösel provides benefits to schools by enhancing both students’ engagement and interaction in the classroom. Brösel allows the teacher to interact with the lecture slides by writing notes in the margins or even over the slides themselves. These notes can then be saved to reference at a future time if any questions arise later in class or if a student was absent that day. The extra notes written in a presentation will provide a better understanding to the students of the material and enhance their learning experience. This device also allows the presenter to use less devices when presenting. The presenters do not need a clicker to change slides or a special stylus to write on the board; all of these things are bundled into one device.

Brösel aims to remove the phrase budget constraints or lack of funding from the decision to buy an interactive whiteboard. The selling price of the product will be well below the competitors selling price. This will provide schools with an inexpensive project while still providing the schools with digital whiteboard technology that will enhance the learning environment.

6.1.2 Demographic profile

The demographic breakdown of the customers will consist of the baby boomers, generation X and generation Y. These generations span the ages from 15 to 51 years old. The average age of administrators, according to the Institute of Education Sciences, is 50 and is made up with approximately a 50/50 split between males and females. The administrators in the target market are late baby boomers and early generation X. This means that majority of people in the generation prefer fixes with little change and instant improvement. They also are the “explorers of technology” or the generations that did not grow up with technology but are willing to adapt to it. The demographic of the teachers will be generation X and generation Y. However, the teachers will not be the end of generation Y because they are not old enough to have teaching jobs yet. As stated previously, they are only 15 years old. These generations will be the most acceptable to technology and will be most willing to use it.

6.2 Customer's Motivation to Buy

The customers will be people that are a part of the educational or business community who frequently give presentations or lectures. They will be motivated to purchase an interactive whiteboard because the interactive functions help better convey the presenter’s ideas. The interactive whiteboard users will be motivated to purchase the Brösel instead of the competitors because Brösel offers the same functionality at a low cost.

7 http://www.socialmarketing.org/newsletter/features/generation3.htm
6.3 Market Size and Trends

The interactive whiteboard market growth has slowed down since 2009. However, the market is still expected to continue to grow by 7% between 2012 and 2016. This indicates that the interactive whiteboard technology is beginning to enter into its maturity phase and leave the growth phase of the product lifecycle. The consumer market within this industry is attracted to new functionality or features in an interactive whiteboard. Current interactive whiteboards can have multiple users and can operate with the user’s finger or a pen; these new functions are believed to be creating growth in the interactive whiteboard market.

6.4 Advertising and Promotion

The majority of the advertising will be conducted online to reach the students and teachers. The majority of teachers will be easier to reach through the internet because the majority of the teachers are a part of generation X or generation Y. Thus, one of the best methods for reaching them will be through online measures such as social media or google ads. The ads on google or social media will be aimed at the teachers and not the students because teachers have the buying power within the schools. Social media will be used to get Brösel’s name out on the market and get the consumer talking about the product.

The school administrators will be harder to reach than the teachers and students; however, they control the majority of the buying power. The best way to reach this target market is through directly advertising to them. Direct advertising means calling and networking with school administrators.

6.4.1 Message

The Brösel’s message will be in that it cares about presenters. The message informs the customer that the brand cares about them. The purpose of the brand is to provide presenters with a low cost interactive whiteboard solution that will better engage their audience. This message fits in well with the brand name because Brösel means bread crumbs in german. The device or Brösel acts like breadcrumbs for the presenter to use to leave a trail for the audience to follow throughout their presentation.

6.4.2 Media

The method for advertising to the target market will be social media, internet ads, and direct sales. The social media and internet ads will be used to target the teachers because generations X and Y are easier to target through the internet. The direct sales approach will be used for the administrators because they are the older generation and are less receptive to online marketing techniques. Also, the administrators typically ignore any fliers or advertisements they receive concerning educational materials. Thus, the best form of marketing is directly advertise to the administrators.

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6.4.3 Budget

The marketing budget will amount to 40,000 dollars and will be used for contracting a marketer and for advertising expenses. Approximately 25,000 dollars will be used to contract a marketer part time to handle and advise the majority of the marketing strategy. The marketer will control the social media image of the company. Then, the final 15,000 dollars will be used for marketing expenses such as online ads, and any travel expenses needed for meeting potential customers if needed. The online ads will include google ads and social media ads. After the first year, the marketing strategy will be analysis and revisions as necessary including revisions in the budget. Marketing performance will be evaluated on sales during different marketing campaigns.

