ABC Solar Manufacturing

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*Note: Attachment 1 contains the Microsoft Excel version of the income statements found in Appendix 3 & 4. Calculations and assumptions can be viewed as comments or formulas in the Excel version.*

###### **Executive Summary**

ABC Solar manufactures, installs and maintains residential solar swimming pool and hot water heating systems in Southwest Florida. The abundant sunshine in Southwest Florida along with the current political push to use alternative sources of energy makes this a lucrative and viable long term business. The previous owner, Barney Max, started ABC Solar based on an idea to capture and utilize the abundant Florida sunshine in a way that is less intrusive and more attractive to homeowners. He designed a system that does not require mounting several unsightly panels on the homeowner’s roof top by utilizing a reflective polymer resin compound in the solar collector to more efficiently collect and process energy from the sun, thereby requiring fewer panels to heat water. Barney worked closely with a polymer supplier, PolyPro in Nicaragua to bring his idea to market. This is the first and only system of its kind on the market. The utility patent has 11 years remaining and is freely transferable.

ABC Solar was purchased by me, Terri Livezey, on January 1, 2008. I am the sole operations manager with the assistance of a small administrative staff and Barney Max who has agreed to stay on as a consultant throughout 2009. ABC Solar is publicly owned with 6,000 shares of outstanding common stock. The average price of the stock has been consistent at about $100 per share. Sales have been increasing over the past 3 years at a steady rate of 5%. There are no liabilities or long term debt. ABC Solar currently manufactures approximately 600,000 square feet of solar collectors each year.

**Biography**

As a hedge fund manager, 2007 was a particularly difficult year and the outlook for the coming years was considerably worse due to the recessionary state of the economy. As a result, I decided to retire from the hedge fund business by December 31, 2007 and purchase a manufacturing business in Fort Myers, Florida where my winter home is located. Manufacturing has always been a passion of mine (along with fishing the beautiful Gulf waters in Fort Myers) so this was a wonderful opportunity to transform my dream into reality. I announced my retirement, packed up my house and family and moved everything to Florida with no prospects in place at the time.

One of my first projects upon permanent arrival in Florida was to install a solar pool heater. Brand and style shopping lead me to ABC Solar, when I soon learned through discussions with the owner, Barney Max, that he too was ready for retirement due to illness and desperately looking to sell the business. Utilizing my 20 year finance background and Operations Management degree from University of Michigan, along with considerable research and discussion with my accountant, I decided to go for it. Barney worked with the board of directors to ensure shareholder confidence would not be in any way eroded by the transaction. The transfer was final as of January 1, 2009.

**Mission/Vision**

 As soon as the transfer of the business was complete I got right to work reviewing the mission and vision for the company to ensure it was in line with my business philosophy. ABC Solar’s mission is to maximize shareholder value through innovative solar pool and water heater manufacturing and customer service practices by continually striving for excellence in the products and services we provide in Southwest Florida. This missing is the driving force behind ABC Solar’s success over the past nine years, and will continue to contribute to exceptional growth in the years to come.

Our vision for the future is to see an ABC Solar device accompany every Southwest Florida residential and hotel pool while continuing to build market share in hot water heating. We expect to realize our vision by developing strong and growing partnerships with pool manufacturers, hotel chains and Florida power companies coupled with building on our outstanding reputation in the residential market.

**Marketing Plan & Competitive Analysis**

ABC Solar’s biggest asset has been its existing customer base. Because customers are so happy with the product and service, they commonly tell friends and neighbors about us. The majority of the calls we receive are referrals from existing customers. We will continue to focus on customer service and offer service discounts to existing customers who refer friends and neighbors.

Our marketing plan will begin a heavy focus on Sanibel and Captiva Islands during the next year. We realize the current economic situation has homeowners concerned about spending a large amount of money on a non-necessity. However, the median income on Sanibel and Captiva Islands is well above average and based on our research we haven’t seen a reduction in spending by island residents. We also plan to market to the hotels and resorts on the island. Because travel is down, the tourism industry is seeking ways to save money. Over the next month we will be doing a financial analysis on the cost savings of going solar for a hotel or resort. We’ll put together a brochure and train sales staff specifically for the hotel and resort chains on Sanibel and Captiva. We believe the cost savings of using an ABC Solar pool and hot water heating system will provide significant savings to hotel and resort owners.

