

# **Manufacturing and Selling a \$4.00 T-shirt in a \$1.00 World**

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## **Summary:**

The textile industry produces one of the world's basic commodities. Fibers, fabrics and apparel are indigenous products throughout the world. The textile manufacturing industry historically has followed low-wage labor rates and even slave labor in order to produce its products as cheaply as possible. With the creation of the WTO (World Trade Organization) and NAFTA (North American Free Trade Agreement) and advancements in communication technologies such as email and the Internet, western textile manufacturing firms have migrated to developing regions of the world leaving thousands of deserted factories and unemployed workers in the United States.

Much of the apparel worn throughout the world is produced from cotton. Cotton is one of the most chemically intensive agricultural products and has a large ecological footprint unless it is grown organically. Therefore, cotton textiles have ecological and social issues that need to be addressed to be more sustainable. [1]

This paper describes the efforts of a small group of apparel manufacturers and marketers that are attempting to produce a high quality and more sustainable printed organic cotton apparel. The goal is to make a garment that meets all the current organic apparel standards, is produced in a socially responsible and transparent manner, and is of the highest quality possible in order to compete against the other extreme of the apparel industry, which utilizes conventional cotton, offshore, low-cost labor and unsound printing techniques.

This business model creates value for each of the supply chain stakeholders, but requires rapid response, high attention to detail, and utilization of the latest technology by all. These requirements are the antithesis of the old Industrial Revolution textile model, which was based on the lack of specialization, large amounts of inventory, and slow product development and delivery cycles.

It has been difficult to succeed because of the increasing price gap between conventional cotton apparel, produced offshore, and the higher costs of domestic organic cotton production. Plus, there remains a lack of perceived value and consumer citizenship.

Just as in the organic food marketplace, which has been growing at a considerable rate in recent years due to the perceived benefits over non-organic food, sustainable apparel manufacturers must find the values that will attract a consumer to buy a \$4 t-shirt in a \$1 world. Or perhaps better stated, find a way to increase the citizenship in apparel consumption by delighting the consumer.

## Introduction

T.S. Designs, Inc., (TSD) is a North Carolina-based textile screenprinting company founded in 1977 by Tom Sineath. A few years later Eric Henry joined Tom after starting his own screenprint sales company while still attending the North Carolina State University. At the peak of its growth as an apparel screen printer, TSD employed over 100 people and had revenues of close to \$4 million a year. Its value proposition historically had been to produce very high quality and innovative screenprinting services for major retail brands. TSD has printed for companies such as Nike, Polo, Reebok and Tommy Hilfiger and has acted as a subcontractor to major textile producers such as Vanity Fair Corp., Sara Lee Corp. and William Carter Company. By all reasonable standards, TSD has been a profitable and successful small company within the textile geography of the southeastern United States for over 25 years.

With the advent of NAFTA agreement in January 1994, most of the major brands in the United States began to rapidly move apparel sourcing out of the United States – first to Mexico, then to Central America and now to China. The major United States textile producers have become trading companies, purchasing commodity textiles from countries where wages and working conditions are far below US standards. The American Textile Manufacturers Institute (<http://www.atmi.org>) goes into great depth about the impact of this business transition. These changes in trade regulations caused a market that was stable for 50 years to leave the USA in less than 7 years.

By 1998, TSD was faced with a severe decline in both volume and selling price of conventional, plastisol-based screenprinting jobs due to this international migration. This problem was compounded by the loss of other local manufacturers that supplied the components necessary for the production of apparel. This resulted in a glut of screenprinting capacity in the United States and a deflation of screenprinting prices. Per-print revenue and volume dropped by more than 50 percent. Since the passing of NAFTA, over 825,000 jobs (or 53 percent) have been lost in the United States in the textile and apparel sectors. *Figure 1* taken from the US Department of Bureau of Labor Statistics (<http://www.mbginfosvcs.com>) outlines a further breakdown of this information.

**Figure 1**

<u>During the 48 Months: December, 1990 - December, 1994</u>		
* APPAREL JOBS LOST:	(49,100)	-5.4%
* TEXTILE PRODUCT JOBS GAINED:	8,200	10.4%
* TEXTILE MILLS JOBS LOST:	(2,600)	-0.5%
* TOTAL INDUSTRY JOBS LOST	(43,500)	-2.7%
<b>NAFTA WITH MEXICO WAS PASSED IN NOVEMBER, 1993 TAKING EFFECT JANUARY 1, 1994.</b>		
* TRANSFER OF MANUFACTURING TAKES A YEAR		
<u>IN THE LAST 104 MONTHS: December, 1994 - August, 2003</u>		
* APPAREL JOBS LOST:	(559,500)	-65.5%
* TEXTILE PRODUCT JOBS LOST:	(45,300)	-20.4%
* TEXTILE MILLS JOBS LOST:	(220,800)	-46.0%
* TOTAL INDUSTRY JOBS LOST	(825,600)	-53.0%

Source: US Dept. of Labor, Bureau of Labor Statistics and MBG Information Services "www.mbginfosvcs.com"

TSD has adjusted its business, resulting in cut-backs, lay-offs, and poor financial performance over this period of 1995-2002. These circumstances forced TSD to began a search for a new value proposition for the company. Was there a way to produce and redefine a niche in the apparel market where high quality, rapid turn around, and innovation were valued?

