

**The Seventh Annual Conference on  
Recycling of Fibrous Textile and Carpet Waste**  
North West Georgia Trade & Convention Center, Dalton, GA  
May 13-14, 2002  
**CONFERENCE PROGRAM**

**May 13, 2002, Monday**

7:30-8:30 Registration and Continental Breakfast

8:30 Welcome, Youjiang Wang, Georgia Tech

**Monday 8:30am-12:30pm Session I**

**CHAIR:** Matthew Realff, Georgia Tech

*Bobbie Lippiatt, National Institute of Standards and Technology (NIST), Gaithersburg, MD*

**Purchasing Environmentally-Preferable, Cost-Effective Products: The BEES Approach**

The BEES (Building for Environmental and Economic Sustainability) software implements a powerful technique for measuring the environmental and economic performance of building products. Developed by the NIST with support from the U.S. EPA Environmentally Preferable Purchasing Program and the White House-sponsored Partnership for Advancing Technology in Housing (PATH), the tool is based on consensus standards for life-cycle assessment and life-cycle costing.

*Alyssa Tippens, Interface Research Corporation, Kennesaw, GA*

**Strategies for Improving Carpet Recycling with Life Cycle Assessment**

Results of a life cycle assessment of carpet tiles made with virgin and recycled backing are presented. The results are used to identify areas for improving the environmental performance of the recycled product.

*Steve Hoffmann, Milliken Carpet, LaGrange, GA*

**LEED; Sustainability goes Mainstream**

A review of the US Green Building Council's 13-step LEED (Leadership in Energy and Environmental Design) green building rating system citing case studies and forecasting the impact on the building and carpet industries. This baseline certification process is gaining momentum and moving sustainable construction into the mainstream.

*Matthew Realff, Georgia Tech, Atlanta, GA*

**LCA Analysis of Carpeting – A Discussion of Challenges, Progress & Future Directions**

LCA is a maturing area and tools exist for evaluating the environmental and economic performance of many

products - including carpet. When the reverse component of the life cycle of carpet is incorporated into the analysis the options and evaluation becomes more complex. A discussion of the BEES tool and the implications for establishing standards around the LCA for carpet will be moderated by the speaker.

10:30-11:00 Break

**CHAIR:** Walter Thomas, Southern Polytechnic St. Univ.

*Andreas Bohnhoff and Jörg Petershans, Carpet Recycling Europe GmbH, Germany*

**Decentralised Technology for the Sorting of Textile Floor Coverings**

Carpet Recycling Europe GmbH (CRE), an initiative of the European carpet industry, has developed the world's first automatic sorting plant for used carpets with a capacity of 20,000 tones/year close to Mainz (Rhine-Main Area, Germany) since May 2000. Based on these experiences of the last two years, an overview is given on the technical and economical performance of an sorting plant within a closed loop recycling system for carpets.

*Robert J. Evans, John Scahill, Michael Looker, Carolyn Elam, Thomas Bash, and Stefan Czernik, National Renewable Energy Laboratory, Golden, CO*

**Integrated Caprolactam And Hydrogen Production From Post-Consumer Nylon 6 Carpet**

This talk discusses a thermocatalytic process performed in an extruder to first convert nylon 6 into caprolactam. The organic residue can be subsequently converted to hydrogen in a catalytic fluid bed reformer. The hydrogen can then be used in a fuel cell to generate electricity.

*John Muzzy, Georgia Tech, Atlanta, GA*

**Preliminary Process Design for Depolymerizing Nylon 6 Carpet in a Twin Screw Extruder**

Preliminary design and economic evaluations will be presented for the depolymerization of nylon 6 carpet in a twin screw extruder. The effects of plant size and selected processing conditions on crude caprolactam conversion costs will be illustrated.