The typical swimming pool water heater utilizes a series of panels mounted to the homeowner’s roof top. Water flows from the pool, through a pipe, then through the panels on the roof which are heated by the sun, and then the heated water flows through an outlet pipe back into the pool. The number of panels depends on the size of the pool. Domestic hot water heaters work in a similar fashion, but utilize less panels and energy. ABC Solar products are unique in the industry. Rather than mounting panels on the roof, the sun’s energy is captured in a much smaller but more powerful collector that is installed on the homeowner’s yard on a post. The collector has the ability to rotate throughout the day and year to maximize the sun’s energy. Barney Max built the system and added the necessary components to market the system for swimming pool and domestic hot water heating. The below matrix provides a breakdown of the systems offered by ABC Solar along with estimated cost and savings. Based on the cost analysis, the solar heating systems will pay for themselves within as little as 3 years. Appendix 1 offers drawings and design layouts for the systems, which shows how the collector is not roof top mounted and considerably smaller and less intrusive than typical collectors.

|  |  |  |  |
| --- | --- | --- | --- |
| System | Description | Average Cost of Electricity per Year | Average Cost of System & Installation |
| **Swimming Pool** | Uses patented solar collection technology along with inlet and outlet pipes to heat swimming pool waterAn extra small solar collector can be added to the system to power a swimming pool pump | $1,260 for average pool size of 14’ x 28’ heated to 80 degrees\*$372 for 1 HP pump running 6 hours per day\* | $4,000$1,000 |
| **Domestic Hot Water** | Uses patented solar collection technology along with a special hot water tank and piping to provide hot water to residential homes | $180 for the average household with a 50 gallon tank\* | $2,500 |
| **Combo System** | System provides homeowners with both swimming pool and hot water heating by combining the two systems via special configuration to get maximum benefits | Average combined cost $1,812 | $6,000 |

*\*Source: Florida Power & Light* [*http://www.fpl.com/residential/savings/energy\_advisor/water\_heating/waterheating.shtml*](http://www.fpl.com/residential/savings/energy_advisor/water_heating/waterheating.shtml)

ABC Solar is the only company manufacturing solar pool and water heating systems that do not require roof top mounting or take up significant space in a yard. This feature makes our products very attractive to both homeowners and hotel chains. At this time, and until our patent expires, our competition is unable to produce a product that can compare to ours. Therefore, it’s our goal to ensure we continue to build an excellent reputation, update our products on a regular basis and maintain a strong market share long into the future.

**Financial Information**

 When I purchased ABC Solar my accountant and I conducted a very thorough financial analysis to ensure a solid return on investment. We found Barney’s financial statements to show solid returns and growth. Barney had been experiencing health issues for some years and was desperate to retire. Coupled with my willingness to pay cash for the business, Barney was willing to take approximately 20% less than the fair market value. My accountant determined the fair market value to be $6,000,000. I purchased the business for $5,000,000. Because ABC Solar sells directly to the consumer, there were no distributors or dealers to worry about in the transition from Barney to me. Since I wanted to retire into something I would find enjoyable, turnkey was definitely the way to go for me. Appendix 2 contains ABC Solar’s financial statements for three years prior to my purchase or the business.

The below table provides a breakdown of the ABC Solar team along with the cost for each employee as of December 31, 2007. While salary is high for this industry in Southwest Florida, Barney does not provide his employees with health or other benefits. Employment costs include Federal Tax Federal unemployment tax at a rate of 6.2% and Florida unemployment tax at a rate of 2.7% with a maximum of $7,000 compensation per employee (US Dept. of Treasury; Florida Dept. of Revenue).