### **The traditional textile model**

The traditional textile production model was based on commodity work-flow, similar to Henry Ford's concepts of the assembly line. In this process, cotton fiber is spun into yarn and then knit into fabric, which is then bleached, dyed and finished. The fabric is cut and sewn into garments and then it is printed, packaged and shipped to the retail store.

One of the problems with this model, in a rapidly changing fashion conscience world, is that color and print design of the fabric must be selected well in advance of the screenprinting. When a printed T-shirt is sourced in Asia, for example, reported process times in excess of 20 weeks are common. This does not fit with "swarm" marketing models describe by Kevin Kelly [2] that indicate that the successful products of the 21<sup>st</sup>

century will respond to an upsurge of almost instant demand due to the influence of the mass media, TV, video and the Internet. The increased number of apparel products being sourced offshore and the impact of much longer lead times have resulted in an inventory control issue at the retail shelf. This is complicated even further by the consumer wanting more and more choices. A 20-week supply chain cannot respond in a timely matter unless large inventories of dyed garments are maintained. Large inventories are not desirable in a fashion-conscious world where one color is in and then out within a single season, and where retailers are looking for ways to conserve cash flows.

Therefore, if a screenprinting company is to take advantage of a quickly changing fashion market, the color and prints of the T-shirts have to be produced and on the store shelves within days, not months. It would stand to reason that if a supply chain and technology could be developed that could take advantage of a more rapid response model, it should create a competitive advantage versus the slower, commodity-driven products, products produced in high volume and low cost from offshore suppliers. This has been researched by [TC]<sup>2</sup> (<http://www.tc2.com>) a non-profit organization dedicated to improving textile business systems and manufacturing resources in the Research Triangle Park, North Carolina. This company has developed a series of rapid replenishment models for the apparel industry introduced during the 1990s.

Unfortunately, deflation due to globalization in textiles and international currency fluctuations, have to date, offset the real value of the rapid response model. However, recent interviews with major apparel producers do indicate that inventory costs, the cost of markdowns, and lost sales opportunities due to products not meeting customer demands, are impacting profits. Retailers are demanding shorter product development cycles, but with distance and shipping times between the far east and the United States being what they are, there is only so much that can be done to improve these cycle times.

It appears that the deflation in textile apparel due to globalization is not producing value for all consumers. Poor quality, slow product development cycles, excess inventory costs, and loss of fashion timing, may be placing commodity textile importers at a disadvantage, at least in some of the fashion areas of apparel. This creates an opportunity for innovation. These factors should provide some advantage for a local, highly innovative apparel producer who can improve cycle times.

### **Organic cotton versus conventional cotton**

Consumers have endorsed the benefits of organic foods. Is there a similar value proposition for organic cotton? The challenge for organic cotton, in comparison to organic foods, is that the consumer is not directly confronted by the negative environmental impact, i.e. there is no direct harm from wearing conventional cotton apparel as there may be when eating non-organic food. Plus, the price of organic cotton continues to remain considerably higher than conventionally grown cotton due to its small supply and challenges in cultivation.

There has been a lot of information published on the environmental benefits of organic cotton. Under **Figure 2**, Sandra Marquardt of the Organic Trade Association in Greenfield, Massachusetts, has compiled a list of some of the reasons why organic cotton production is important to the long-term health of the planet. Sandra's complete references for this research are:

<http://www.sustainablecotton.org/NEWS007/news007trends.html>.

Conventional cotton has resulted in a huge negative impact to both the environment and the people and communities directly involved in the growing of it.

