

1999 State of the Recycled Plastic Lumber Industry
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“The Plastic Lumber Industry; Where do we go from here?”

The established goals of the Plastic Lumber Trade Association (PLTA) are to promote the Plastic Lumber Industry, develop test methods, quality standards and promote the use of recycled plastic materials. The Plastic Lumber Industry is leaving the early business cycles of emerging technology and emerging growth and entering into the cycles of business growth and marketplace acceptance. Before we can look to the future, we need to review our ASTM accomplishments, review the PLTA/Battelle Multi-Client program and related demonstration projects, look at the various competing technologies, analyze the growth of current and developing markets, look at the stages of business cycle development, list recent publications and technical presentations, glimpse at the trends in raw material supply and offer a few thoughts for the future of the PLTA.

ASTM Test Method Development:

To date there have been eight new ASTM test methods establish. These tests represent a significant amount of work and effort of many members of the ASTM D20.20.01 Committee. For this we offer our sincerest thanks to those many individuals involved.

D6108-97, Standard Test Method for Compressive Properties of Plastic Lumber and Shapes
D6109-97, Standard Test Method for Flexural Properties of Unreinforced and Reinforcement Plastic Lumber.

D6111-97, Standard Test Method for Bulk Density and Specific Gravity of Plastic Lumber and Shapes by Displacement.

D6112-97, Standard Test Method for Compressive and Flexural Creep and Creep Rupture of Plastic Lumber and Shapes.

D6117-97, Standard Test Method for Mechanical fasteners in Plastic Lumber and Shapes.

D6341-98, Standard Test Method for Determination of the Linear Coefficient of Thermal Expansion of Plastic Lumber and Plastic Lumber Shapes Between -30F and 140F (-34C and 60C).

D6435-99, Standard Test Method for Shear of Plastic Lumber and Shapes.

E108 (Modified), Residential Decking Flammability (Burning Brand Test)

There are several test methods that are currently in ballot and review by the ASTM D20.20.01 Committees. Most notable is the X-20-18-K Standard Specification for Polyolefin Plastic Lumber Residential Decking Boards. There are several other items in ballot and are listed as follows.

- X-20-28 Guide for Testing Plastic Lumber
- X-20-30 Guide for Plastic Lumber Deck Construction
- X-20-43 Specification for Plastic Lumber Joists
- X-20-44 Standard Specification for Engineered PVC Decking

In addition, the ASTM committees are evaluating Slip Resistance, Outdoor Weatherability and Electro-Static Issues. There is no formal ballot items in place at the writing of this document.

In addition to our Plastic Lumber ASTM D20.20.01 work there has been a spin off D20.20.04 Committee for Marine/Waterfront Markets. The current work in process for this committee is as follows.

X-20-41a, Standard Test Method to Determine the Flexural Properties of Unreinforced and Reinforced Polymeric Piles.

X-20-48 Test Method for Radial Compression of Polymeric Fender Piles.

X-20-49, Specification for Plastic Lumber used in Bulkhead Systems

X-20-51a, Standard Specification for Polymeric Piles Used for Marine Load Fendering Systems.

PLTA/Battelle Multi-Client Project:

1999 marked the second year of the PLTA/ Battelle Multi-Client Project to push RPL into the structural applications of decking, marine waterfront and material handling. A special thanks to Battelle; Dr. Prabhat Krishnaswamy, principal investigator; Richard Lampo, Army Corps of Engineers; M. G McLaren Engineering; Louisiana State University; Rutgers University; The State of Ohio Department of Natural Resources, Division of Recycling and Litter Prevention and our newest supporter the State of New York for their work and efforts for this successful program. In September we successfully completed the full scale testing of our deck model. To date, three demonstration projects have been completed and are listed below.

June 1998, Fort Leonard Wood, Missouri. A replacement of a 25 foot light vehicle bridge.

April 1999, Fort Belvoir, Virginia; Jackson M. Abbot Wetland Refuge and Mulligan Pond. A new wetlands boardwalk and observation areas utilizing an "all plastic" lumber substructure and decking boards.