|  |  |  |  |
| --- | --- | --- | --- |
| Employee / Number / Responsibilities | Salary | Employer Cost (Federal Tax, UT 6.2% , FL-UT 2.7%) | Total Yearly Payroll Expense\*\* |
| **Office Manager – 1**Troubleshooter; customer & supplier interface; logistics; quality control; scheduling | $40.00 per hour @ 2,080 per year = **$83,200** | **$6,988** | **$90,188** |
| **Secretary – 1**Owner and office manager support | $20.00 per hour @ 2,080 per year = **$41,600** | **$3,240** | **$44,840** |
| **Fabrication Specialists – 4**Manufacturing; quality control | $25.00 per hour @ 2,080 per year = $52,000 x 4 = **$208,000** | **$13,706** | **$22,706** |
| **Installation Professionals – 2\***Install new solar systems | $720 per installation @ 160 per year = **$115,200** | Not Applicable | **$115,200** |
| **Maintenance & Repair – 1**Warranty repair; troubleshoot system problems | $35.00 per hour @ 2,080 per year = **$72,800** | **$5,202** | **$78,002** |
| **Shop Labor – 2**Factory maintenance; material handling; packaging | $20.00 per hour @ 2,080 per year = $41,600 x 2 = **$83,200** | **$6,988** | **$90,188** |
| **Sales – 2\*** | $100 per sales call; $200 bonus per sale.  | Not Applicable | **$160,000** |

*\*Contracted labor*

*\*\* Assuming payroll expenses increase by 3% per year*

**Challenges**

 My purchase of ABC Solar was not without challenge. Between the historical financial statements, feedback from staff and general observation I found three operational issues that warranted analysis. First, the ABC Solar warranty repair costs increased over the previous 3 years and showed a major jump in 2007 of 67%. When I consulted Barney on the issue he explained that he had some assumptions, but really had no way of knowing the real crux of the issue. Because Barney was so busy with managing the rapidly growing operations of ABC Solar, he had never implemented a quality control process to monitor quality, measure defects, perform root cause analysis or implement improvements based on the analysis. The introduction of a strong quality control process was first on my agenda.

 There were two methods for quality control that I considered. Six Sigma was one option, and, and Lean Manufacturing the other. I had experience with Six Sigma implementation in the past at my previous job and it worked very well to reduce variance in our processes. “Six Sigma is a program designed to reduce defects to help lower costs, save time, and improve customer satisfaction” (Heizer 173). It’s based on a 5 step improvement model known as DMAIC (define, measure, analyze, improve and control). In my opinion, all of these are very important concepts in any organization and absolutely critical to running any high quality operation. None of these concepts were being utilized by ABC Solar. There were no metrics kept to identify trends or defects, and no processes in place to ensure everything was functioning as expected. Based on my experience with Six Sigma the level of effort involved to realize success in all 5 DMAIC concepts is enormous. Six Sigma principles require team involvement from all parties, including ABC Solar, vendors and customers to perform root cause analysis, process improvements and process control. We did not have the capacity to involve several members of our staff in these projects. Furthermore, the nature of our business (similar to retail sales) does not warrant effective involvement from customers in Six Sigma projects. These projects, although beneficial, can be quite time consuming and cumbersome.

 ABC Solar’s other option was to implement a Lean program. “Lean operations supply the customer with exactly what the customer wants when the customer wants it, without waste, through continuous improvement” (Heizer 636) One of the most important steps would be to document processes and procedures to ensure staff knows how to effectively perform their jobs, generate monthly metrics and identify when their process is out of control. These are also key elements of Six Sigma, but Lean is less time consuming and simply makes more sense for us since it’s a customer focused process. I was very confident that implementation of Lean would get us to the cause of the high warranty repair costs and get us on track to resolve the issue before our reputation is damaged and costs increase.

One important task I assigned myself in the first week of my arrival was to interview the entire staff. Their feedback was helpful, but revealed yet another operational issue with ABC Solar. Our sales staff regularly follows up with customers after install and repair work to ensure customers are satisfied with the product and service. I learned from the sales staff that while customers are very happy with the product, they had been expressing concerns over the promised delivery & install date. Customers are promised an install date of 2 weeks from the date of sale. Feedback from the sales staff indicates this promise date had been missed on what seemed to be a regular basis, and the trend seemed to be growing throughout 2007. Without a quality process, the number of complaints and actual install time is not documented; however, the sales staff estimates the problem has grown to about ½ of all sales. This was the second serious operational problem that needed to be resolved immediately as it impacts reputation and future sales.