## **Figure 2**

- Cotton uses approximately 25% of the world's insecticides and more than 10% of the pesticides (including herbicides, insecticides, and defoliants). (Allan Woodburn)
- Approximately 10% of all pesticides sold for use in U. S. agriculture were applied to cotton in 1997, the most recent year for which such data is publicly available. (ACPA)
- Eighty-four million pounds of pesticides were sprayed on the 14.4 million acres of conventional cotton grown in the U.S. in 2000 (5.85 pounds/ acre), ranking cotton second behind corn in total amount of pesticides sprayed. (USDA)
- Over 2.03 billion pounds of synthetic fertilizers were applied to conventional cotton the same year (142 pounds/acre), making cotton the fourth most heavily fertilized crop behind corn, winter wheat, and soybeans. (USDA)
- The Environmental Protection Agency considers seven of the top 15 pesticides used on cotton in 2000 in the United States as "possible," "likely," "probable," or "known" human carcinogens (acephate, dichloropropene, diuron, fluometuron, pendimethalin, tribufos, and trifluralin). (EPA)
- In 1999, a work crew re-entered a cotton field about five hours after it was treated with tribufos and sodium chlorate (re-entry should have been prohibited for 24 hours). Seven workers subsequently sought medical treatment and five have had ongoing health problems. (California DPR)

The supply of organic cotton grown in the United States continues to decline. Retail brands interested in organic cotton are going offshore to purchase their organic cotton at lower prices and to take advantage of the apparel manufacturing that has also moved offshore. Under **Figure 3** more information from Sandra Marquardt's research shows the acres of organic cotton planted in the US from 1990 to 2001.

**Figure 3**

<b>Table 1: Estimates of United States Acreage Planted with Organic Cotton: 1990-2001</b>	
<b>YEAR</b>	<b>ACRES</b>
1990	900
1991	3,290
1992	6,305
1993	12,402
1994	15,856
1995	24,625
1996	10,778
1997	9,050
1998	9,368
1999	16,785
2000	13,926
2001	11,459

The supply of conventional cotton on the world market continues to grow faster than the demand of cotton products. This is resulting in cotton prices being at some of the lowest ever recorded, which results in lower prices for organic cotton as well. World cotton production is expected to increase by seven percent to 20.5 million tons in 2003/04, the third largest crop on record according to the International Cotton Advisory Committee (ICAC), an association of 42 governments of cotton producing and consuming countries. Therefore, the deflationary pressures on cotton fiber will continue as demand is not expected to rise at anywhere near that rate.

## The REHANCE® Business Model

Conventional screen printed T-shirts use a surface coating on an already dyed and finished garment. The ink most widely used is plastisol, which is solvent-based and made from PVC (polyvinyl chloride) and phthalates. There are serious environmental and health issues associated with the manufacturing and disposal of PVC because of dioxins.

PVC is a major chlorine donor and thus a significant cause of dioxin generation in a large percentage of identified dioxin sources. These facts are further described by Joe Thornton in April 1997, in an article entitled: “Dioxin from Cradle to Grave”. It can be found at: <http://www.greenpeaceusa.org/media/publications/dioxins/dcgsum.htm>.

One of the on going quality challenges that TSD and the screenprinting industry have is how to produce a breathable print on a medium to dark color T-shirt. In the early 1990s TSD addressed this along with others in the industry by utilizing discharge screenprinting. The discharge process uses a chemical called zinc formaldehyde sulfoxalate, which under heat, changes the chemical structure of the dyes in the fabric and removing the color. This process was inconsistent, required the carrying of dyed T-shirt inventory, and had environmental issues due to zinc and the unknown composition of the changed dyes on the garments.

Another challenge of printing plastisol inks on cotton T-shirts is that it does not have a favorable lifecycle as outlined in the book Cradle to Cradle by William McDonough and Michael Braungart [3]. The book reasons that in order to be sustainable a product has to become food for another process at the end of its useful life. Products are described in one of two categories: biological or mechanical. This means that a product has to be biodegradable (biological) or it has to be recyclable (mechanical). When plastisol ink (mechanical) is cured onto a cotton T-shirt (biological), automatically a waste is created since it does not fit into either cycle.

Early in 1995 TSD began a dialogue with Burlington Chemical Company (BCC), who had developed a technology that would allow the modification of cellulose fibers on a molecular level (called nano-technology), to change the way the fibers would react to reactive dyes. TSD saw an opportunity to refine this technology to work in a textile screen print operation in order to address some of the quality and sustainability challenges that they were facing in the apparel industry with plastisol inks. This technology had the potential to disrupt the current plastisol technologies by producing a print of higher quality based on the principals of “greener production.” This technology had the opportunity to produce a competitive advantage for TSD in the changing global market.

After working with BCC for almost a year and with roughly a quarter of a million dollars invested between the two companies, they refined the technology to work, resulting in a registered trademark for the naming of the technology, REHANCE, and three patents. The REHANCE ([www.rehance.com](http://www.rehance.com)) technology was developed on a “green chemistry” model reducing environmental issues that would have to be addressed at a later time. It

was later discovered that REHANCE already met the pending North American Draft Organic Fiber Standards: Post Harvest Handling, record Keeping, & Labeling. These standards can be found:

<http://www.ota.com/pics/documents/FiberStandardsDraft5Rev.pdf>.