September 1999, Kelley's Island, Ohio; 600 foot wetland walk way in the North Pond area in association with the Audubon Society, Ohio Department of Natural Resources and the American Plastic Council.

Technologies:

There are several technologies and polymer resin systems competing within the market place. We'll try and give an overview of each and see how they are faring.

1) Single Polymer Systems made from recycled HDPE High Density Polyethylene is experiencing the highest growth. For the decking markets, the continuous extrusion of structurally foamed HDPE appears to be the leader in entering the decking board market. Several capacity addition announcement have been made with the most notable being US Plastic Lumber adding 37 new production lines.

2) Extrusion Flow Molding systems has had two set backs this year. Temple-Inland and US Plastic Lumber ceased the manufacturing of lumber from the flow mold process. However there appears to be sustained growth in the thick wall molding of large parts which serves as components for picnic table and bench components along with other markets.

3) Fiberglass Reinforced RPL has made a nice recovery from the liquidation of Trimax in 1998. US Plastic Lumber purchased the assets and appears to have recovered lost market segments in the marine/waterfront after moving manufacturing to their Tennessee facility.

The markets are continuing to look for products with enhanced physical properties. There is continued work in the placement of fiberglass reinforcements in the outer regions of the lumber profile to better optimize the flexural modulus of RPL. No significant announcements have been made to date.

4) Polymer/Polymer systems have furthered their gain in the marketplace. Of particular note is the activity of Polywood, a New Jersey manufacturer, that participated in Army Corps projects as joist members in bridge and wetland boardwalk projects. In addition, Polywood has announced licensing agreements with Rutgers University for the manufacturing of railroad ties utilizing Rutgers University patents. The Polyethylene/Polystyrene resin systems are reporting physical properties higher than the chopped fiberglass competitive products. This is certainly a new technology segment worthy of observing.

5) While the Wood Filled/Thermal-plastic composites systems **do not** meet the ASTM definition for Plastic Lumber, as they are more wood material than plastic. Nor are any manufacturers on wood/plastic systems a member of PLTA. However, many of their markets parallel those within the RPL industry thereby making it important to mention their successes. Most notable is the Initial Public Offering of Trex and their new Fernley, Nevada plant, which opened the 3rd quarter this year. Recent public announcements would have Trex's 1999 sales volume near \$80 million. The primary Trex market segment is residential decking with extensive distribution throughout the US.

Other Wood/Plastic products are beginning show up on the radar with the most visible being Timbertech, Smartdeck and AERT. It is rumored that many of the major forest product and building product companies are developing their own wood/plastic products. Most of this activity still resides within their research and development areas and no significant public announcements have been made to date.

6) The PVC Industry is another technology area of great significance as they have significant activity in the decking and railing markets. The PLTA has worked cooperatively with AAMA, the American Architectural Manufacturers Association, which is developing a PVC Decking Standard through their own organization and ASTM. The PVC industry is a significantly more mature industry that has enormous capital resources and has been working within the Building Products marketplace for many years. There has been significant activity utilizing RPL decking and PVC Railing components in the marketplace. It is important to watch the relationship of these technologies as the consumer decides what products it will purchase and install.

The Markets for RPL:

Sales volume estimates still remain hard to project given that most manufactures still remain privately held or are divisions of larger companies. Gross revenue estimates have moved to \$60 to \$80 million from last year's \$50 to \$70 million estimate. With the merger consolidation experienced over the past year, it is difficult to place an overall market growth. Most certainly with the new capacity coming on line in year 2000 there will be continued revenue growth. The residential decking market is close to surpassing the long time leader of the Park and Recreation Market as the largest single market segment.

Also, of particular notice has been the Railroad Tie market segment. There have been several announced demonstration projects throughout the US and four companies have announced they are making are railroad tie products. The railroad tie market offers a size larger than the residential decking market and you should keep your eyes open to new announcements.

Our best estimates for the percentage ranges of market share of the \$60 to \$80 million dollars of the gross sales revenue are as follows.