12:30-1:30 Lunch (Included)



**CHAIR:** Howard Elder, J&J Industries

*Frank Hurd, Carpet & Rug Institute, Dalton, GA*

**National Recycling Agreement: The Next Phase in Carpet Stewardship**

This presentation summarizes the agreement which establishes an ambitious ten-year schedule to increase the amount of reuse and recycling of post-consumer carpet and reduce the amount of waste carpet going to landfills for achieving a 40% landfill diversion goal in the agreement's ten-year span. The carpet industry has established a third-party organization, known as the Carpet America Recovery Effort (CARE), to achieve the national goals for reuse and recycling of discarded carpet.

*Robert Peoples, Solutia, Gonzalez, FL*

**CARE - A Market and Product Development Update**

CARE is now up and running. The key to the success for carpet recycling will be the creation of products and markets that are cost competitive. This talk will provide a review of CARE efforts to support the development of new products and markets derived from post industrial and post consumer carpet.

**Panel Discussion on Carpet Recycling**

*Moderator: Robert Peoples, Solutia, Gonzalez, FL*

*Members:*

*Mike Bertolucci, Interface*

*Fred Cook, Georgia Tech*

*Matt Ewadinger, North Carolina DEP*

*Frank Hurd, CARE/CRI*

*Werner Poppe, Dr. Poppe AG, Germany*

The Industry has set a goal to recycle 1.5 billion pounds of carpet per year by 2012. Panelists from industry, government and academia will lead the discussion on challenges to achieve the goal and actions to make this a reality.

3:30-3:50 Break

**CHAIR:** Chuck Boelkins, P<sup>2</sup>AD, GA-DNR

*James O'Blennis, Nylon Board Manufacturing, Medford, MN*

**Nylon Boards from Carpet Waste for Building Applications**

Ny-Board is a plastic sheet material made from recycled nylon carpet. This talk describes the process, product characteristics, and applications of Ny-Board.

*Jack Weitz, Mary Ann Industries, Villa Rica, GA*  
**GeoHay Products from Carpet Waste**

GeoHay™ erosion and sediment control products are made from recycled fibers. This talk discusses their characteristics in comparison with traditional products.

*Forrest Bacon, Wendell Holland, Jack Weitz, and Patrick Kelly, Nyloboard LLC, Covington, GA*

**Nyloboard Building Materials**

Three new categories of building materials are discussed, all made from needle-punched mats obtained from shredded carpet: (1) "Nyloprime" is made with a two-component adhesive mixture that undergoes foaming reaction to drive the liquid through the dense fiber mat; this material can create a wood-like material in sheets, comparable to plywood or oriented strand board; (2) "Nyloflex" uses heat to soften low-melt polymers such as polypropylene, into a leather-like material; and (3) "Nyloplate" uses resins or heated compression of Nyloboard, to create a harder material that approaches a ceramic in its traits. All three forms offer several major advantages over wood products (including waterproof, bug-proof, and high strength), and can be made by placing a single additional machine at the end of a needle-punch line.

*Matthew J. Realf, James L. Clark, Fred Cook, Georgia Tech, Atlanta, GA*

**Update on Carpet As an Alternative Fuel for Cement Kilns**

Cement kilns have a tremendous appetite for energy. Carpet has a relatively high value of energy content due to its high fraction of polymer material, and its calcium carbonate filler is a feed for cement kilns. This talk will focus on the progress that has been made towards solving the technical and economic issues surrounding the use of carpet as fuel for cement kilns as part of a regional system for recycling carpet.

*Fred Cook, Georgia Tech, Atlanta, GA*

**Georgia Tech and Dalton State College's CARPET research facilities and activities**

CARPET (Center And Research Program in Engineered Tufts) is an endowed program established by the carpet and allied industries to support research related to the floorcoverings sector. It provides a link between academic institutions and the carpet industry to address both technical and educational issues. Fundamental research laboratories will be located at GIT in Atlanta, and pilot processing/testing laboratories are being set up at the DSC Dalton site. CARPET's missions as related to the sustainability of the carpet industry and products will be discussed.