 Further interviews indicate employees believe delivery is consistently late due to delayed arrival of materials to manufacture key components of the solar equipment. Specifically, the polymer resin used to manufacture tubing and the bulk of the solar collector are purchased from a small specialty polymer company, PolyPro Central, located in Nicaragua. The office manager indicates that she frequently receives CF28/29 (Customs Form 28 or 28 requests for additional and/or corrected documentation) and detention notices from US Customs and Border Protection (CBP). She has not had the proper training in this area to resolve the problems or truly understand what they are. I also learned that the number of delays has increased since the implementation of the Dominican Republic – Central America Free Trade Agreement (DR-CAFTA) for Nicaragua on April 1, 2006 (Trade Compliance Center). I reviewed the entry documentation and determined ABC Solar is claiming duty free entry under the DR-CAFTA program, but there is no documentation to support the claim and the goods appear to be stopping in Mexico for some time prior to crossing the US border, which could disqualify the resin from duty free entry under DR-CAFTA. This helps to explain the increase in delays as DR-CAFTA was implemented for Nicaragua in 2006. Additionally, invoices are not completed correctly as they’re missing key information such as a tariff number and clear description. There are two possible ways to resolve this issue.

 Training the current office manager and supplier to ensure the proper documents are in place prior to shipping will reduce the number of CF28/29 requests and detention notices from CBP. Import compliance can be complicated, but all of the information required to enter goods correctly can be found in Title 19 of the Code of Federal Regulations (CFR) and on the CBP website. Establishing a relationship with the office manager at the supplier in Nicaragua and working to ensure invoices and the DR-CAFTA documentation is correct will help to reduce the delays. The steps to implement this process are fairly simple and straight-forward and include the following:

 Work with the customs broker to obtain import process training for the office manager

 Create a process to audit import documentation

 Establish a relationship with the supplier to ensure documentation is correct prior to shipping

 Require a review of the import documents prior to shipment

The cost of this option will be minimal as an internet meeting tool can be utilized for training and no travel will be required by the office manager. A quality process requires implementation anyway, so there is no additional cost or burden for including trade documentation.

 A second possible solution to this issue is to find a domestic supplier for the raw material. I’ve contacted some people I know in the industry and explained that we need a specialty polymer formulated as follows:

**Product Code: 753-337-991 Description: Nylon 6.6 Solar Resin**

 Percent Component Description

 42.200 125-320 Dupont Zytel 101 NC010 6/6

 32.000 141-075 Manville reflective 719 1/8”

 15.000 111-130 Dupont Zonyl MP 1300

 00.100 153-091 Rhodia NAH2P02 Monohydrate

 00.100 156-019 Synpro Aluminum Stearate R (F/M 404)

 10.600 125-356 NRM ZDL 6/6 Pellets

After speaking with 5 well known polymer manufacturers, 3 of them indicated they do not have the capability to manufacture the goods. We sent the other 2 manufacturers a request for quote (RFQ), which they promptly returned indicating that they have the capability and capacity to manufacture our product, but would need approximately 6 months to get the contracts completed, procure the materials and get their factory set up for manufacturing. Furthermore, they would charge a set-up fee over and above the cost of the product. The following table provides a complete cost comparison between our existing supplier and the 2 competing suppliers on a per pound basis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Supplier & Location | Product Cost per Pound | Shipping per Pound | Total Cost per Pound | Total Cost per System\* |
| PolyPro Central – Nicaragua (Current) | $23.67 | $21.08 | $44.75 | $895.00 |
| Specialty Polymer – United States | $34.78 | $14.05 | $48.83 | $976.60 |
| XYZ Polymer Products – United States | $26.97 | $13.99 | $40.96 | $819.20 |

\**Each system requires approximately 20 pounds of resin*

Shipping costs include freight, insurance and any import duty liabilities. Our incoterms, or international shipping terms, are EXW (ex-works), which means ABC Solar is responsible for the cost and set-up of shipping the product from the supplier’s factory to ours (ICC). We choose this option to maintain control over the shipment from point of sale. If we changed our polymer source to a domestic supplier, we would be responsible for the cost of domestic freight and insurance. The HTSUS tariff classification for the polymer 3908.90.7000 and carries a duty rate of 6.5% along with a merchandise processing fee (MPF) of .21% and a harbor maintenance fee (HMF) of .125% (HTSUS). I’m assuming the product from our current supplier in Nicaragua will remain eligible for DR-CAFTA free trade and continue to be duty free and MPF free (HMF will still apply).