With REHANCE, TSD is able to print the finished, undyed apparel product, then garment-dye it to a specified color, which eliminates investing in color inventory and allows for quick responses to unique color requests. The REHANCE technology eliminates the plastic surface coating, allowing the print to breathe and to not abrade over time. The REHANCE process utilizes garment dyeing of the finished apparel product which results in the garment having zero shrinkage. This addresses the typical issue of cotton apparel products shrinking once the customer has made the purchase and washed the product at their home. All these benefits add up to a much higher quality product than is typically found on the retail shelves. *See Figures 4,5 and 6.* REHANCE produces not only a garment of higher quality but with an improved life cycle and ecological footprint.

REHANCE therefore, has given TSD a competitive edge in the changing global market with a better quality product, hopefully with higher value for the consumer.

Figure 4

# The most sustainable, highest quality, printed T-shirts available

**Certified 100% Ring Spun Organic Cotton**

**Printed with REHANCE Apparel Technology  
No noxious PVC or Phthalates**

**Sewn at either a worker-owned cooperative in Nicaragua or in North Carolina**

**Only biodegradable detergents used, no optical brighteners or chlorine bleach**

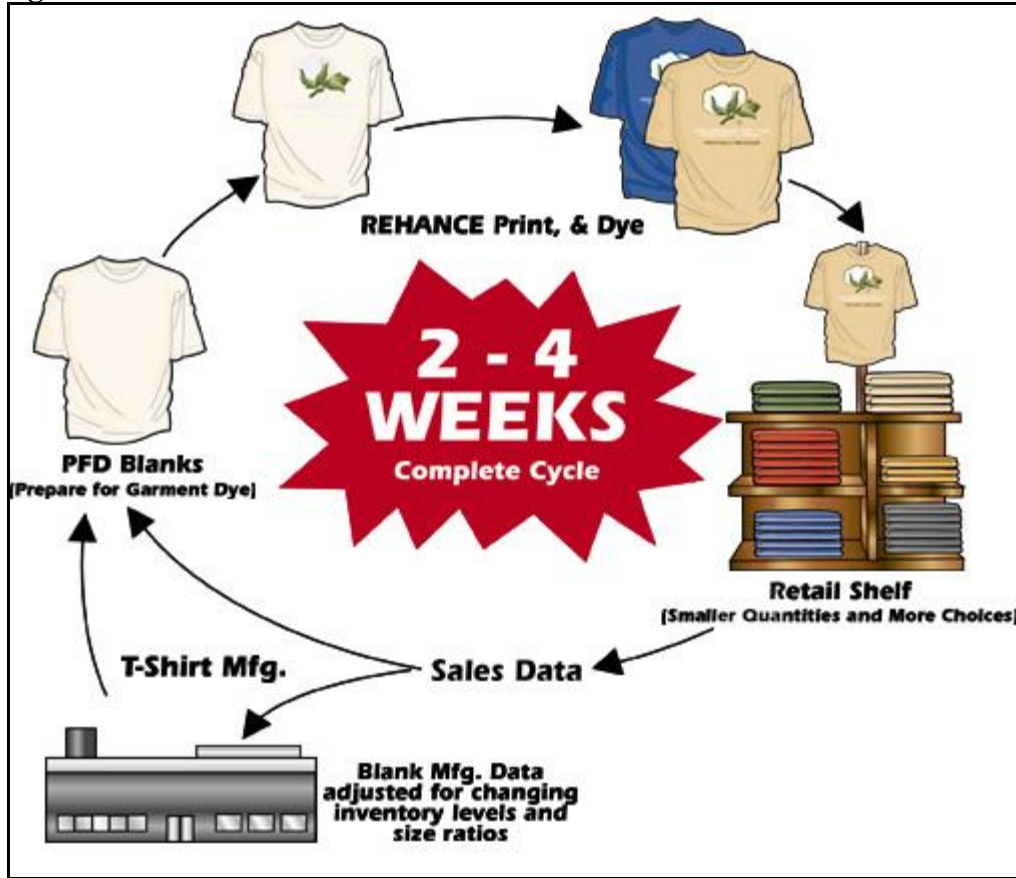
**Garment-dyed with low-impact reactive dyes**