5:30-6:30 Reception (Included)



May 14, 2002, Tuesday  
8:30am-11:50pm Session III

8:00-8:30 Continental Breakfast

**CHAIR:** Jerry Zolkowski, Georgia Tech EDI

*Randy Bouchillon, Wellman, Johnsonville, SC*  
**Manufacturing Polyester Fiber from Recycled Raw Materials**

This presentation outlines the processes for recycling polyester raw materials. Sources of the major recycled waste streams are discussed, including examples of the materials. The fiber manufacturing process is reviewed, describing major product types and end use markets.

*Ken Hawn, Tex America, Charlotte, NC*  
**An Overview of Commercial Recycling Technologies and Textile Applications for the Products**

A broad overview is provided on commercial equipment for size reduction, densification, pelletizing, washing and sorting. Processes for converting the recovered materials into plastic parts, fibers and films will be discussed.

*Chris Strzelecki, Advanced Extrusion Solutions, Alpharetta, GA*

**Latest Recycling Machinery Developments for Extrusion of Synthetic Fiber & Carpet Waste**  
Latest machinery breakthroughs in repelletizing synthetic fiber, nonwovens and carpet waste will be discussed. Different materials (PET, Nylon, PP) and economic factors (energy usage, labor, capital equipment cost, floor space) will also be discussed.

10:00-10:20 Break

**CHAIR:** Youjiang Wang, Georgia Tech

*Rulf Schneider, Dr. Poppe AG, Germany*  
**From Used Carpets to Raw Materials for the Plastic Industry - Experiences and Opportunities in USA and Europe**

The activities of Dr. Poppe AG are based on the experiences made with one of the major projects, Polyamid 2000 AG, Premnitz/Germany (close to Berlin), which is capable of processing European as well as American carpets in an industrial scale. The presentation will describe the potential for processing used carpets into basic chemicals and compounds, based on the successful technology used by Polyamid 2000 AG, and further developments by Dr. Poppe AG in Germany. The different qualities of European and American carpets and the influence of these differences

on quality and economy of further processing will also be discussed, followed by a description of the opportunities of cooperation with special consideration of the interests of potential investors.

*Juergen Roth, Bird Machine Company, South Walpole, MA*

**CENSOR™ Centrifuge Technology for Plastic Separation**

Component separation after shredding is a key step to recover valuable plastics from commingled waste such as carpet. This presentation will discuss technologies for separating plastics, particularly the CENSOR Technology developed by Bird Machine Company. The CENSOR is a centrifuge system specifically designed for separating and reclaiming mixed plastic materials based upon the differences in their densities. The use of the CENSOR Technology in commercial carpet recycling operations will be illustrated.

*Patrick Kelly, Patent Attorney and Professional Engineer, St. Louis, MO*

**Patents as Fences to Protect Ideas and Properties**

No matter how much good they might do, very few ideas can be or will be developed and commercialized, unless the profit opportunity can justify the investments. Patents serve as fences that can be built around properties, making it worthwhile for the owner to do the work of plowing, sowing, and digging weeds, knowing that the harvest will belong to the one who has done the work. The author, who has handled the patent work for the new class of Nyloboard products from needle-punched fiber mats, offers guidance on how inventors and managers can do the preparatory work, to keep costs to a minimum and get the best possible results when they begin working with a patent attorney. These comments cover both (i) the new simplified do-it-yourself "provisional" patent applications that were created by Congress in 1995, and (ii) the conventional "utility" patents that create enforceable legal rights.

11:50 Sessions Adjourn

11:50 Lunch (Included)

1:00-2:30 **Tour of DuPont Carpet Reclamation Center**, 220 Boling Industrial Way, Calhoun, GA 30701. Phone 706-624-8833.

Includes an introductory presentation and a tour of the facility. Expanded in 2001 to a capacity of sorting up to 50 million pounds of carpet per year, the facility is one of the largest carpet recycling operations in the US (See next page for driving directions).