6.5 Pricing

The competitors’ prices range from 1,000 to 10,000 dollars. The lower price range, 1,000 to 5,000 dollars, are typically the cheaper whiteboards that require a battery operated pen and only one user can operate the board. The higher range product will allow the user to use either the pen or finger and they can handle multiple users at once. Brösel is aimed to be priced around 200 dollars per unit. The reason for the high cost in competitors’ products is because their product includes a new whiteboard with their respective sensor network integrated with the board whereas Brösel will retrofit the already existing whiteboard. Brösel gives customers a low cost alternative to other interactive board technology. The low cost will help place Brösel in the customers minds as a caring company whose mission is to deliver a quality interactive whiteboard at a low price. With the low price, the company is anticipating about a 30% gross profit margin.

6.5.3 Discount policy

Brösel is planned to sell at the lowest price possible while maintaining a financially stable company. This means continuously providing the lowest price to clients. However, to achieve the goal of making this technology available to as many classrooms as possible and that all students have access to the tools they need to succeed, a discount will be given to educators and educational institutions. The products would be provided at a maximum discount of 20% depending on the order size.

6.6 Distribution Strategy - Channels of Distribution

The company will manufacture the product and then directly sell to consumers. The selling environment will be conducted through the internet. The direct distribution approach is to reduce cost and provide the customer with whatever necessary information they need about the product. The system is small enough to ship to the customer via FedEx.
7 Competitive Analysis

The main competitors of Brösel are companies who are taking steps to bring the classroom into the twenty-first century. The main competitors are SMARTBoard®, Promethean Board®, and Epson BrightLink®. The products function similarly to one another but SMARTBoard® and Promethean Board® require a physical board to be connected to the projector. The Epson BrightLink® allows interaction while being projected on any surface making it more like the product Brösel offers than that of SMART Technologies or Promethean. Comparisons of the three main competitors shown in Table 1 which highlights the price of each unit and projection surface.

Table 1: Summary of Brösel Competition

<table>
<thead>
<tr>
<th>Device</th>
<th>Manufacturer</th>
<th>Projection Surface</th>
<th>Unit Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>SmartBoard</td>
<td>Smart Technologies</td>
<td>Smartboard Interactive Whiteboard</td>
<td>$4 - 11K</td>
</tr>
<tr>
<td>Promethean Board</td>
<td>Promethean</td>
<td>Promethean Interactive Whiteboard</td>
<td>$4.6 - 5K</td>
</tr>
<tr>
<td>BrightLink</td>
<td>Epson</td>
<td>Any Surface</td>
<td>$1.5 - 3.5K</td>
</tr>
</tbody>
</table>

7.1 Existing Competitors

7.1.1 SMARTBoard®

SMARTBoard® controls a significant portion of the K-12 interactive whiteboard market. SMARTBoard® offers a variety of options including screen sizes and resolutions, projector options, additional pens or erasers to increase the ease of use. SMARTBoard® arguably has the most recognizable brand for this product in terms of interactive whiteboards.

7.1.2 Promethean Board®

Promethean Board® also controls a significant portion of K-12 interactive whiteboard market. They offer extra software specifically to work with PowerPoint to improve the learning environment in the classroom. Purchase of a Promethean board includes access to a large database of online training and software improvements.

7.1.3 Epson BrightLink®

Epson is a renowned projector manufacturer with a large consumer base and proven expertise. They offer many projector options which can work with any surface or projected on a dedicated board for increased precision.
7.2 Potential Competitors: Companies that Might Enter the Market

7.2.1 Apple TV
Apple TV is currently involved in app and computer mirroring with innovation in classroom involvement. They are aiming for a technology where multiple different applications can be used simultaneously. Apple TV can connect with multiple different outputs including both TVs and projectors. Apple TV has been used in classrooms to improve the classroom experience and it may be possible that Apple expands Apple TV to further innovate the classroom.

7.2.2 Chromecast
Chromecast, like Apple TV, offers connectivity between your smartphone or computer to a projector. Currently, Chromecast, produced by Google, allows for easy connection between the teacher or student with the classroom. They currently support seamless integration with many smartphone and computer applications and may eventually transform this into an interactive classroom.