**Zero Shrinkage!**

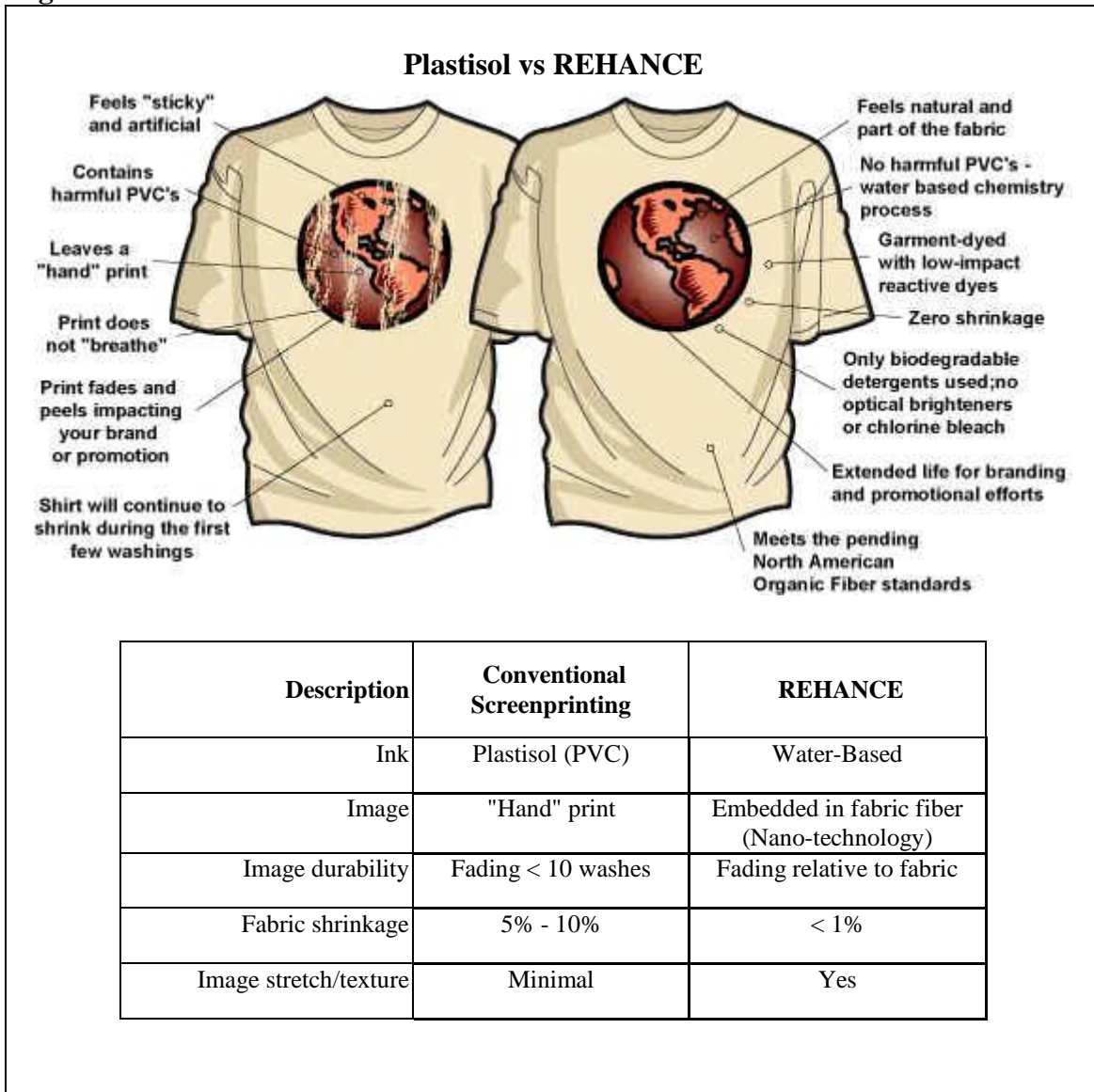
**Printed fabric before being dyed**      **Printed fabric after being dyed**

100% ORGANIC COTTON  
ENVIRONMENTALLY FRIENDLY  
PRINTING BY REHANCE®

Figure 5



**Figure 6**



### Understanding Sustainability

Sustainability for TSD is balancing the three “P’s” of Planet, People and Profits. Balancing this triad is difficult; however, TSD feels it is a worthwhile goal.

TSD has concerned itself with being responsible for its impact to the environment (Planet) for over 15 years. This started when Eric Henry attended an Earth Day event in the late 80’s. He determined that an even greater positive environmental impact could be accomplished applying green principals at work as well as in the home. The first change that TSD implemented was the elimination of Styrofoam coffee cups, having the employees bring in their own mugs instead. TSD has since been involved in many

aspects of conservation, waste reduction and innovation including recycling, energy conservation, product development and alternative landscaping. TSD has only started tracking the financial benefit of these conservation measures in just the last few years so it is impossible to determine an exact dollar amount that these steps have had.

The company has received much recognition over the years for its accomplishments, including an award from the governor of North Carolina in 1994 for Outstanding Achievement in Waste Reduction for small businesses. More information about ways in which the company has been recognized can be found on the Web site: <http://www.tsdesigns.com/pressrelease.htm>.

TSD also understands the importance of being responsible for the well-being of their employees (People) and since the company's beginnings have included benefits such as retirement plans, profit sharing and health care. The making of a Profit, although it has been a challenge over the last five years, is important as the company has struggled through the rapidly changing market.