	<u>Market Share</u>
Park of Recreation	30% to 40%
Commercial and Residential Decking	30% to 40%
Industrial/Agriculture	20% to 25%
Material Handling	2% to 3%
Marine Waterfront	5% to 15%
Fencing	1% to 5%
Railroad Tie	1% to 2%

Recent Publications:

“Standards Boost and Industry, Recycled Plastic Lumber Gains Ground.”, Richard Lampo
ASTM Standardization News, July 1999

“Recycled Plastic Lumber in the Landscape.”, Alex Wilson, Landscape Architecture, Sept.
1999

“Structural Applications for Recycled Plastic Lumber”, Dr. Prabhat Krishnaswamy and Donna
Stusek, Resource Recycling, October 1999.

Notable Technical Presentations:

“Recycled Plastic Lumber, Technical Session”, International Composites Expo, May 1999,
Cincinnati, Ohio, various presenters.

“Development of ASTM Standards for Plastic Lumber, a Comprehensive Overview of Standards
to Date and Work in Process.” Alan Robbins, Society of Plastic Engineers, Annual Recycling
Conference, November 1999, Dearborn, Michigan

Business Cycle Development:

US Plastic Lumber has continued its successful use of the public markets to aggressively consolidate the RPL marketplace by purchasing 13 various plastic lumber manufacturing entities, vertically integrating raw materials and the announcing two new large manufacturing facilities in Fontana, California and Ocala, Florida. The most notable 1999 acquisition was the Eaglebrook Companies, Chicago, Illinois. From SEC filings, it is estimated that USPL's plastic lumber division revenues will top \$40,000,000 in 1999.

A secondary activity within the merging industry business cycled is the spinoff cottage industries created by those individuals displaced by the consolidated businesses. We are only beginning to see this aspect beginning to reveal itself and unable to ascertain the total market impact which this will have on the industry.

Raw Materials:

The cost of HDPE plastic resin rose nearly 35% over the past year with the pricing beginning to flatten out third quarter, 1999. It is anticipated that new HDPE capacity will come on line the first quarter 2000 which should help relieve pricing pressure. We must continue to watch resin pricing trends as there still appears to be no stable pricing model from which to base your business plan.

A large part of the plastic lumber technologies and markets developed from the recycled materials is fueled by the on going availability of natural colored, unpigmented plastic resins. Particularly, the use of recycled dairy bottle materials (HDPE) has added much to the growth of our industry. This allows the plastic lumber manufacturer to add attractive colorants to the recycled plastic resin and enhance the commercial acceptance of their product.

There is a rather disturbing change in the raw materials supply beginning to develop within the dairy industry. This is the change to a pigmented milk jug. There are estimates that nearly 50% to 70% of the dairies are moving to a colored milk jug. This change in raw materials could significantly alter the raw material supply chain and force manufacturers to buy wide-spec or prime virgin resins to meet capacity needs, thereby significantly increasing cost of goods sold. This movement to pigment dairy bottles could derail the RPL industry's commitment to recycled plastics and damage the vertical integration into the raw material supply that several manufacturers have in acted.

Where do we go from here?:

The RPL industry is quite young from a business cycle stand point and has only begun to leave the emerging technology cycle into the business growth cycle. Much work needs to be done both in depth and breadth before RPL will gain market place acceptance. The various RPL technologies and the markets represented by these technologies will compete in the open market against other, new developing material systems, along with the traditional materials they are attempting to displace. The competing companies will need to work cooperatively to resolve industry problems, continue to create relevant ASTM Standards, provide competent demonstration projects, gain building code approval, consumer marketplace acceptance and efficiency in distribution networks that will allow these materials to enter the marketplace efficiently.

To compete effectively in the US Building Products Industry the Plastic Lumber Industry must be represented by a competent trade association. There needs to be a renewed commitment by the manufacturers, design engineers, researchers, marketers and end users to have a sound trade association representing their market interests.

The rapid merger aspects of this industry and shrinking number of manufacturers has stressed this trade association's ability to affectively serve its constituents. The PLTA will continue the access its role within the industry and explore ways that better serves the future of Recycled Plastic Lumber. We must not become complacent with our successes and early business cycle growth and miss the opportunities which will technically advance our products and move our industry totally into the market acceptance for our products.

Respectfully Submitted,

Alan E. Robbins
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Plastic Lumber Trade Association
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