8 Description of Management Team

8.1 Key Managers and Employees
Managers for Brösel include the four lead engineers for the project: Kegan Leberman, Nathan Leduc, Chad Malinowski, and Tom Van Noord as well as business consultant Ryan Beezhold. Beezhold, a junior engineering student at Calvin College, partnered with Brösel in order to create the business plan for the company.

8.1.1 Their Backgrounds
Nathan is a senior at Calvin College and is planning on graduating in May 2016 with a Bachelors of Science in Engineering with a concentration in Electrical and Computer Engineering. He grew up as a missionary kid and is an American and Canadian dual-citizen who was born in England and spent nine years growing up in France. He hopes to pursue a career in controls or in hardware development and is hoping that, some day, his career takes him back overseas. Outside of engineering, Nathan enjoys rock climbing, spending time with his friends and girlfriend, and never refuses an opportunity to travel.

Chad is a senior engineer in the Electrical and Computer engineering program at Calvin College. He grew up in Ada, Michigan. In the summer of 2015, Chad had the opportunity to work as a research intern at Carnegie Mellon University. Chad’s research focus was on hardware security. He analyzed industrial data and designed a circuit which would be able to identify a single microchip. He interests are in controls or embedded systems.
Kegan Leberman is a senior at Calvin College. He is currently pursuing a degree in Electrical and Computer Engineering and a minor in Mathematics. Kegan is from Manchester, New Hampshire. His hope is to graduate and move on to professional work in embedded systems and digital systems design.

Tom Van Noord is a senior engineering student at Calvin College in the Electrical Computer concentration. His hometown is Grand Rapids, Michigan specifically the Ada/Lowell area. His main interests lie in embedded systems and robotics. He hopes to go on to work in a field involving robotics, automotive, medical, or electric vehicles.

Ryan is a junior engineering student at Calvin College and is planning on graduating in May of 2017 with a Bachelors of Science in Engineering with a concentration in Mechanical engineering and a Bachelors of Arts in German. He speaks fluent German and has worked closely with Germany while he worked at Bosch as a summer intern working in Quality management. He grew up in Grand Rapids, Michigan. He hopes to pursue a career in design engineering and hopes to have an opportunity to connect internationally.

8.1.2 Experience, Skills, and Know-How they bring to the company
Each of these engineers bring the experience of designing digital and embedded systems from their education at Calvin College. Each also has the experience of seeing their respective middle and high schools go through the transformation to an interactive classroom and begin the process of investing in interactive whiteboard solutions.

8.2 Resumes of Key Managers and Employees
See Appendix A for resumes of key managers and employees.

8.3 Future Additions to Management Team
Future additions to the management team may include a plant manager if the company decides to manufacture the product and an engineer hired to start up and oversee the Research and Development division of the company. One key addition to the team will be a marketing consultant to help the company sell its product effectively. Outside of this addition, future additions would fall into non-managerial positions as the company looks to expand the quality and feature set of the software.

8.4 Board of Directors or Advisers
At the current and short-term predicted size of the company, Project Brösel’s board of directors will consist of the lead engineers, Kegan Leberman, Nathan Leduc, Chad Malinowski, and Thomas Van Noord. Currently, the sole advisor to the project is Ryan Beezhold who has aided in the formation of this business plan.
9 Operations

9.1 Legal Form of Ownership Chosen and Rationale

The company will be a limited liability company (LLC). This will offer limited liability protection to the owners of the company so that debts and liabilities of the company are not the personal responsibility of the owners, meaning that the assets of the owners are separate from that of the company. Forming this type of company will also help display a formal commitment towards the business and help establish credibility with potential customers or employees. This model also has few restrictions on leadership, meaning that there are no restrictions on who can be an owner or how many owners of the company there can be. An LLC also has fewer restrictions allowing for more flexibility and making it easy to sell the company if the owners decide to exit the business. In addition to that, an LLC does not normally pay taxes at a business level, but rather any business income or loss is passed through to the owners and reported on their personal tax returns.

