State of the Recycled Plastic Lumber Industry
Presented November 5, 1998
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"Recycled Plastic Lumber Comes of Age"

1998 marked a monumental year in the growth and development of the Recycled Plastic Lumber (RPL) Industry. Five (5) ASTM test methods were published and one modified so that the physical properties of RPL can be properly represented and standardized. Our new test methods are:

* D6108-97, Standard Test Method for Compressive Properties of Plastic Lumber and Shapes.
* D6109-97, Standard Test Method for Flexural Properties of Unreinforced and Reinforced 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 Methods for Mechanical Fasteners in Plastic Lumber and Shapes.
* E108 (Modified), Combustibility of Plastic Lumber in outdoor decking applications

The work and efforts to develop additional ASTM test methods is proceeding full speed ahead. Current active projects include; thermal-expansion/contraction, Residential Decking Board Standard, Residential Decking Design Guideline, PVC Decking Standard, RPL Joist Standard and many others in the marine-waterfront areas.

The PLTA owes our deepest gratitude to the following individuals and their respective organizations, along with many others too numerous to mention, that have put forward yeoman's efforts to complete the tasks of ASTM test method development.

Dr. Prabhat Krishnaswamy, Battelle and Engineering Mechanics Corp. of Columbus, Ohio
Rich Lampo, USACERL,
ASTM, Kathy Morgan, John Blair, Paul Graboff, Paul Sample,
Mal McLaren, M.G.McLaren Engineers
Mike Burnett, Plastic Lumber Company
Tom Nosker and Rich Renfree, Rutgers University & The Plastics & Composites Group
Roger Seals & Vijaya Gopu, Louisiana State University
State of Ohio, Department of Natural Resources, Div. of Recycling and Litter Prevention.
Underwriters Laboratories, Pravin Ghandi, Andy Bertram, Dan Marcinek

PLTA/Battelle Multi-Client Partnership: 1998 marked the first complete year of the PLTA/Battelle Multi-Client Partnership, where seven RPL manufactures, M.G. McLaren Engineering, US Army Corp Civil Engineering Research Laboratories, Owens Corning Fiberglass, the State of Ohio, and most recently, the State of New York have contributed cash and materials to support the work of Dr. Prabhat Krishnaswamy at Battelle to further push RPL into the structural markets of decking, marine/ waterfront and material handling.

Participating PLTA Manufacturers:

Bedford Technologies, Worthington, Minnesota
Ecotrust/Genelytic, Alberta, Canada
Hammers Plastic Recycling, Iowa Falls, Iowa
NEW Plastics, Luxemburg, Wisconsin
Temple-Inland, Dibold, Texas
The Plastic Lumber Company, Akron, Ohio
US Plastic Lumber, Boca Raton, Florida

The deliverables in the first year include the following.

(1) Demonstration Projects:
a) The retro fit of a pedestrian bridge at Fort Leonard Wood, Missouri.
b) A 1700 foot wetlands walkway on Kelley's Island, Ohio.

(2) A CD- ROM database of physical properties of the participating manufacturers along with the beginnings of a collective library database of plastic lumber articles, published papers and research reports, a U.S. Department of Energy report on RPL pallets, which

includes a federal government accepted Life Cycle Cost Analysis process.

Technologies: Let's take a look at each of the technology areas and see how they are faring.

1) Single Polymer Systems made from recycled (HDPE) High density Polyethylene appears to be the highest growth area within the RPL industry with approximately 10 new operating lines placed in service within the last 12 months.

2) The expansion of the Extrusion`Flow-Molding systems was marked by the formation of JET-SPS Inc., Tillsonburg, Ontario which is a manufacturer of turn key process equipment for thick wall moldings. This is a combination of European and North American Technologies and is being marketed by Mid-Atlantic Plastic Systems.

3) The Fiberglass Reinforced RPL technology has effectively been serving the marine-waterfront markets of break wall, bulkhead, pilings and others. Most certainly the marketplace is still in need of products with enhanced physical properties that would rival that of wood and other traditional materials within the harsh marine-waterfront environments. The assets of Trimax, the long time manufacture of fiberglass reinforced RPL based in Ronkonkama, NY., were recently purchased by US Plastic Lumber.

Railroad ties is a new product area which has been emerging over the last few years. There have been recent announcements of various demonstration project installations of the US Plastic Lumbers licensed technology from Rutgers University. In addition there are rumors of other companies and other technologies utilizing various fiberglass reinforcements that are working to make a market entry.

