Notes on Case

"Jim Poss"

Jim Poss, a second year full-time MBA student at Babson College, has a passion for preserving and protecting the environment. He uses a summer internship and Babson courses to search for opportunities and evaluate them. By the final semester he focuses on a solar-powered trash compactor. When he graduates he puts all his efforts into his new venture and soon lands an order from Vail for one of his trash compactors, which will be installed in a remote area of the ski resort.

Location: Greater Boston
Date: 2003-2004
Industry: Solar-powered trash compactors
Age of entrepreneur: Late-20s
Topics: Entrepreneurship as a career choice, finding and shaping an opportunity, team building, networking, bootstrapping, 4F financing, environmental products, developing new products, product pricing, manufacturing, patents,.

First of all, assess Jim Poss. Here are some important items to bring out:

- Jim has a passion for protecting and preserving the environment.

- By his senior year in high school he knew that he wanted to be involved with environmental issues.

- He read Rachel Carson's *Silent Spring*, which is generally regarded as one of the most important influences in the early days of the environmental movement. Here is the citation from the Ecology Hall of Fame:

"In 1992, a panel of distinguished Americans declared Rachel Carson's *Silent Spring* the most influential book of the past 50 years. This was one of the latest in a long line of tributes to a woman who almost single-handedly alerted Americans to the dark side of science in alliance with industrial society. Her measured, carefully-worded yet passionate prose was all the more damning because she, herself, was a scientist." http://www.ecotopia.org/ehof/carson/bio.html

(As an aside, ask, "Who has read *Silent Spring*?" In general, most students have never heard of it, let alone read it. If the instructor asks this question, he should urge every student to put it on their list of books to read in the future.)

- At Duke University, Jim studied environmental science & policy and geology, with a minor in engineering.

- After graduation he got experience as a hydrologist designing parking lots; as a sales engineer with a company designing and manufacturing sustainable energy and

transportation solutions; and as a production manager of a boat manufacturing company.

- Jim enrolled in the Babson 2-year MBA program specifically because he could focus on a career as an entrepreneur in his second year, so that when he graduated he would be able to launch a new business.

- He had a summer internship with Spire Corporation, a solar energy company.

- **Jim's attributes**

    - Sees lots of opportunities
    - Good at persuading others to join him
    - Effective at networking
    - Resourceful
    - Flexible
    - Open minded
    - Determined
    - Relevant experience

Opportunity

This is a good example of a would-be entrepreneur who knows the broad industry that he would like to be in (something concerned with the environment); sees opportunities; then examines the opportunities in the light of what he might be able to grasp; next evaluates that opportunity in detail; then decides to go for it. To tease out how Jim did this, ask a student:

"Starting from the beginning, tell us how Jim found this opportunity":

- Jim seems to be obsessed with the environment.

- The first thing that he looked at was capturing tidal energy. Hence the name of his company, Seahorse Power Company. He soon realized that sea-powered generators were a long way off.

- Next, he considered collecting data from abandoned deep oil wells and selling those data to geothermal energy companies. But persons who talked with him about his idea steered him in other directions.

- He then turned to wind power because it is the fastest growing energy source in the world. (Of course wind power had a small installed base; in 2004, it was less than one percent of the total electric power generated in the USA. According to aggressive predictions it might be 6% by 2020. In contrast, 20% of Denmark's electricity in 2004 was generated by wind power.)

- His first idea for the wind-power industry was a data buoy for evaluating ocean sites for

wind farms. He actually wrote a business plan, but the capital required ($5 - $10 million), was beyond his reach at that stage of his career.

- He then revived his interest in a solar-powered trash compactor, which he had proposed to Spire Corporation for his internship, but it had been rejected. His interest was rekindled by an independent study on the trash industry.

Ask the following question "Tell us what Jim's specific opportunity in the trash industry is, and give us his or her evaluation of it."

- Does SPC's solar-powered trash compactor really have an economic advantage over the traditional method of trash disposal?
    - It all depends on the cost of the receptacle and the cost of emptying and servicing it. Exhibits 3 and 4 seem to indicate the SPC's trash compactor has the advantage because even if the capital cost of the traditional receptacle or the SPC compactor are included as a one-time annual cost, rather than depreciated over their lifetimes, the SPC trash compactor wins by a good margin in both remote and urban locations.
    - Of course, Jim's numbers could be self serving, for instance:
        - Does it really take approximately $5,000 per year of labor to service one traditional receptacle? Or $9,000 to service a remote one?
        - What will be the annual maintenance costs for a trash compactor? Has Jim taken this into account?