9.2 Company Structure

![Organisational Chart for Brösel LLC](image)

9.3 Decision Making Authority

The Vice President of Finance and the Vice President of Sales and Marketing will make decisions on how to manage their respective teams. Within the engineering department, the Design Manager will be in charge and decide how to manage the hardware, software and prototype, and validation teams. However, large engineering decisions such as design modifications must be made in collaboration with the Vice President of Engineering. The Manufacturing Manager will make all decisions regarding the manufacturing process from start to finish, including logistics. Large company wide decisions are to be made in collaboration between the three Vice Presidents and the President of the company, however the President has the authority to make the final decision.
9.4 Significant Compensation and Benefits Packages

Due to the small size of the company and the young nature of the operation, competitive wages will be hard to match so new employees will be offered fair compensation but may be lower than that of comparable companies. For full time employees, they will receive one week vacation for the first year increasing to two weeks after the first year, and further increasing to three after the fifth year and another week added every five years that the employee stays with the company until 5 weeks of vacation time is accrued. The company will also offer full time employees medical insurance and a matching 401k plan.

9.5 Description of Production or Process

The production process will be simple. The PCB fabrication will be outsourced to external companies. When received from the company, the products will be assembled and tested in-house before being sent to the buyer. The boards and components will be ordered in lots of 1,000 to get a bulk order discount and save additional costs.

9.5.1 Raw Materials and Costs

The price of raw materials is significantly reduced as the quantity bought is increased, however this may not always be economically feasible due to customer demand. Using a demand pull strategy, it may be necessary to decrease the cost of the raw materials if the demand is high enough, but when entering the market it may be the case that such high quantities are not always required.

<table>
<thead>
<tr>
<th>Parts</th>
<th>Quantity</th>
<th>Cost (single)</th>
<th>Cost (thousand)</th>
<th>Total (single)</th>
<th>Total (thousand)</th>
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<td>Camera</td>
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<td>0.76</td>
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<td>0.99</td>
<td>0.26</td>
<td>0.99</td>
<td>0.26</td>
</tr>
</tbody>
</table>

Table 2: Raw materials and Costs for single and bulk purchases

Part Cost/Unit: 61.38 36.39
9.5.2 Key Supply Chain Components

The supply chains that are key to the components are the PCB manufacturer, the component suppliers, and the plastic case supplier. The production of new devices is dependent on having these three aspects of the product readily available.

9.6 Facilities

The ideal location for the facility would be near Grand Rapids or Holland, Michigan. Due to the target market being schools, the facility location is based on preference and local connections with whom the company could expand their business further. The building would have office space for engineering teams as well as the sales, marketing and finance teams. The facility would also require a mid-to-small sized production space to produce the product. If the company were to expand, it could be the case that a headquarters location would be built in which engineering, sales, marketing, and finances operate and several separate production locations both in and out of state would handle the manufacturing process.

10 Financial Forecasts

10.1 Key Assumptions

The company is assuming that it will be able to sell approximately fifteen percent of the number of units that the largest competitor is able to sell. The largest competitor sold an estimated 40,400 units in the past year. Using this number, the company is estimating an annual sales number of 6,060 units. The assumptions that go along with this number are that the company has sufficient capability to produce the needed number of units in the year and that each of these units is sold. The company also assumes that the current facilities are sufficient for the needed production volume and design space. One last assumption is that sales will increase each year by approximately five percent.

10.2 Financial Statements

The income statement for Brösel’s Engineering Firm, LLC takes into account several different factors. As the company is an LLC, there are no direct income taxes on the company. Instead, the income of the company is claimed by the owners of the company and placed on their personal income tax statements. Therefore, there is no direct income tax reported on the company’s income statement.\(^\text{10}\) The statement focuses on the costs and profits of the company and reports several different values representing the annual revenue and revenue over the first three years of operation.

\(^\text{10}\) http://www.nolo.com/legal-encyclopedia/how-llcs-are-taxed-29675.html
The cash flow statement and the break-even analysis are also indicative of the company’s progress. Cash flow takes into account the operations, investing, financing and increase in cash.\textsuperscript{11} The break-even analysis shows where and when the company moves from the red and into the black. See Appendix B for tables and values of the financial statements. In order to calculate the price of the device, the team took several financial aspects into account including, but not limited to, the overhead costs of the company, the salaries, the cost of materials, and the cost of operation for the business. These factors were all taken into account and calculated for the first year of operation. Using these values, it was possible to find the needed amount for the startup loan of the company. The calculations can be seen in Appendix B.