 Based only on the cost per unit analysis between the three potential suppliers, the best option is to re-source the resin from our current supplier in PolyPro Central in Nicaragua to XYZ Polymer Products in the United States. However, the risks and benefits required a complete review prior to making the decisions. The major factors to consider are as follows:

 Quality – There have been no quality problems with the resin from PolyPro Central over the past 4 years. Switching to a new supplier could pose quality problems, especially since they have not worked with our resin formula containing reflective polymers in the past. While XYZ Polymer has a good reputation related to quality, there’s guarantee we would see the same outstanding quality that we’re accustomed to with PolyPro Central resin.

 Service – ABC Solar has had a positive and strong relationship with PolyPro Central for 8 years. Customer service, response time and shipping has been outstanding. XYZ Polymer boasts impeccable customer service. The RFQ process went very smoothly and it appeared there would be no issues related to service.

 Global Challenges – Our only issue or challenge with PolyPro Central was related to typical challenges faced by companies engaged in global business transactions. None of the problems identified were necessarily the fault of PolyPro, although, there were improvements that could make the process smoother. All issues in this area would disappear with XYZ Polymer as they’re a domestic supplier. Additionally, we would save on international freight, insurance and duty.

Based on the costs and benefits of switching to a new supplier, we decided to stick with PolyPro Central in Nicaragua regardless of the international risks. Going with our first option meant training for our office manager, working with PolyPro Central on improvements to international shipping documents and documenting a solid process to overcome this major operational issue.

The final operational issue identified was high and increasing costs associated with the manufacturing process. Some of the costs that seemed unreasonably high were energy costs and machinery repair costs. At time of purchase the energy costs, according the ABC Solar financial statements, was approximately $12,000 per year and had been increasing by about 5% per year. I contacted Florida Power and Light, and they agreed to visit the factory and perform an energy analysis to determine where we can improve energy costs. As expected, they indicated the outdated machinery is the crux of the high costs and updating the machinery will cut the energy cost by 25%. All of the machines were old and no longer under warranty. The machines were all purchased used and modified when ABC Solar went into business. The following provides a list of machines along with average repair costs and estimated energy consumption per year based on 2007 energy data & analysis provided by FP&L:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Machine  | 2005 Costs | 2006 Costs | 2007 Costs | Estimated Energy Consumption / Cost |
| Injection Molding Machine 1 | $4,000 | $10,000 | $13,000 | $2,000 |
| Injection Molding Machine 2 | $2500 | $3500 | $7500 | $1,500 |
| CNC Lathe | $200 | $200 | $450 | $500 |
| Drilling Machine | $50 | $150 | $50 | $500 |
| Cutting Machine | $540 | $230 | $100 | $500 |
| Conveyor System | $359 | $231 | $987 | $750 |
| Testing Gauge | $100 | $500 | $250 | $250 |

Based on the above analysis there were three possible solutions to reduce manufacturing costs related to machinery. The first option was to dispose of the existing machinery and replace it with new equipment. However, new machinery is very expensive and the cost of installation and setup is also very high. Based on my estimates, it would cost approximately $1,000,000 to update the whole plant with new machinery. That was obviously not a good option at the time since I had just purchased ABC Solar and was still getting comfortable. Alternatively, it was possible to replace the oldest and most costly injection molding machines. The cost of two new injection molding machines including setup and installation was approximately $250,000. Since the machines will be under warranty for 5 years, the immediate cost savings is $13,000. Assuming the energy consumption would be reduced by 25% results in energy savings of approximately $875 per year.

 We also looked at simply upgrading the existing machines to make them more efficient. The most beneficial upgrade was to the drive motors on the machines, as those consume the bulk of the energy. The cost of replacing the motors on the injection molding machines was $75,000. The average replacement motor with installation for the remaining machines was approximately $50,000 each (totaling $125,000 to replace all motors in the factory). While the motors would be under warranty for 2 years, the remainder of the machinery would still require regular maintenance and repair. Since the motors seemed to run okay, I assumed the bulk of the repairs were not to the motors on the machines. However, Parker Hannifin states, “A partnership between energy management specialists, NRG, and SSD Drives Division of Parker Hannifin, the world's leading manufacturer of motion and control technologies, helps injection molding companies cut the power consumption of molding machines by more than half without affecting machine performance” (Global Spec). Even so, I was not convinced this was the way to go since the motors were not the cause of the high repair costs.