- If the cost advantage of the trash compactor is dubious, what is the reason for buying them?
    - It is the politically correct thing to do.
        - Gives the impression that the organization using environmentally friendly trash compactors is a good citizen.
    - Good public relations for the buying organization provided that the public is aware that the trash compactor is environmentally friendly.
    - It's an innovation in an industry where trash collection has not changed much in a hundred or more years.
        - But will it be a novelty or fad? Only time will tell.

- What are the potential disadvantages of the SPC trash compactor?
    - It stores the trash for several days. What happens in warm climates? Will the trash smell?
    - Vandalism will probably be a problem, especially in remote locations.

Ask a student to sum up the discussion about why someone would buy the SPC solar-powered compactor. The key points you want the student to bring out are that the strictly economic justification for buying it maybe dubious. It is likely that the most persuasive selling point is that it is environmentally friendly because it uses solar power. Hence it reduces the amount of fuel used by trash trucks because it does not have to be emptied as

frequently as a conventional receptacle, and along with that reduces the air pollution produced by the trash truck.

Marketing and Product Development

If SPC were a big established company, Jim would do much more marketing research; then if he were convinced that the market was favorable, he would develop a prototype, install it in a beta site, make modifications as necessary, roll out the product in a limited geographic area, and then if the results were satisfactory, ramp up production and go nationwide. This case provides the instructor to an opportunity to discuss how a new company operating on a shoestring really does its marketing and product development.

Ask, "What is your opinion of Jim's decision to take an order from Vail when SPC does not even have a detailed design let alone a working prototype?" Before the student answers, take a vote: "Should Jim should take Vail's order?" The vote is usually overwhelming YES.

- What is the upside to taking the order?
    - Vail is a household word in the USA. There is considerable prestige in having Vail as a customer.
    - SPC will have to work on a tough time schedule.
    - The order will be a big motivator for Jim and his associates.
    - The customer is paying for part of his development costs.

- What is the downside?
    - Risky. What happens if he is unable to deliver it?
    - Or he delivers it, but it is unreliable?
    - Will he have big service expenses involved in travel to Vail? Or perhaps worse, if it is not reliable, the customer might ship it back to SPC. That will damage SPC's reputation.

If you are teaching this case to MBA students or executives, ask, "Who in the class is an engineer." Ask one of the engineers, "How long do Jim and his team have to design, build, and test the first compactor?" He has approximately 3 months because he received the order in September and has to deliver it by Christmas.

Next ask the engineer how he would respond if the sales manager or maybe the CEO of the company where he works came to him and said: "I've just accepted an order of a solar-trash compactor, I want you to manage the project. You have 3 months to design, build, test, and ship the product. You can have 2 student engineers to help you part time. And by the way, the budget is very tight." Almost every engineer will reply that he would not accept the project.

This brings home to students—especially those who are not engineers—the enormousness of the task that Jim and his student engineers undertook when Jim accepted the Vail order.

Jim turned out to be a master at bootstrapping. Ask students to discuss how Jim set about getting the first unit designed, built, and tested?

- First he bought a couple of kitchen trash compactors from the Want Ads for $125 and took them apart and did some "reverse engineering."
- He designed it himself with help from two undergraduate engineering students at the F. W. Olin College of Engineering. They were able to use the Olin facilities including CAD software.
- The quotes from potential prototype builders ranged from $80,000 to $400,000 so Jim decided to build it himself.
- Jim teamed up with Bob Treiber of Boston Engineering, who agreed to make the prototype cabinet for $2,400. Bob also let Jim and his team use the Boston Engineering facility to assemble and test the prototype compactor. In the course of that work, Bob mentored Jim and his team and provided free assistance.
- They tested the compactor for 3 hours and then shipped it.
- Jim traveled to Vail to make sure the machine was working OK after it arrived.
- While all this was going on Jim was protecting his intellectual property by filing a patent.

This is a typical story of how an entrepreneur finances a startup by scraping together resources, including services, material, space, and labor. It is useful to make sure that the students appreciate how Jim has gotten as far as he has with very limited financial resources.