11 Loan or Investment Proposal

The original cash request for the company is 600,000 dollars. This amount will pay for the first year of operations including utilities, overhead, machines, salaries, and everything needed for the company to operate effectively over the first year.

The company feels that it will have a customer base large enough after that year to be self sustained and to systematically pay off the loan. The business launch plan is as follows. The launch of the business will be in early January, 2016. This launch date is early enough to begin beta testing the product during the end of the school year. During the summer of 2016, the design teams will be focusing on perfecting the product. The product will go on sale in July 2016 to allow educators to become familiar with the product.

After the first round of production, the design team will continue to make changes and updates to the software and the hardware working towards a better second revision of the product. As sales increase, the business will begin paying back loans. The company chooses to perform a principal and interest repayment strategy, paying the principal and the interest back each month.

A typical small business loan has an interest rate ranging from 3.78% to 4.44%, according to regulations established by the Small Business Administration (SBA).\textsuperscript{12} While most SBA loans require the business to be in business for 2 years, Brösel’s engineering firm is hopeful that they can find one or more private investors who is willing to loan a total of 600,000 dollars to the company. Assuming a worst-case SBA interest rate of 4.44%, it would be possible to repay the loan over a course of 7 years by paying 100,000 dollars a year or 8,341 dollars per month.

\textsuperscript{11} http://www.investopedia.com/terms/c/cashflow.asp
\textsuperscript{12} http://fitsmallbusiness.com/sba-loan-rates/
12 Appendices

Appendix A: Resumes of Key Managers and Employees

Appendix B: Financial Statements and Product Price Estimations
Appendix A: Resumes of Key Managers and Employees

Ryan Beezhold

6783 Forest Valley Drive, Grand Rapids, Michigan 49546 | 616-295-6719 | rpb22@student.calvin.edu

Objective
- Third-Year Mechanical engineering student with senior status seeking a full-time summer internship. I am looking to gain real world experience while positively contributing to the company.

Education
CALVIN COLLEGE, GRAND RAPIDS, MICHIGAN
Bachelor of Science in Engineering, BSE International Mechanical Concentration, Anticipated 2017
Bachelor of Arts in German, Anticipated 2017
- Overall GPA: 3.7, Dean’s list every Semester
TECHNICAL UNIVERSITY OF BERLIN, BERLIN GERMANY, SUMMER OF 2013
- Course work in engineering and German language and culture.
GRAND RAPIDS CHRISTIAN HIGH SCHOOL, GRAND RAPIDS, MICHIGAN, 2013
- Overall GPA – 3.7/4.0, Varsity Swimming, 4 years, Team Captain

Technical Courses
- Intro to Engineering Design
- Graphical Communication Lab
- General Chemistry
- Calculus I, II, and III
- Physics: Electricity and Magnetism
- Differential Equations with Linear Algebra
- Statics
- Mechanics of Materials
- Calculus: Mechanics and Gravity
- Applications
- Engineering Chemistry and Material Science
- Thermodynamics I, II

Computer Skills
- Microsoft Office
- AutoCAD
- Autodesk Inventor
- Python
- Mathcad
- Polyworks
- Quartzes
- Eclipse
- Adobe Photoshop

Experience
INTERN QMM | ROBERT BOSCH LLC | JUNE 2015 - PRESENT
- Worked with various aspects of QMM at Bosch including customer returns, guidelines and standards, calibration, product audits, and dimensional layouts.

GERMAN CONVERSATION GROUP LEADER | CALVIN COLLEGE GERMAN DEPARTMENT | 2014-2015

SCHOOL YEAR
- Led conversation groups for lower level speakers in the German program at Calvin College
LIFEGUARD | CALVIN COLLEGE | 2013-2015
- Acted as lifeguard for the Calvin College pool

MACHINE WORKER | TUFF COVER INC. | JUNE 2012 AUGUST 2012
- Cut and assembled covers for automobile companies to use during shipment of parts.

About Me
I speak fluent German and enjoy speaking with people of all different languages and backgrounds. I jump at any opportunity to continue my learning. I enjoy designing and perfecting things, and striving to be the best that I can be. I am a hard worker and always see things through to the end.