 The final option we looked at was to dispose of some of the machinery all together and outsource to a local manufacturer. This option would significantly reduce production costs by eliminating all energy consumption related to the machinery. Again we focused mainly on the plastic injection molding process as those machines generated the highest repair and energy consumption costs. We met with, and received a quote from, Bill’s Plastic Molding Company in Fort Myers, FL. He estimated a cost of $560 per collector component and $276 per tube. Based on my calculations and assumptions at the time this cost was significantly higher that was it costs ABC Solar to make the parts ourselves.

 In our make-or-buy decision we considered all of the risks and benefits. Risks of outsourcing to Bill’s Plastic Molding includes higher production costs, protection of our proprietary design, lower quality, and the risk that the supplier will go out of business assuming our fumbling economy did not make a quick recovery. Some of the benefits of outsourcing that we looked at were the fact that it would benefit our growth objective by freeing up internal resources to focus on our core competencies of design, development and service of solar pool and water heating systems. One other thing to consider with this option is our factory. By outsourcing our plastic injection molding we would gain space in the factory. This space would ultimately become *wasted* space since we have no other function to fill the injection molding areas.

We ultimately decided new plastic injection molding machines was the best way to resolve high production cost operational issue. After researching machinery and injection molding vendors, I found it most cost effective to replace both injection molding machines as it nets a significant cost savings on setup and installation.

**Conclusion (Implementation Plan & Results)**

Lean implementation has proven to be very successful. We hired a quality consultant to ensure we document everything correctly, produce meaningful metrics and train the entire staff on the Lean concepts. The consultant charged $100 per hour and spent approximately 40 hours with ABC Solar for a total cost of $4,000. The program was fully functional by March 2008. Once we began measuring our process and defects we soon learned that the reason for the high warranty repair costs was associated with defective plastic tubing. Further research indicated the plastic resin was melted at a temperature too high during the plastic injection molding process, which made the plastic harder than it should be and eventually caused cracks in the tubing after exposed to sunlight for approximately 3 months. We found both the temperature gauges and heating elements in the machines were not functioning as intended. As identified by the below production metrics, replacement of the machines in June 2008 resolved this issue. Without implementation of a quality process, we would have never effectively identified the root cause of the high warranty repair costs or realized the positive impact the replacement machines have had on our organization.

Implementation of our quality process has been detrimental to the success of our import process. I was able to obtain historical CF28/29 and other requests for information from US Customs by contacting the port where the goods enter the United States. The port director was happy to assist after I explained we were in the process of reviewing our process to make improvements. The office manager was tasked with reviewing the documents and following our new quality process to document and measure the defects. The below graph shows significant improvements after the new process was up and running. 

 The new import process started with training. I contacted the Customs broker that manages our imports, UPS, and they were happy to provide an on line training session for the office manager. Based on her training she was able to create a new process that complies with CBP regulations. Additionally, the office manager took her new knowledge to PolyPro Central and worked with them on their invoicing and export documentation. Their documentation is now reviewed by the ABC Solar office manager prior to each shipment leaving the factory. This has created a smooth process that allows the material to arrive at my factory on time and ready to fill customer orders timely.

 We also found, by reviewing the shipping documents and DR-CAFTA regulations, that the polymer does in fact quality for preferential duty treatment. We now have a generic blanket DR-CAFTA certificate of origin on file for the 2007, 2008 and 2009 calendar years. We also found that while the shipments do stop in Mexico, the goods are not entering the commerce of Mexico; therefore, the eligibility status is not negatively impacted.