Ask a student: "How has Jim achieved so much with so little so quickly?"

- $1,500 of legal services awarded at an investors forum by Brown and Rudnick. Jim used this as part payment for the legal fees associated with his patent application.
- Recruited engineering students to help with the design, manufacture, and testing.
- Developed a "partnership" with Bob Treiber and his firm, from which he received some a "ton of work pro bono" and free space in which to assemble and test the prototype.
- Jim put in $10,000 from his savings; he was awarded $12,500 through the Babson hatchery program.
- Vail paid him the full purchase price ($6,000) in advance.
- He pre-sold nearly half of the first production run; there was a 50% down payment with each order.
- Jim's parents invested $12,500.
- A business angel invested $12,500.
- Roger Little's company, Spire, invested $25,000.
- He won the Babson business plan competition, which brought in $20,000 cash, which he shared among the team members—the first compensation that they had ever received from the project; it also brought in $40,000 of services and lots of publicity.
- He was working on an SBIR proposal.

Jim's was raising $250,000 of A-round financing and expected to raise a B-round of $700,000 to $1 million one year later. He had raised $50,000 of the A round and was in the process of raising the remaining $200,000. He presented his idea to a gathering of angels who invested in socially responsible ventures.

One angel group was interested in investing. The group offered to put in $250,000 in two batches: $50,000 now and the remaining $200,000 later if SPC met its milestones. They wanted to do more due diligence. What's more their valuation of the company was $1 million less than Jim's pre-money valuation of $2,500,000. Jim knew he needed $50,000 immediately.

"What is your advice to Jim? What should he tell the group of angel investors?"

Essentially there are two major issues to be cleared up:

(1) The pre-money valuation.
(2) The amount of money that the angel group will invest and when.

Let's look at the pre-money valuation first:

Ask, "Can Jim justify a $2.5 million pre-money valuation?"

Based on SPC's financial projections, the EBIT in 2008 will be $6.4 million, which means that the Net Income after tax will be at least $3.2 million. Assuming a P/E ratio of 25, the company will have a market capitalization of 25 x $3.2 million [=$80 million].

Jim's company is beyond the seed stage and is closer to the startup stage where the expected IRR is 60%. Hence, the present value of SPC is $80 million/$(1.6)^4$ [= $12.2 million].

The above calculation is contingent on both Jim's forecast and the P/E ratio four years from the present. But if things work out as Jim has forecasted this is a good investment because Jim has put a $2.5 million pre-money valuation on the company, which means a $2.75 million post-money valuation.

But we have not yet discussed the likelihood that SPC will meet its projections. If it has not been discussed earlier in the class now it the time to do it.

<u>Financial projections</u>

Start with the revenue projections. Ask a student to critique the revenue projections. The sense of the class is mostly in favor of Jim's projections. Some students will question the size of the market and whether he can penetrate it as fast as he expects. Others will question the price. Both topics can lead to lively discussions.

- The biggest question is the size of the market. Who are the potential customers?
    - "Is there is a real cost advantage in all of the market segments that Jim had identified?"
    - But if the cost advantage is dubious, purchasers will only be organizations

that want to be seen as doing things that are environmentally friendly

- What will the rate of adoption be?
- Conventional trash collection methods that have been used for many years and have been found to be satisfactory. This is an industry not known for innovation.
- The first purchasers will be pioneers.
- It might take longer than Jim expects before early adopters buy the solar-powered trash contactor.

        - Who is the buyer? A new, innovative product selling for about $4,000 is probably not going to be purchased until it is approved by someone higher up in the organization than the person in charge purchasing items for trash collection. Hence, the purchase decision will require agreement among several people within an organization. That will make the selling costs higher and delay the decision to purchase.
- How did Jim price the product?
    - He estimated what it was worth to Vail. Some would say that he priced it based on its value to the customer.
    - The gross margin in 2008 is approximately 48% assuming that the COGS is associated only with the BigBelly. It is a gross margin that is more in line with cost-plus pricing rather than what it is worth to the customer.
- The 2008 Net Income margin (assuming a 50% tax rate) is approximately 14%, which is good if Jim can achieve it.

Epilog, February 2005

Jim had 17 investors by February 2005, they had put in between $12,500 and $50,000. The NY angel group that he was negotiating with in the case put in only $25,000 but on Jim's terms not theirs.