Therefore while the three "P's" were separate goals and challenges for TSD, the concept of sustainability provided a congruent strategy that encompassed them all. Sustainability gave TSD the vision to pull its ideas together and understand what was needed to be a more responsible company and flourish in a dying industry. Since that time TSD has adopted the concept of sustainability as creating economic, ecological and social prosperity while ensuring that further generations have the same opportunity – the triple bottom line. TSD revised its mission statement to say, "To build a sustainable company by looking after people, planet and profits."

TSD was first introduced to the idea of sustainability about two years ago by Sam Moore, Vice President of BCC, who had developed a sustainable plan for his company a few years earlier (<http://www.burco.com/Downloads/SUSTAIN.pdf>). Eric Henry spent a year attending conferences and seminars to hear some of the pioneers of sustainability, including Paul Hawken, author of "Natural Capitalism"; Lester Brown, author of "Eco-Economy: Building an Economy for the Earth"; and Ray Anderson, founder and past CEO of Interface and author of "Midcourse Correction Toward a Sustainable Enterprise: The Interface Model." TSD also expanded its involvement in sustainable organizations to include the Organic Trade Association, Co-op American, Social Venture Network, Net Impact and Save our State.

TSD has discovered that by educating its employees and clients, the momentum of change has increased dramatically. Project success rates have also increased due to this unified mission. TSD has quickly become recognized as a good choice for printed T-shirts at companies with similar sustainable missions for their businesses. Companies such as Clif Bar, Ben and Jerry's Ice Cream, Greenpeace and Timberland, have seen the value in TSD's products. In September of this year TSD was asked to host the business tour of North Carolina's *Save our State* (<http://www.ncsos.org>) to showcase the many sustainable initiatives that the company has on going see **Figure 7**. A list of these activities, which include projects such as installation of a photo voltaic solar array, gray

water systems, and low-impact landscaping, can be found at <http://www.tsdesigns.com/sustainabilityinitiatives.htm>.

**Figure 7**



### **Addressing Social Impact**

TSD's business model in 1995, involved services: printing on garments provided by its customers. There was very little consideration given to the social aspects that the product or process had outside of the employees of TSD. In its "old" screenprint business, TSD has had very little responsibility for supplying the T-shirt blanks and did not pay much attention to where and how they were being made.

Within the last five years, there has been a major decrease of apparel manufactured in the United States due to the politics of trade legislation as described earlier. This has shifted the source of textiles from domestic to now almost completely offshore. Most people in the Southeast have seen or read stories about the poor working conditions or minimal pay at these offshore facilities. This is due to lack of regulations and education. As TSD developed and understood their company's more sustainable mission, they realized that its social responsibility went beyond their employees and the screen printing process itself. TSD has accepted greater responsibility for the social impact of everyone in its supply chain including the sourcing of the garments for printing.

Recognizing this need for a greener supply chain, TSD began conversations in 2000 with Bena Burda, the founder of Maggie's Functional Organics in Ypsilanti, Michigan. Maggie's could be a supplier of organic cotton garments. Maggie's had started working with Mike Woodard of the NGO "Jubilee House" in Nueva Vida, Nicaragua, to establish a worker-owned, women's sewing cooperative to sew these organic garments. The Nueva Vida Women's Sewing Cooperative is located in an area of Nicaragua that had been devastated by Hurricane Mitch in October 1998. The women built the sewing facility themselves and they are organized such that all profits of the venture go back into the business for long-term sustainability. The women are paid top wages and benefits. The co-op was set up to do the cut and sew portion of organic apparel products that Maggie's

was selling in the U.S. TSD, Maggie's, and the co-op, decided that they could be a part of the developing REHANCE business model. Quality standards were established and shipments began, but there have been many challenges that are being resolved.

There were several reasons that extraordinary efforts have been made to bring the co-op into the REHANCE supply chain. After meetings with both Bena and Mike along with viewing a video of the conditions at the co-op, TSD felt an obligation to bring these people who had worked so hard into the global marketplace. This was certainly a People consideration, but there was also a profit motive and quality motive as the number of cut and sew operations in the U.S. had dwindled to only a handful, and Nicaragua was geographically much closer than China.

The relationship between all parties has not been easy. All have struggled over the last several years. This has been due to the lack of funding, inadequate training, outdated equipment, inconsistency of orders, and the complexity of making consistent high quality apparel in a developing country.

The co-op has been working for almost a year to arrange their own outside financing so they can have greater control over their sourcing and be able to supply a finished apparel blank to TSD and Maggie's. This will give the co-op more control over the project and the opportunity to make greater profits. With the addition of the co-op to the supply chain, TSD now had two approved cut and sew suppliers. (TSD also maintains some cut and sew at Granite Knitwear in North Carolina due to the increase of transportation time and cost with the co-op plus the importance of keeping some jobs in North Carolina.)