In addition, new research efforts are beginning to focus on placing glass reinforcing fibers in the outer regions of the lumber profile dimensions to optimize the physical properties of the RPL materials.

4) While the wood filled thermal-plastic composite lumber materials do not meet the ASTM definition of "Plastic Lumber" and no manufacturers of these materials participate in the PLTA activities, it is worthy to note that within the decking industry and the lumber distribution systems, they have made great strides in market acceptance. This success primarily centers within the activities of Trex, a former division of Mobil Chemical Company, that was purchased by management in 1996. TREX gross sales are estimated at over $40,000,000.

In addition, Strandex has signed license agreements with three North American

manufacturing entities that are offering their own versions of a wood-thermoplastic composite. It is too early to estimate their successful penetration into the decking and other markets.

It is also note worthy of the research being conducted into the Micro-Cellular Foaming of wood filled thermoplastic materials at the University of Toronto.

5) PVC Extrusion Technologies is another technology area that is not participating within the PLTA activities but their activity within the decking and railing markets are significant as there are over 14 companies manufacturing various decking board and railing components which may offer opportunities to mix material systems to offer the best products to the marketplace. It is unclear what the current market size is at this time, however, there are very large companies participating. Current market size is estimated above $40,000,000.

The Markets for RPL: Sales volume estimates are still very hard projections in that most of the manufacturers remain privately held companies with no published sales figures. Our 1998 RPL gross sales volume is now estimated to be in the range of $50 million to $70 million. While the merger and consolidation has taken place, it is too early to tell whether this activity has added any significant growth in sales as opposed to consolidation of the sales of each operating entity. However it is felt that while sales are increasing, the overall sales growth in all market entities has slowed below the +30% growth rates it has experienced in the past. The successful penetration into the estimated $600 million to $800 million decking markets will offer the largest single growth area in the near future. It is still felt that the Park & Recreation Markets still holds the largest single market segment. Our best estimates follow:

	Market Share
Park & Recreation	40% to 60%
Residential and Commercial Decking	20% to 30%
Industrial/Agriculture	20% to 30%
Marine Waterfront	5% to 15%
Material Handling	2% to 5%
Fencing	1% to 5%
Railroad Ties	Under 1%

Market Alliances: PLTA is pleased that the Composites Institute, a Division of the Society of Plastic Industry, has extend the opportunity to be a co-sponsor of the International Composites Expo 1999 (ICE'99) to be held in Cincinnati, Ohio May 10-13, 1999. Our participation includes a full technical session on RPL, demonstration projects

of the use of RPL and composite materials along with exhibit booths of manufacturing companies. We are pleased that this years ICE'99 includes the Architectural and Materials Division of the American Society of Civil Engineers. This offers one of our first opportunities to present our products to the design areas of the engineering and architectural communities.

In addition, we have begun dialogue with the American Architectural Manufactures Association to work cooperatively in the development of decking board standards and other areas of joint synergy.

Business Cycle Developments:

Over the last two years, US Plastic Lumber has successfully used the public markets to aggressively consolidate the RPL marketplace by purchasing several plastic lumber manufacturing and distribution entities. Their 10Q filings with the Securities and Exchange Commission show their annualized plastic lumber sales to be approximately $14,000,000.

From a business cycle analysis perspective, this merging and consolidation within the industry marks our first step out of the emerging technology cycle into a business growth cycle. A close watch of the effective integration and synergy developed by the merged business entities and how other industry players respond will give an idea how quickly RPL will reach into the additional stages of business cycle development and market place acceptance.

Recent Articles and Publications:

Plastic News, November 2, 1998; "ASTM needs help from the whole industry."
Recycling Times, October 1998; "What's New with Plastic Lumber?"
Plastic News, Kelley's Island Project, October 1998
Plastic News, Fort Leonard Wood Project, July 1998
Boston Globe, "Plastics Hit the Deck" March 1, 1998, by Eleanor Siegel

Future needs:

Our industry still needs to work cooperatively among ourselves and other related industry segments of the marketplace for the development of ASTM Performance Specifications, Test Standards and Quality Assurance of Recycled Plastic Lumber and other material systems entering the marketplace.

It is also important to develop Precision and Bias statements for the new ASTM test methods that have recently been adopted.

Once the proper test methods and performance specifications are in place, it will require a significant push from each individual manufacturer to have their materials meet building code approval. This in turn will fuel the new and sustained growth as the "***Recycled Plastic Lumber Industry comes of age.***"

Respectfully Submitted,
The Plastic Lumber Trade Association
Alan E. Robbins, President