References
David Wunder
Engineering Professor, Calvin College
616-526-6337
dbw4@calvin.edu

Diane Jenks
Quality Manager, QMM
Robert Bosch LLC
616-558-6595
diane.jenks@us.bosch.com

Pennyllyn Dyylestra-Pruim, Ph.D.
Professor, Department of Germanic & Asian Languages,
Calvin College, 616-526-8866
pdpruim@calvin.edu
Kegan Leberman
kmilo81293@hotmail.com (603) 714-2635

Current Address:
1901 Rowland Ave SE
Grand Rapids, MI 49546

Permanent Address:
49 Beech Plum Drive
Manchester, NH 03109

Objective
Engineering senior seeking full time employment in Electrical and Computer Engineering starting in the summer of 2016.

Education
Calvin College – Grand Rapids, MI
Bachelor of Science in Engineering, Electrical/Computer Concentration
May 2016
Minor in Computer Science
Overall GPA: 3.2/4.0; Math, Science, and Engineering GPA: 3.5/4.0

Technical Courses
- Electrical Devices and Circuits
- Fundamentals of Digital Systems
- Analog Circuits and Systems Design
- Electrical Signals and Systems
- Statics and Dynamics
- Calculus I, II, III
- Physics: Mechanics and Gravity
- Physics: Electricity and Magnetism
- Materials Science and Chemistry
- Intro to C++ and Data Structures
- Operating Systems and Networking
- Differential Equations/Linear Algebra

Work Experience
DEKA Research and Development – Manchester, NH Summer 2015
Intern
Designed, programmed, and performed long term lithium-ion battery tests and fault insertion testing on multiple medical devices.

Calvin College Theatre Company – Grand Rapids, MI January 2013 – May 2016
Student Carpenter/Scenic Assistant
Designed and constructed scenic sets and large props for company shows and performances.

McDonald’s – Manchester, NH August 2010 – December 2015
Crew Trainer
Trained new employees on basic and specialized skills to start work. Experienced in customer service, employee training, and managerial training.

Computer Skills
- FPGA
- AutoCad
- AutoDesk Inventor
- Windows, Mac, and Linux
- Microsoft Visio and Office
- C/C++, Python, VHDL
- Matlab
- MathCad

About Me
  - In 2011 and 2012, charged with leading the design and construction of the chassis and drive systems.
  - In 2012, elected Chief Mechanical Engineer with responsibility of overseeing the entire build process.
- Built a desktop computer for personal use from individually bought components.

References
Mike Baier, Electrical Engineering Lead – DEKA Research and Development, (603) 545 – 5233, mjbair@gmail.com
Professor Ned Nielson, Calvin College – Professor of Engineering, (616) 526 - 6440, nnelson@calvin.edu
Steve Haase, Technical Director – Calvin College, (616) 526 – 7807, sh42@calvin.edu
NATHAN LEDUC

Current Address
1849 Covington Drive, SE
Grand Rapids, MI 49506
(215) 796-7161
nrl3@students.calvin.edu

Permanent Address
9861 Mountain Lake Drive
Orlando, FL 32832

EDUCATION
Calvin College – Grand Rapids, MI, Graduating May 2016
Bachelor of Science in Engineering – International Electrical Concentration
Minor in Mathematics
GPA: 3.84/4.00

Technical University of Berlin – Berlin, Germany, Summer of 2013
Course work in engineering and German language and culture

COURSES
Calvin College – Grand Rapids, MI
- Circuit Analysis and Electronics
- Electronic Devices and Circuits
- Analog Circuits and Systems Design
- Engineering Chemistry and Materials Science
- Engineering Electromagnetics
- Intro to Computing
- Calculus I, II, and III
- Complex Variables

- Electrical Signals and Systems
- Fundamentals of Digital Systems
- Advanced Linear Algebra
- Computer Architecture and Digital Systems Design
- Intro to Data Structures with C++
- Control Systems
- Differential Equations with Linear Algebra

COMPUTER SKILLS
AutoCAD, Autodesk Inventor, Microsoft Office, Java, C++, C, MathCAD, R
Quartus, PSPice, MATLAB, EagleCAD, MIPS Assembly Language, VHDL, PLC