### **Transparent Supply Chain**

One of the early discoveries was that REHANCE demanded a higher quality preparation of the T-shirt fabrics than was required in the older printing processes. With plastisol screen printing, the condition or consistency of the T-shirt fabric is not material in regards to the final outcome of the print. This is not true for REHANCE, where the purity of the cotton fabric is imperative to the final print quality.

One of the challenges TSD faced is that the quality requirements required closer communications with companies that would manufacture their T-shirts. New specifications to insure production of a high-quality product utilizing the REHANCE process were necessary. A preparation process and education system was developed by BCC and TSD to meet this need, and this process included a green manufacturing method and standards for organic cotton fabric processing.




The team developed standards and procedures from the yarn to the finished product that would be required to insure a consistent quality product. TSD found this initially very challenging. Changes in manufacturing of T-shirt blanks in an industry that did not realize the new quality standards, was difficult. Due to the higher quality requirements for REHANCE and the global price pressures being put on the domestic apparel manufacturing markets, TSD has found itself going through a lot of different companies



to find ones that matched up to the REHANCE requirements. Over the last two years a supply chain of like-minded companies has grown with the shared goal of producing a high-quality, competitive, organic cotton T-shirts.

Sustainability requires great transparency to allow customers to monitor the activities in a green manufacturing process. TSD decided on the direction of making its supply chain transparent because there are no organizations that audit the processes currently.

TSD keeps its supply chain information up-to-date on the Web site at <http://www.tsdesigns.com/partners.htm> and **Figure 8** has the current list of suppliers as of the date of this paper. TSD is very open with who it is working with and does not hesitate if a client wants to contact one of the suppliers in the group directly.

**Figure 8**

	<p><b>Athena Mills</b> is T.S. Designs' ringspun organic yarn supplier. It opened in 2001 in the inner-city of Richmond, California, one of the more neglected urban areas in northern California. While aiming to create job training and development for the area, it pays a "living wage," part of a national movement on poverty reduction. By providing T.S. Designs with ringspun organic yarn, Athena Mills ensures you a soft, long-lasting, and sustainable T-shirt.</p>
<p><b><u>B &amp; J Knits Inc.</u></b></p>	<p><b>B&amp;J Knits</b> handles the knitting process of our yarn. Their web site is still in development, but some information is available.</p>
	<p>Established in 1974 as a springboard for its manufacturing company, Granite Knitwear, to enter the small but rapidly growing retail market of basic tee shirts, Cal Cru has grown into a well respected, high quality knit garment supplier. We are family owned and our extended family of employees, some of whom have been with us since we began, are proud to print on the label of each shirt <b>MADE IN THE USA!</b></p>
	<p><b>Maggie's Functional Organics</b> is T. S. Design's primary T-shirt partner. Maggie's manufactures T-shirts that are made from 100% organic cotton and utilizes the craft of Maquilador Mujeres, a worker-owned sewing cooperative located in Nueva Vida, Nicaragua. Together with other key partners and non-profit groups, T.S. Designs and Maggie's supports the continued development of the cooperative and closely collaborates on how to make the world a better place.</p>

<p><b>Maquilador Mujeres</b></p>	<p>Maggie's Organics, working with the NGO Jubilee House has helped in the establishment of a worker owned sewing cooperative in Nueva Vida, Nicaragua. Hurricane Mitch, and a series of other natural disasters have ravished this area. As a result many inhabitants found themselves forced to work in sweatshops in order to survive.</p> <p>The women of Maquilador Mujeres built the sewing facility by hand and all profits of the venture go back into the business for long-term sustainability. Maggie's partners with Maquilador Mujeres for the production of organically grown and responsibly sewn T-shirts and camisoles.</p>
	<p><b>Burlington Chemical</b> T.S. Design's key partner and innovator in the development of the REHANCE technology. Burlington Chemical's commitment to sustainability is evident in the myriad of environmental practices the company employs and in its R&amp;D efforts to discover, develop, and market environmentally friendly chemicals and chemical processes. T.S. Designs and Burlington Chemical actively manage the advancement of REHANCE technology and the promotion of socially responsible manufacturing.</p>
	<p><b>Meritage</b>, a NC-based company is T. S. Design's partner in apparel dyeing. Meritage's commitment to continuous improvement in their manufacturing practices and utilization of environmentally-sustainable dyeing technology is one reason they have been selected as a key partner for T. S. Designs. Our close collaboration in the dyeing and finishing process ensures you have a quality product.</p>