We ended up purchasing two 5 ton plastic injection molding machines from Rain Machinery at a total cost of $350,000. We opted to have high efficiency Parker Hannifin drives installed on the machines. While the drives increased the cost of the machines, the energy efficiency made it worth the price. We offset this cost by having our existing molds installed on the machines. The machines were paid for with $200,000 cash and a bank loan of $150,000 at 5% interest for 5 years compounded monthly (future value of $192,503.80). However, we are now able to write off depreciation on the new machines, and claim the interest expense as a tax deduction

Incorporating the new plastic injection molding machines into our factory and production process went very smoothly. We found a machinery vendor to build and install both machines in a timely manner. The machines were installed by June of 2008 and the ABC Solar staff was fully trained on the new equipment by July 2008 and we were operating at full capacity. The only issue we identified with the new machinery was 1 week of down time while our old molds were being installed into the new machines. Most importantly, we noticed a 20% decrease in our total factory energy consumption immediately and will have no repair costs for at least the next 5 years while the machinery is under warranty. We will still have minor maintenance costs associated with oil and grease for the machines, which was estimated to by approximately $100 per year.

After one solid year as the owner ABC Solar I’m feeling very confident that I made the right decision to purchase this business. Sales have increased by 10% due to our marketing push on Sanibel and Captiva Islands. When I started analyzing the 3 major operational issues, it became very clear to me that they were in some way all tied together. Implementation of our Lean quality system provided a clear window into the root cause of the high warranty costs while providing us with the tools to refine and measure our process to identify and resolve defects before they get out of control. The entire ABC Solar staff has embraced the Lean concept and they’re very happy to have clear processes to follow. Our import process is running smoothly and we’re receiving our material in a timely manner. Thanks to our new metrics, we can spot any delay trends immediately to prevent any future issues with global material procurement. Furthermore, when an issue does arise our office manager has the tools and knowledge to resolve it before it becomes a major problem. Our two new injection molding machines are running very well. Not only are them much more energy efficient, they work much faster and have virtually eliminated the problem with the defective tubes. These machines have significantly cut our energy and warranty repair costs. Appendix 4 shows a 2007 and 2008 side-by-side income statement indicating a 40% increase in net income since the improvements have been implemented. This increase is directly related to improvements in operations management. I expect this trend to continue over the next several years.

Appendix 1 – Product Diagrams

Hot water heating system



Pool heating system



Drawing source: http://www.backwoodshome.com/articles/hackleman65.html

Appendix 2 – Historical Financial Statements

|  |
| --- |
| ABC Solar |
| **December 31 Income Statements** |
|   |  | 2005 | 2006 | 2007 |
| Revenue: |  |  |  |   |
| New Equipment Sales |  |  $ 761,078.70  |  $ 801,135.00  |  $ 843,300.00  |
| Maintenance & Repair Sales |  |  $ 84,564.30  |  $ 89,015.00  |  $ 93,700.00  |
| Net Sales |  |  $ 845,643.00  |  $ 890,150.00  |  $ 937,000.00  |
|   |  |  |  |   |
| Cost of Goods Sold: |  |  |  |   |
| Beginning Inventory |  |  $ 4,500.00  |  $ 5,300.00  |  $ 4,700.00  |
| Material Costs |  |  $ 5,000.00  |  $ 5,250.00  |  $ 5,513.00  |
| Contracted Labor |  |  $ 258,936.00  |  $ 266,944.00  |  $ 275,200.00  |
| Ending Inventory |  |  $ 4,500.00  |  $ 5,300.00  |  $ 4,700.00  |
| Total COGS |  |  $ 263,936.00  |  $ 272,194.00  |  $ 280,713.00  |
|   |  |  |  |   |
| Gross Profit (Loss) |  |  $ 581,707.00  |  $ 617,956.00  |  $ 656,287.00  |
|   |  |  |  |   |
| Expenses: |  |  |  |   |
| Advertising |  |  $ 1,200.00  |  $ 1,200.00  |  $ 1,200.00  |
| Depreciation |  |  $ -  |  $ -  |  $ -  |
| Insurance |  |  $ 3,200.00  |  $ 3,200.00  |  $ 3,200.00  |
| Interest |  |  $ -  |  $ -  |  $ -  |
| Maintenance & Repairs |  |  $ 7,749.00  |  $ 14,811.00  |  $ 22,337.00  |
| Warranty Expense |  |  $ 2,000.00  |  $ 3,000.00  |  $ 9,000.00  |
| Office Expenses |  |  $ 250.00  |  $ 250.00  |  $ 600.00  |
| Operating Supplies |  |  $ 100.00  |  $ 125.00  |  $ 100.00  |
| Payroll Expense |  |  $ 306,662.00  |  $ 316,146.00  |  $ 325,924.00  |
| Permits and Licenses |  |  $ 150.00  |  $ 150.00  |  $ 150.00  |
| Professional Services |  |  $ -  |  $ -  |  $ -  |
| Property Taxes |  |  $ 20,000.00  |  $ 29,000.00  |  $ 29,000.00  |
| Utilities |  |  $ 11,597.00  |  $ 122,075.00  |  $ 12,850.00  |
| Vehicle Expenses |  |  $ 500.00  |  $ 500.00  |  $ 500.00  |
| Miscellaneous Expenses |  |  $ 325.00  |  $ 300.00  |  $ 350.00  |
| Total Expenses |  |  $ 353,733.00  |  $ 490,757.00  |  $ 405,211.00  |
|   |  |  |  |   |
| Income Before Taxes |  |  $ 227,974.00  |  $ 127,199.00  |  $ 251,076.00  |
| Income Taxes |  |  $ 91,189.60  |  $ 50,879.60  |  $ 100,430.40  |
| Net Income |   |  $ 136,784.40  |  $ 76,319.40  |  $ 150,645.60  |