WORK EXPERIENCE
Calvin College, Resident Assistant – Grand Rapids, MI
August 2014 – May 2015
- Maintained the physical and mental health of 40 individuals in the residence hall

Highlight Industries, Electrical Engineering Intern – Grand Rapids, MI
June 2015 – May 2016
- Oversaw the production line of automated stretch-wrapping equipment
- Diagnosed and repaired mechanical and electrical faults in refurbished machines

Senior Design Project – Calvin College, Grand Rapids, MI
- Designing a gesture controlled computer interface system that doubles as a presentation aid for real-time editing

OTHER
- Fluent in French
- US Citizen
- IEEE Member
- Conversational in German

REFERENCES
- Laura Rodelheaver · Van Gelder · Calvin College Resident Director,
  lvangelder@ccc1t, +370 654 38205 (UTC + 02:00)
- Randy Broemer · Calvin College Engineering Professor,
  bror@calvin.edu, 616-526-0787
- Randy Hiemstra · Production Manager at Highlight Industries,
  randyr@highlightindustries.com,
  616-531-2464 ext. 210

23
Chad Malinowski

Address: 9301 Conservation NE
Ada, MI 49301
Phone: 616-337-1487
Email: chadmalski@gmail.com

Education
Calvin College, Grand Rapids, MI (Graduating May 2016)
BSE in Electrical and Computer Engineering with Honors
Minors: Computer Science, Business and Mathematics
GPA: 3.659

Studied at Technical University of Berlin, Berlin Germany, summer of 2013
Course work in engineering and German language and culture

Engineering Courses Completed by Graduation:

Computer Languages
C, C++, Python, VHDL, Assembly,
MATLAB, C#

Computer Programs
Quartus, EagleCAD, Pspice, AutoCAD, Rhino,
Inventor, Microsoft Office

Projects
Senior Design Project: A new computer interface device (Fall 2015-Spring 2016)
• Design a board less SMART Board
• Project leader
Research power converters to design efficient converter to power a LED (Spring 2015)
• Designed and constructed a step-down Buck converter
Design a laboratory for future Electrical Signals & Systems classes (Fall of 2014)
• Programed TI’s DSP to filter noise out of music
Developed marketing strategy for BoldSock’s Statement brand (Fall of 2014)
• Worked with a team to enhance their online marketing presence

Work Experience
• Analysis of SCAN-PUF architecture using industry data
• FPGA hacking for gathering additional data
• Motivation of research is to save IC manufactures money by reducing the hardware cost used by a PUF

Meijer, Grand Rapids, MI - Deli Clerk (May 2012 to March 2015)
• Served as shift leader
• Mentored less experienced co-workers
• Effectively preformed customer service
• Prepared food and stocked inventory

The Badge Company, Ada, MI - Production Assistant (Jan. 2009 to Current)
• Administered daily operations in the absence of owner
• Assisted with daily production
• Consulted regarding operations
Thomas Van Noord

Current Address: 1901 Rowland Ave. SE  
Grand Rapids, MI 49546

Home Address: 3523 Quiggle Ave. SE  
Ada, MI 49301

Contact Information: Phone: 616-516-0061  
Email: thomasvannoor@gmail.com

Education:

Calvin College, Grand Rapids, MI:
   Bachelor of Science in Engineering, Computer/Electrical concentration – Computer Science minor
   Overall GPA: 3.16
   Expected Graduation: May 2016

Senior Design Project:
   Worked in teams to produce a design concept and a prototype.

Coursework:

Math: Calculus 2, Multivariable Calculus, Differential Equations with Linear Algebra, Statistics
Scientific: Chemistry, Introduction to Physics: Mechanics/Gravity, Electromagnetism, Global Health Environment and Sustainability

Liberal Arts: 29 Credit Hours

Computer Skills:

- EagleCAD
- LTSpice
- Eclipse
- Matlab
- Quartus

- AutoCad
- AutoDesk Inventor
- C, C#, C++, Python
- Altera Monitor Program
- Linux

Work Experience:

Optec Incorporated:
   School Year and Summer 2015
   • Served as the electrical engineer for Optec
   • Helped push out a new prototype for the company
   • Used PIC microprocessors and peripheral interfaces (I2C, SPI, etc)
   • Designed and prototyped circuit boards