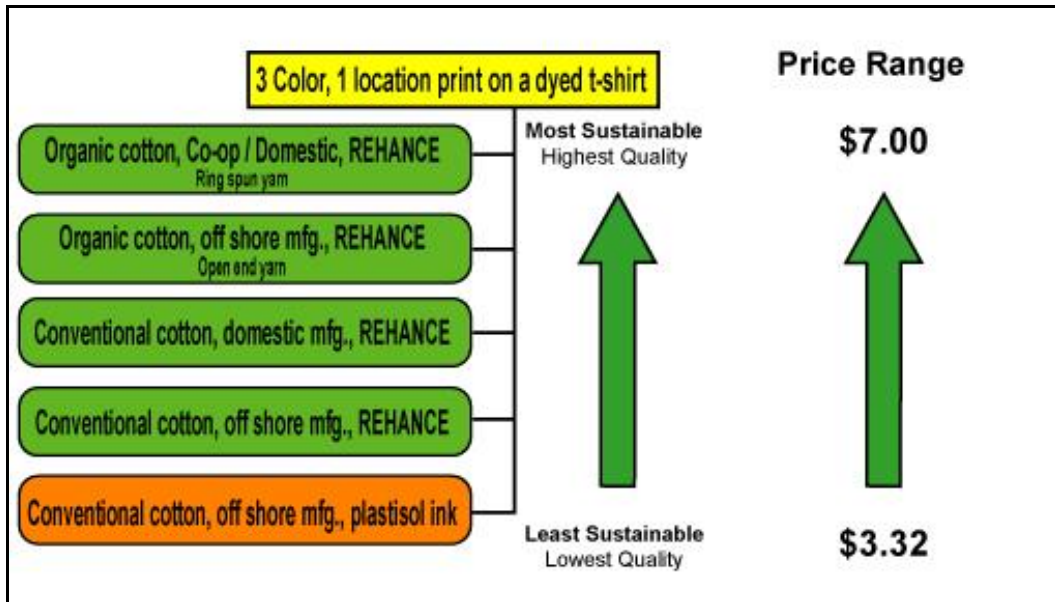
### The growing price difference

Since 1997, TSD has seen a dramatic drop in the price of conventional cotton T-shirt prices, which can be attributed to an oversupply of conventional cotton on the global market, manufacturing moving to countries with lower wages, currency issues, and the current global economic slowdown. All of these factors are causing an oversupply of T-shirts. Current prices for conventional cotton, unprinted white T-shirt from a major brand can be as low \$0.65 per shirt while that same shirt two years ago was about \$1.50.

During the same period, organic blank cotton T-shirts cost \$3.50 each. Organic cotton T-shirt manufacturers are handicapped by not being able to generate the economies of scale seen with non-organic producers. In addition most of the organic supply chain is based in

the United States, which has higher labor costs than operations in other countries. Due to this growing price gap, TSD developed what are called “sustainable print” options so as to give clients choices. These options provide for REHANCE printing on organic and non-organic garments to meet a variety of economic and sustainability requirements. The diagram in *Figure 9* was developed as a sales tool by TSD to outline these options.

**Figure 9**



### Conclusion

TSD has gone from a plastisol screenprinting company to printing REHANCE and offering a more sustainable, printed apparel package. By controlling the process, from purchasing the certified organic cotton yarn from the fields in California, to shipping the finished T-shirt to their clients, TSD has greater control and can improve the social and environmental impact of its process.

TSD is planning to establish this business model in other areas of the country and globally. Current targets are the West Coast, and other parts of the world. The goal is to continue to increase the speed to market, reduce the environmental footprint and financial impact of transportation on the supply chain, and delight the customer with a superior product.

The jury is still out if TSD will find enough customers that perceive the value of organic cotton and the REHANCE printing process. Will they pay the higher price for a higher quality print and organic-based garment? If the production of a greener, higher quality printed garment can gain market share, will it stimulate the transition from the conventional plastisol printed T-shirt market to a greener, more sustainable model?

Presently, the more sustainable, organic, REHANCE product line represent about 20 percent of TSD total revenues, but it is the fastest growing part of the business. TSD continues to gain efficiency in its manufacturing processes. This will lead to some reduction in costs. However, efficiency gains cannot keep pace with the deflation of conventional cotton T-shirts, produced offshore with plastisol based printing. The challenge comes with the majority of consumers basing most of their apparel-buying decisions on price and not the environmental impact of their purchase. As with organic foods, the challenge to organic apparel producers is to find the value in organic, printed apparel that will appeal not only to the ethical sensibility of the consumer, but also delight them. Ultimately, TSD must turn “*consumers into citizens*” to make a successful transition to being a more sustainable company. This is a sticky proposition, not unlike the challenge of increasing the efficiency of automobiles or investing in mass transportation. Not only does the product need to be more sustainable, but lacking the support of government or consumer understanding the value, the product must be of higher quality and carry a higher esthetical value to gain market share. Achieving these characteristics simultaneously is a massive challenge.

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