

Case Study in Technology Transfer Training

MarketLook for OpenCell

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<i>SUMMARY</i>	
<i>Technology Name</i>	OpenCell
<i>Researcher/s</i>	António Valente
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<i>Markets</i>	Shipping Containers Concentrated Solar Panels

This is one in a series of case studies in how the University-Technology Enterprise Network (UTEN) is helping Portuguese Technology Transfer Offices develop practices that lead to globally competitive and sustainable operations. This case study summarizes the results of a MarketLook study for OpenCell, an emerging technology from Ply Engenharia. Ply's founder, António Valente, was a student at Instituto Superior Técnico (IST) in Lisbon.

The MarketLook is a 40-60 hour process and study designed to uncover the "voice of the market" as it relates to the technology. The core of the MarketLook effort is 8-12 interviews with potential customers, end users and partners, as well as scientific validators for the technology. The deliverable is an 8-10 page report delivered to the technology team with market findings, other comments on technology readiness, a go/no-go recommendation, and potential go-to-market strategies based on understanding the perspective of players in the market.

The final report was provided to the technology team. This case study describes the work performed, market insights, and lessons learned for future Portuguese technology transfer office operations.

Technology Introduction

OpenCell is a new concept for lightweight and stiff structural panels, made with only two metal sheets (as opposed to typical composite sandwich panels made with 3 or more materials). The concept incorporates small tabs cut into the panel and arranged in uniform groups and bent (cold formed) into a position that can be spot or laser welded to an opposing sheet (see Figure 1). The panels have uniform material properties in all directions, unlike most welded corrugated steel or channeled structures. It offers flexible designs for specific shapes. It is also extremely lightweight for the stiffness and strength properties offered. It can be produced through the use of known manufacturing technologies at a lower cost than competing panels.

- Reduced cost per panel: Depending on the volume produced, the manufacturing process could include just two steps (stamping and welding the plies) and could yield very low cost relative to conventional material.
- Significant strength to weight ratios (often referred to as “specific strength”): This can be viewed in two ways: either dramatic weight improvement for the same strength or significant strength improvement for the same weight.
- Isotropic properties: Opencell should yield approximately same strength and stiffness when loaded in all directions. By comparison, corrugated paneling tends to have high stiffness in parallel to the stamped folds in the paneling, but relatively low stiffness perpendicular to the folds.
- Design Flexibility: Opencell can be easily configured to meet the needs of specific applications. Key design parameters include materials selection, sheet thickness, tabs configuration, welding/bonding process, filler material (if desired).

While there are numerous fields of application, the MarketLook focused on two fields, shipping containers and concentrated solar panels for solar arrays. The benefits of the OpenCell technology offer significant potential benefits in these areas.

Market Contacts Made

During performance of this MarketLook, contacts were made with the following organizations in the market. The specific names and comments were shared with the technology team.

- Fallbrook Technologies, Inc.
- Southwest Research Institute
- Martin Marietta Composites
- Dayton Rogers of Texas
- Ausra, Inc.
- Maersk Lines
- 3M Solar
- Concurrent Technologies Corporation
- Satco, Inc.

Current CSP Manufacturers	
• Abengoa	• Schott
• eSolar	• SolarReserve
• SkyFuel	• Torresol
• Sopogy	Energy
• Acciona	• BrightSource
• Iberdrola	Energy/
• Solar	• Luz II
Millennium	• Sener
• Stirling	Aeronáutica
Energy	• Solel
Systems	• Wizard
• Ausra	Power

Market Insights

Concentrated Solar Panels

Concentrated solar power (CSP) is a subset of the solar power industry that also consists of photovoltaic generators and solar thermal energy systems. In the U.S., the overall industry grew by 16% between 2007 and 2008. While no new CSP plants were completed in 2008, projects totaling more than 6,000 MW are in currently planned, most with signed purchase power agreements. The anticipated growth rate is expected to range from 10 to 50% annually for the next several years. Below is a list of concentrating solar thermal power (CSP) companies. The CSP industry finished a first round of new construction during 2006/7, a resurgence after more than 15 years of commercial dormancy.

The primary pain in this market is the cost of material used to construct CSP fields. There is a major effort to get metal out of the system. One interviewer commented that there is more metal in some CSP plants than in the entire Golden Gate Bridge. Other pains include transportability, especially for larger panels, and system stiffness.

Shipping Containers

Interviews indicate that shipping container manufacturers sell about 40,000 containers annually, and that 220,000 containers are manufactured each year. Market size is about \$1.5B. Airborne containers are called Unit Load Devices (ULD's) and are a much smaller market, with the total potential indicated at \$200M with the top four competitors listed below. Typical customers for larger 20 ft and 40 ft containers are ocean and rail shipping companies. Airline companies and express overnight mail shipping companies are buyers of ULD's.

The driving considerations for shipping containers are price, weight and insulating value.

PLY is evaluating a sandwich technology solution for a large, global shipping company.

Commercialization Impacts

The MarketLook effort identified key characteristics for the technology along which it will must with other solutions. These criteria are weight per square meter, cost per square meter, stiffness in all directions per square meter, thermal resistance in all directions, and fatigue life of weld joints. This information can be the basis for a competitive matrix that highlights the benefits of the technology in the eyes of the customer. Also, based on the perspective of players in the market, the MarketLook made specific recommendations regarding brand management and manufacturing processes.

One of the companies interviewed is a prospective partner for advancing the technology. The technology team is following up on the opportunity.

Lessons for Portuguese Commercialization

Working through UTEN and on prior and current efforts in the U.S., António notes the challenges in reaching out to U.S. companies from Portugal. He notes that "the challenge is multiplied by 10x" as compared to outreach to Portuguese or European companies, that it's important to have substantial resources, and ultimately, a company local to the country to advance international efforts.

Ongoing Ply Commercialization Efforts

Ply is continuing commercialization of the technology in the U.S. with plans to form a U.S. based company, secure a local host as a primary sponsor, and to continue to pursue applications in sustainable product development, social housing building panel technology, defense applications in shipping, housing and blast protection, and more. Serious commercialization efforts also continue for Africa and Brazil, and for local and EU applications. Ply continues to seek assistance in business development, application-specific prototype funding, and international outreach.

For more information about this technology, the related markets, this case study, or the UTEN program, send email to antonio.valente@ply.pt or czintgraff@ic2.utexas.edu.