Calvin College Physical Plant Paint Crew:
   Summer 2013 and 2014
   • Taught different techniques by a supervisor and trusted to teach others the same task
   • Worked full and over time
   • Worked effectively in the team based environment
   • Earned the respect of boss because of hard work and work well done

References:

Douglas Herrera  
Calvin College Physical Plant  
616-526-6648  
dherrema@calvin.edu

Yoon Kim  
Engineering Professor  
616-526-8717  
ygk2@calvin.edu

Jeff Dickerman  
Optec Inc.  
616-897-9351  
jeff@optecinc.com
Appendix B: Financial Statements and Product Price Estimations

### Broseal's Engineering Firm, LLC
#### Pro-Forma Statement of Income

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<thead>
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<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
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<tbody>
<tr>
<td>Sales Revenue</td>
<td>847,362</td>
<td>889,730</td>
<td>978,712</td>
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<tr>
<td>Variable Cost of Goods Sold</td>
<td>120,523</td>
<td>133,458</td>
<td>254,730</td>
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<tr>
<td>Fixed Cost of Goods Sold</td>
<td>31,200</td>
<td>10,000</td>
<td>28,000</td>
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<td>Depreciation</td>
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<td>3,347</td>
<td>3,676</td>
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<td>Gross Margin</td>
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<td>42,552</td>
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<td>Fixed Operating Costs</td>
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<td>Operating Income</td>
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<td>Income Before Tax</td>
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<td>276,904</td>
<td>296,494</td>
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<tr>
<td>Net Income After Tax</td>
<td>251,120</td>
<td>276,904</td>
<td>296,494</td>
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### Broseal's Engineering Firm, LLC
#### Pro-Forma Statement of Cash Flows

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<td>Net Income After Tax</td>
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<td>296,494</td>
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<td>Depreciation expense</td>
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<td>3,676</td>
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<td>Invested Capital (Equity)</td>
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<td>Increase (decrease) in borrowed funds</td>
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<td>(100,000)</td>
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<td>Ending Cash Balance</td>
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### Broseal's Engineering Firm, LLC
#### Break-Even Analysis

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<tbody>
<tr>
<td>Sales Revenue</td>
<td>847,362</td>
<td>889,730</td>
<td>978,712</td>
</tr>
<tr>
<td>Less: Variable Costs</td>
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<td></td>
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<tr>
<td>Variable Cost of Goods Sold</td>
<td>120,523</td>
<td>133,458</td>
<td>254,730</td>
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<tr>
<td>Variable Operating Costs</td>
<td>42,552</td>
<td>46,679</td>
<td>49,147</td>
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<tr>
<td>Total Variable Costs</td>
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<td>Contribution Margin</td>
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<tr>
<td>Less: Fixed Costs</td>
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</tr>
<tr>
<td>Fixed Cost of Goods Sold</td>
<td>31,200</td>
<td>10,000</td>
<td>28,000</td>
</tr>
<tr>
<td>Fixed Operating Costs</td>
<td>285,000</td>
<td>297,150</td>
<td>328,845</td>
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<tr>
<td>Depreciation</td>
<td>1,786</td>
<td>3,347</td>
<td>3,676</td>
</tr>
<tr>
<td>Interest Expense</td>
<td>13,200</td>
<td>24,200</td>
<td>19,000</td>
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<tr>
<td>Total Fixed Costs</td>
<td>331,186</td>
<td>334,697</td>
<td>375,341</td>
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<tr>
<td>Income Before Tax</td>
<td>251,120</td>
<td>276,904</td>
<td>296,494</td>
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</table>

### Break-Even Sales Volume

<table>
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<tr>
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<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fixed Costs</td>
<td>331,186</td>
<td>334,697</td>
<td>375,341</td>
</tr>
<tr>
<td>Contribution Margin %</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
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<tr>
<td>Break-Even Sales Volume</td>
<td>483,198</td>
<td>486,907</td>
<td>548,708</td>
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<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment Purchases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchases</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Equipment Purchases Year 1</td>
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<tr>
<td>Parts</td>
<td>Quantity</td>
<td>Cost (single)</td>
<td>Cost (thousand)</td>
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