Jim reported that SPC had not yet sold a compactor purely on its economics (cost savings); every sale so far had been because of environmental factors. SPC had just received an order for 50 units from Queens (New York City). The purchase was not driven by cost savings; rather it was driven by "green" concerns. The city was planning to do an audit of both the garbage truck fuel savings and the reduction in pollution. The purchase was funded by a foundation.

SPC did not receive an SBIR award. It was 15 months before SPC was turned down. Jim commented, "SBIR awards are ill-suited for getting money for seed stage companies."

SPC had 4 full-time employees and 4 part-time employees. It was manufacturing the BigBelly at a plant in Worcester, Massachusetts, that is owned by one of SPC's investors. The cost of manufacturing a BigBelly was down to $3,000 per unit and Jim expected to reduce it further to $2,000. The solar panel, which was purchased from Kyocera, cost $150. Jim wanted to build the order book to 150 units and then raise a B-round of capital.

SPC was exploring leasing units and perhaps placing advertising on them, especially those located in urban areas. For example, one of the BigBellies was located on a busy street corner in New York City and it had attracted a lot of attention.

Jim said the SPC's core competence was finding opportunities, developing products, and growing them through adolescence. Hence, the future of the company might be in development and licensing.

The following is an article from the Worcester Telegram and Gazette:

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Hungry little devil

Solar-powered Big Belly eats garbage for lunch

By Lisa Eckelbecker TELEGRAM & GAZETTE STAFF
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(T&G Staff / DON LANDGREN JR)

WESTBORO— The "Big Belly" works with a certain ruthlessness, but that's not a bad thing when it comes to garbage.

Powered by the sun's energy, which is stored in a battery and used to fuel a small motor, the Big Belly trash compactor developed by startup company Seahorse Power Co. can send 1,800 pounds of pressure down on that candy wrapper you just threw away. And that paper cup. Or anything else that drops into one of its bins.

It's all part of cleaning up the planet for Seahorse President James A. Poss.

"I don't love trash or hate trash. I want to steer people in the right direction," Mr. Poss said. "Unfortunately for me, it's a dirty business cleaning up after everybody."

Founded in April 2003 and financed with money from small "angel" investors, Seahorse is a young company that has made a home in a corner of Carlstrom Pressed Metal Co.'s building in Westboro. Carlstrom President David M. Carlstrom is one of eight Seahorse employees who have spent the last two years developing, testing and marketing a trash container that Mr. Poss first conceived while working on his MBA degree at Babson College in Wellesley.

Seahorse shipped its first Big Belly in February 2004 and, after a year of updates, is preparing to produce 60 Big Bellys by June through its manufacturer, Columbia Tech of Worcester. The production number may even go up to 75 as Seahorse markets its trash compactors to municipalities, park authorities, resorts and just about any place where trash piles up and managers or haulers are looking for ways to reduce trash collections.

Some of the machines have been tested in New York City and at Universal Studios in Florida. The first Big Belly went to Vail ski resort in Colorado, and the resort just installed a newer version at one of the busiest points at its base.

The Big Belly has been easy to use, effective at hiding trash and helpful in reducing trash collections, said Luke J. Cartin, Vail environmental coordinator. The resort may buy more.

"We're looking into it for our base areas," Mr. Cartin said. "They look a lot nicer. They look tidy. We can allocate our grounds crews other ways."

The Big Belly is not what Mr. Poss first thought he would develop. A geological engineer who worked at times in soil pollution assessment, solar energy and electric vehicles, he first wanted to focus on wind power. But the challenges of commercializing wind power turned him to his idea for a solar-powered trash can.

Fellow students from Babson made up early members of Seahorse's team. Others who Mr. Poss knew from the renewable energy industry joined. Some, including Mr. Carlstrom, heard Mr. Poss speak about his plan and asked to be involved. Boston Engineering Corp. of Waltham

provided early engineering services for free and later became a paid consultant to Seahorse.

"I didn't expect to be in the trash industry," Mr. Poss said. "I didn't expect to deal with soil and pollution. It just pains me that we dump pollution all over this beautiful planet of ours."

The Big Belly works with what its developers describe as a fairly simple design. Each is essentially a closed steel box about 50 inches tall, 28 inches wide and 32 inches deep. A 2-foot-by-2-foot solar panel covers the top of the box and feeds energy to a battery sealed inside. The battery connects to a small motor that drives a gearbox.