Appendix 3 – Import Process Flow



Appendix 4 – Post Process Improvement Income Statement Comparison

|  |
| --- |
| ABC Solar |
| **December 31 Income Statements** |
|   |  | 2007 | 2008 |
| Revenue: |  |  |   |
| New Equipment Sales |  |  $ 843,300.00  |  $ 1,173,330.00  |
| Maintenance & Repair Sales |  |  $ 93,700.00  |  $ 130,370.00  |
| Net Sales |  |  $ 937,000.00  |  $ 1,303,700.00  |
|   |  |  |   |
| Cost of Goods Sold: |  |  |   |
| Beginning Inventory |  |  $ 4,700.00  |  $ 4,500.00  |
| Material Costs |  |  $ 5,513.00  |  $ 6,064.00  |
| Contracted Labor |  |  $ 275,200.00  |  $ 283,456.00  |
| Ending Inventory |  |  $ 4,700.00  |  $ 4,500.00  |
| Total COGS |  |  $ 280,713.00  |  $ 289,520.00  |
|   |  |  |   |
| Gross Profit (Loss) |  |  $ 656,287.00  |  $ 1,014,180.00  |
|   |  |  |   |
| Expenses: |  |  |   |
| Advertising |  |  $ 1,200.00  |  $ 5,200.00  |
| Depreciation |  |  $ -  |  $ 500.00  |
| Insurance |  |  $ 3,200.00  |  $ 2,100.00  |
| Interest |  |  $ -  |  $ 2,300.00  |
| Maintenance & Repairs |  |  $ 22,337.00  |  $ 6,000.00  |
| Warranty Expense |  |  $ 9,000.00  |  $ 3,000.00  |
| Office Expenses |  |  $ 600.00  |  $ 250.00  |
| Operating Supplies |  |  $ 100.00  |  $ 80.00  |
| Payroll Expense |  |  $ 325,924.00  |  $ 335,702.00  |
| Permits and Licenses |  |  $ 150.00  |  $ 150.00  |
| Professional Services |  |  $ -  |  $ 4,000.00  |
| Property Taxes |  |  $ 29,000.00  |  $ 22,000.00  |
| Utilities |  |  $ 12,850.00  |  $ 10,280.00  |
| Vehicle Expenses |  |  $ 500.00  |  $ 1,124.00  |
| Miscellaneous Expenses |  |  $ 350.00  |  $ 1,200.00  |
| Total Expenses |  |  $ 405,211.00  |  $ 393,886.00  |
|   |  |  |   |
| Income Before Taxes |  |  $ 251,076.00  |  $ 620,294.00  |
| Income Taxes |  |  $ 100,430.40  |  $ 248,117.60  |
| Net Income |   |  $ 150,645.60  |  $ 372,176.40  |

Appendix 5 – Factory Layout

**ABC Solar**

**Facility Layout**

**FRONT**

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