



Conversion Technologies

Industries, Inc.

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As you observe almost any manufacturing or distribution location there appears to be a blight overtaking the land. Wooden pallets are everywhere! The nation's landfills are no longer willing to dispose of them. Tons of hardwood are harvested each year to make these tormenting devices. The truth is, everything we buy and use is typically shipped on a pallet. The country can't do without them, but must do something about them. There is a solution to displace wood with a comparably strong material that can easily be recycled. **SpaceBoard** has the potential to capitalize on the aggravation caused by wood in the packaging and shipping industry.

In the early 1980's the Forest Products Laboratory in Madison, WI, was tasked with finding a useful application for short fiber (hardwoods) that was being introduced as a waste to the landfills. Since short fibers were not reusable in the papermaking process, the scientists at FPL determined that some useful product could be made by forming the short fibers in a compression molding process.

After several years of research, FPL invented a process that produced a product that is called "**SpaceBoard**". This technology has emerged that significantly enhances the basic Chapman Process of hardboard production to create a product that exhibits strength characteristics comparable to wood. In a molded forming process, a panel (4' x 8') of "SpaceBoard" can be produced efficiently in up to 1 inch thickness that can then be fabricated to make shipping pallets, appliance bases, bulk bin containers and more. Using a silicon and stainless mold is the critical operative in setting "SpaceBoard"

technology apart from all other techniques of composites material forming. The raw material for this technology can be many forms of recycled and post-industrial waste fiber.

THE "SPACEBOARD" PROCESS

Using the technology described above, a simple, proven and inexpensive production line can be erected to generate several hundred panels of "Spaceboard" per day. The concept uses pulped furnish from old corrugated or other recycled paper actually being discarded to land fills. By distributing a layer of furnish (slurry of raw material fiber) over the proprietary mold, the system draws the water out of the sheet of "SpaceBoard" to cause the formation of a 4' x 8' molded hardboard. The sheet then undergoes a "cold" press to remove water. The final stage requires a steam-heated, multi-opening press to physically "form" the furnish in the shape of the mold and then heat it to "bone dry" while pressing at 150 psi for shape, strength and hardness.

Once the sheet is made, fabricators will cut the 4' x 8' sheets into appropriate segments and then glue them into the final product form. Stacks of the final product will be shrink-wrapped and shipped to the customer for immediate use. The process has considerably reduced the amount of energy required to produce the "equivalent product" had there been a requirement to make the product from wood. The final consideration is the significant reduction in use of wood that occurs when displacing wooden "throw-away" products with recycled paper in the form of "Spaceboard".

THE COMPANY

Conversion Technologies Industries, Inc., is an emerging technology company that will develop the processes and systems to produce and market this patented technology for packaging and material handling to displace wooden pallets, appliance bases and bulk bin containers. The world-wide exclusive sub-license for SpaceBoard technology (a proprietary process that produces a unique 3D fiberboard of structural molded fiber (SMF)) has been held since 1994. Through technology advancement and commercial application the company intends to convert post-consumer waste fiber (sludge), primarily from recycling paper mills, into packaging and material handling products.

Having already proven applications as a pallet and an appliance packaging skid, SpaceBoard is in position to become a displacement material for millions of dollars in wooden products. Currently, the company is negotiating a merger with an environmental company to build several SpaceBoard plants.

BUSINESS OPPORTUNITY

There exists throughout manufacturing industry a strong desire to shift from wooden and plastic packaging materials to a recyclable product that will serve the performance function at the same cost. In just one simple industry - pallets - the U.S. makes and sells 585,000,000 pallets per year at an average selling price of \$6. Forty-seven percent (47%) of those pallets made are only used once and discarded. Ideally, a material like SpaceBoard could displace the use of wood in the pallet industry using a material that is both recycled and can be recycled. It requires less energy to make, ship and recycle/reuse. This material, when used in constructing composite pallets can compete head on with the wooden pallet industry. The differences SpaceBoard makes in a comparable pallet are:

- ▶ Lighter weight (about 30# per pallet)
- ▶ Same load (1500 - 2000 #)
- ▶ Equivalent price (\$ 6-10 @)
- ▶ No nails or splinters (this helps reduce workers' comp claim)
- ▶ Recycled and recyclable

The packaging and material handling industries are presently using wooden or Extended Poly Styrene (EPS) products for pallets, appliance bases and bulk bin containers. Due to the scarcity of wood, the increased prices caused by the lack of wood, high plastics prices, and the difficulty associated with trying to discard the wooden and EPS product after it has been used as solid waste, alternatives are in high demand. The industries are committed to displacing wooden and EPS products with other choices that are recycled and recyclable like SpaceBoard.