At the front of the Big Belly, a drawer pulls open to allow users to toss in garbage. When the drawer closes, garbage drops down into two plastic-bag-lined bins that sit on a cart. A sensor near the top of the bins detects when garbage has piled up and signals two compacting blocks to drop down and press garbage into the bins.

When compacted, the trash in each bin weighs about 35 pounds. Together, they make up 42 gallons of compacted trash. Garbage collectors retrieve the trash by unlocking and opening a large door in the front of the container and wheeling out the cart that holds the bins.

The Big Belly is designed to sit outside, soaking up the sun, but it does not really need much energy to operate, according to Jeffrey T. Satwicz, Seahorse mechanical engineer. The compactor uses about 40 watts per day, enough to tamp down trash for about four to five minutes. That's about as much energy as needed to run a hair dryer for about 12 seconds, he said.

Seahorse is working on a way for the Big Bellys to alert garbage collectors when they are full. It might be a wireless text message sent to a cell phone or a Web interface, something that would help collectors avoid a pileup of litter or a trip to an empty Big Belly, Mr. Satwicz said.

"If we let them know when this is full, it would make their trash collection even more efficient," he said.

Seahorse is also testing the limits of Big Belly, studying how much energy it musters even when its solar panels are covered with snow or turned to face in differing directions. One Big Belly is running inside Carlstrom Pressed Metal near the company's lunch room, where lighting is limited.

The Big Belly sells for about $4,500, but the company also leases each compactor for about $100 a month. That cost compares to what municipalities or other large organizations pay for conventional trash cans — about $150 and up, depending on materials.

Seahorse argues that the comparison cannot be limited to containers alone. Conventional trash bins need to be emptied more frequently than Big Bellys, maybe eight to 10 times per day in busy spots, which means paying people and operating polluting, gas-guzzling garbage trucks, Mr. Poss said. A Big Belly can pay for itself in savings in about a year-and-a-half, he said.

"If you use one of these, you can collect once a day," Mr. Poss said. "We can lease them cheaper, for less money than someone could pay someone to collect the garbage."

Although it may seem difficult to persuade cash-strapped public authorities to purchase more costly solar technologies, some municipalities and agencies are buying them, especially as costs come down, according to the Solar Energy Industries Association, a Washington, D.C., trade group. In 1996, about 100 megawatts of solar panels were manufactured globally. By 2004, production was up to 1,100 megawatts.

It started with solar panels that provide power to light up highway signs and has moved into solar light strips for helipads, bus shelters and other facilities, said Colin C. Murchie, SEIA

director of government affairs.

"You're seeing it start to move into things like runway lights, taxi stands and street lighting," Mr. Murchie said. "Effectively, it hits a certain price point and it just goes in."

Seahorse has hired DCI Engineering Services to finish the design of the Big Bellys and Columbia Tech to manufacture them. Both are Worcester-based subsidiaries of Coghlin Cos. Inc.

Big Belly production should begin in earnest in about four to six weeks, and Columbia Tech expects that it will be producing thousands of the compactors in a few years, said Christopher J. Coghlin, president of Columbia Tech.

"I think it's got incredible potential," Mr. Coghlin said. "It's going to enhance the time it takes to do trash collection. It's going to reduce the overall amount of trash collected."

As it continues work on the Big Belly, Seahorse is also developing a solar-powered compacting Dumpster — a *really* Big Belly called the Hippo. It would work on the same idea: solar panels collecting power to tamp down large loads of trash for commercial customers.

Dumpster users could get more into their dumpsters without installing costly electric lines for compactors and haulers could make less frequent trips to Dumpsters, said Mr. Carlstrom.

"They can have the benefits of compaction," he said. "The retailer's happy and the waste hauler is happy."

If Seahorse can develop something with sufficient power, a solar-powered compacting Dumpster could be a feasible alternative in trash transfer stations far from electrical lines or at sites where customers do not want to put in costly electrical wiring, said James A. Harvey, chief executive of E.L. Harvey & Sons Inc. of Westboro, a commercial waste operation.

"I've got one application, it's going to cost $2,000 just to run electricity to a spot, and if we could run something off solar power, I could maybe talk to these people about it," Mr. Harvey said.

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