Ideally, the next-generation pallet, for example, will be made from a material that has been recycled and then able to be recycled once its useful life has ended. "SpaceBoard" products are capable of displacing these wooden products and will have a strength-to-weight ratio of 2:1 over equivalent wooden materials while weighing much less than the same products made of wood. The Pallet requirements of industry typically have three (3) categories of performance

characteristics. A light weight (less than 12 pounds) pallet that will carry less than 1,000 pounds of load. The second level (which when included with the first category) accounts for over 50% of the pallet market should weigh less than 35 pounds and carry 1,500 pounds of load . Extensive testing of the SpaceBoard pallet (not optimized) at the Forest Products Laboratory yielded a 35 pound pallet that exceeded the 1,500 pound load requirement. The market is SpaceBoard's. Process and product optimization will prove SpaceBoard to be the competitive product for the 21st Century in Transport Material.

Examples of potential markets that will be enhanced using SpaceBoard are:

<u>Markets</u>	<u>Primary Material</u>	<u>Annual U.S. Sales</u>
Pallets	Wood	\$3 Billion
Appliance Bases	Wood / EPS	\$50 Million
Bulk Containers	Wood / Plastic Corrugated	\$250 Million
Protective Packaging	Corrugated / EPS	\$250 Million

SpaceBoard is an SMF (Structural Molded Fiber) material panel made from a vast number of unique fiber sources. The product exhibits a tremendous number of characteristics common with "ideal" packaging material including: superior strength-to-weight, exceptionally strong, versatile, light weight, protective cushioning.

COMPETITIVE ADVANTAGES

The company started as an outcropping of CAE Consulting, a company created in 1988 to provide technical management assistance to the manufacturing and utilities industries. The sub-license for "SpaceBoard" Technology has been awarded for exclusive world-wide use for packaging and material handling to CTI from SONOCO Products Company, Hartsville, SC. CTI is incorporated in the State of Delaware and plans to build the "SpaceBoard Technology Center and Incubator" Plant in South Carolina. The product process is patented (one of six patents is U.S. Patent No. 4,702,870) by the Forest Products Laboratory, thereby eliminating imminent infringement by other companies copying the technology.

There are three perspectives which must be considered in the competitive analysis:

1. Industry will continue to use wooden and EPS packaging and material handling products in the face of higher raw materials costs and scarcity of wood.
2. Alternative products are appearing made of corrugated and/or recycled plastic. Cost, comparative product strength and endurance and true recyclability will have a dramatic adverse impact here.
3. "SpaceBoard" meets or exceeds the strength and price/performance issues. The product as currently designed is completely recyclable; beginning from post-industrial waste paper. Water and fire retardation, durability and "rock - bottom competitive pricing" must still be proven.

Assuming that the challenges are achievable for "SpaceBoard", the most significant competitive obstacle at hand will be meeting customer demand for quality product in a meaningful time frame.

BUSINESS ECONOMICS AND PROFITABILITY

The elegance of "SpaceBoard" is that there is simply no direct competitor. Incorporating strategic partners like SONOCO, Pratt Industries and Stone Container enhances the forgiveness of the industry as CTI develops marketable products for significant client companies. Direct customer feedback during initial product testing, complete order fulfillment of "SpaceBoard" product produced and potential funding for the R&D effort by grants and corporate sponsors ensure a direct entrance into the market and strong return on investment. CTI is projecting its role as a Technology Delivery Company. Once the preliminary markets are established and the technology has been accepted by potential industrial partners, CTI will license the technology to each partner and contract to receive royalties on future production by each SpaceBoard converting plant. The expected return on investment (ROI) for this project is in the 30-40% range. On revenue of \$ 4,500,000 for each 30 ton per day converting plant, each CTI-licensed operation is expected to be profitable within eighteen months. Positive cash flow is anticipated shortly after start up. Profit margin is calculated to be 20% after taxes and five-year payback of loans.

REVENUE PROJECTIONS

In one simple example the following conditions describe the potential revenue generation possible in the CTI - SpaceBoard Model:

<u>Market:</u>	<u>PALLETS</u>
<u>Current Pallet Sales in the U.S.:</u>	\$ 3 Billion
<u>Product Production Volume:</u>	2 Million Pallets per day
<u>Reasonable SpaceBoard Penetration:</u>	5 % Market Share
<u>Suggested Product Sales Point:</u>	\$ 8 per PALLET
<u>CTI Revenue Stream at 5% Product Sales:</u>	\$ 150 Million
<u>Added Income from technology:</u>	\$ 10 Million
(Annually)	
- Tooling Fabrication	
- Technology Development	
- Consulting	
<u>TOTAL REVENUE PER YEAR:</u>	\$ 160 Million

DUAL USE APPLICATIONS

The United States Marine Corps, through the Naval Engineering Test Facility in Port Hueneme, CA, has specified the transition of Marine Expeditionary Force packaging from stainless steel and extended poly styrene (EPS) to lighter and stronger composite materials. As such, SpaceBoard was selected to initially be tested as a replacement container for portable fuel cells. The application involves creating a carrier that would protect a 22 gallon fuel bladder, keep it from rupturing due to severe handling, offer exceptional stacking strength while in storage and retain containment integrity when wet. SpaceBoard was tested and found competitive for this application. It is now up to the Marine Corps to fund future production of the fuel cell and other packaging applications.

ENVIRONMENTAL IMPACT

All impact from the company's products represents positive environmental contribution. Recycled material, rejected from paper mills, is utilized to produce SpaceBoard. The final product can then be recycled. In all, there are quantifiable net energy, emission and land-fill savings. Since this process is using recycled material, there are no heavy metals and minimal suspended solids other than fiber. The effluent is suitable for normal sewage disposal.

CONTRIBUTING INITIATIVES

Since 1994, the leadership of CTI-SpaceBoard has taken advantage of government initiatives that contribute to overall technological development. The final success of this tremendous business has been positively impacted by federal and state programs that provide direct assistance to small, industrial businesses.

- Technology Transfer Act of 1986 - Partnering of public-private initiatives in which the government doesn't bear the entire resource responsibility.
- Manufacturing Extension Partnerships (South Carolina MEP) - Designed to assist small-to-medium manufacturers conquer business and technical issues through consulting and networking.
- Office of Naval Research - Through "teaching factories" and MANTECH Program Agreements, avenues of opportunity have been made available. Especially through the Great Lakes Composites Consortium (GLCC) and the Center for Excellence in Composites Manufacturing Technology (CECMT). (Note: as a small composites manufacturer, CTI-SpaceBoard has been dramatically assisted by ONR and the GLCC. It has been a designated incubator with potential for acquisition.)
- Licensing from Federal Laboratories - Forest Products Laboratory invented this technology and was able to transfer the technology into the commercial arena through licensing into specific fields of use.

BUSINESS DEVELOPMENT CONSIDERATIONS

In the true sense of entrepreneurship, it must be understood that small technology or industrial companies require a considerable investment in time, resource and energy. Listed below are the seven (7) elements which CTI-SpaceBoard and most equivalent small companies have experienced in the journey to success.

- Technology development usually takes 2-3 times longer than expected.
⇒ ***REDUCE IRS AND CORPORATE REPORTING REQUIREMENTS***
- Funding sources and the amount of money made available directly impact the final outcome. SBA is not adequate because all the risk is taken by the company, not the lending institution.
⇒ ***GREATER AVAILABILITY OF FUNDING AND SPONSORED FUNDING SOURCES***
- Federal laboratories must understand that simply delivering the invention does not constitute the direct link to commercialization. And, in light of the first comment, it will take time to make the technology prosper.
⇒ ***STREAMLINE LICENSING PROCEDURES WITH NATIONAL LABORATORIES***
- Additionally, the federal laboratories should consider “back-end loading” the license agreements and CRADA obligations of the small, technology company. There is much more mutual benefit when everyone shares in the rewards of proven success, not merely assessing fees.
⇒ ***NATIONAL LABS TO REALIZE THAT CASH MUST BE CONSERVED FOR SUCCESS***
- Tax breaks and incentives contribute to company success.
⇒ ***BOTH FEDERAL AND STATE INCENTIVES***
- Collaboration between federal and state economic development could be stronger in order to leverage more support directly to the strategic initiatives. Possible matching funds to the states. More “seed” money.
⇒ ***STRONGER FUNDING FOR BLOCK GRANTS, ETC.***
- Commercial and government contracts dramatically enhance the company's chances of survival. Initiation of positive, small-business opportunities that allow companies to secure good contracts will improve the overall health of small business.

⇒ ***BUSINESS OPPORTUNITIES LIKE 8A FOR ALL SMALL BUSINESSES***

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