

**The Eighth Annual Conference on
Recycling of Fibrous Textile and Carpet Waste**
North West Georgia Trade & Convention Center, Dalton, GA

CONFERENCE PROGRAM

May 12, 2003, Monday

7:30-8:30 Registration and Continental Breakfast

8:30am-10:30am Session I
Chair: Anselm Griffin, Georgia Tech

Frank Hurd, Carpet & Rug Institute, Dalton, GA
Carpet America Recovery Effort (CARE): An Update

This presentation provides an update on CARE, including Memorandum of Understanding (MOU), overall progress, and committees and their activities. Efforts to support research, development, and commercialization will be highlighted, such as grants and CARE's seeking of non-profit status (501c3).

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.

Patricia Annis and Mary Sue Brewer, University of Georgia, Athens, GA

Current Status of Carpet Waste Generation, Disposal and Diversion from Landfills

Data was collected from carpet manufacturers and suppliers, reclaimable materials handlers and recyclers, and federal and local government agencies to quantify current material usage for carpet manufacturing, post-industrial and post-consumer carpet waste generation, waste disposal in landfills, and waste diversion for reuse, recycling, and energy generation, among others. The data provides a basis for assessing the impact of CARE on waste diversion in coming years.

Frank Kreklau, Infra-System AG, Germany
State of the Art Post Consumer Carpet Recycling and Its Opportunities in the US Market

Producers of plastics, like fiber and carpet manufacturers, feel an increasing need to develop recycling concepts for their products in order to compete in the marketplace. Producers of other floor covering systems, such as tiles and stoneware goods, benefit from the natural properties of the appropriate raw materials, whereas carpet producers have to develop and to design these recycling systems for post consumer carpets. This presentation discusses the approaches to this complex topic, and our view on the opportunities for recycling post consumer carpet. Differences between the American and European concepts are compared.

Kiyomi Sugai, Niigata Women's College, Japan
Current Status of Fiber Waste Recycling in Japan

The total fiber consumption in Japan is 2,317,000 tons per year, and 2,076,000 tons of fiber waste is abandoned each year. This talk summarizes the consumption, generation, and recycling of fibrous waste in Japan. As the rate of fiber recycling (excluding secondhand clothing) is decreasing, the development of new usage for fibrous waste is seriously needed.

10:30-11:00 Break

11:00am-12:30pm Session II
Chair: Chuck Boelkins, P²AD, GA-DNR

Rudy Underwood, American Plastics Council, Atlanta, GA

State of Plastics Recycling

The number of plastics recycling businesses has tripled since 1990, with more than 1,700 businesses handling and reclaiming post-consumer plastics. Through their support of economically and environmentally responsible and sustainable plastics recycling, the plastics industry and organizations such as the American Plastics Council have played a role in that growth. During the period between 1990 and 1998, the plastics industry invested more than \$1 billion to support increased recycling within the United States. This talk will highlight the state of plastics recycling and the challenges facing the industry. Lessons learned in plastics recycling may help guide carpet recycling to a greater level of success.

Ed Jakush, ADVAC Elastomers, Evanston, IL
TIRECYCLE™ Technology in Advanced Recycling of Post Consumer Carpet

The TIRECYCLE™ technology enables post-consumer carpet, at 100% grind, to be effectively co-reacted with post consumer cured scrap rubber to create families of useful molding and extrusion compounds, both thermoset and thermoplastic, with a broad range of properties. This talk reviews lessons learned from the well-established tire recycling industry, and discusses the principles, commercial operations, logistics and products of TIRECYCLE™.

Ruth Simon McRae, McRae Associates, Taylorsville, GA

LEED: Understanding the Requirements

The LEED (Leadership in Energy and Environmental Design) Green Building Rating System is rapidly becoming the standard and benchmark for developing high-performance, sustainable buildings. This presentation offers an overview of LEED, including new applications currently being evaluated. Emphasis will be placed on how LEED requirements impact carpet specification.

12:30-1:30 Lunch (included)

1:30pm-3:30pm Session III
Chair: Fred Cook, Georgia Tech

Fred Cook (Moderator), Georgia Tech, Atlanta
John Conyers, Jr., Shaw Industries, Dalton, GA
Frank Endrenyi, Mohawk Ind., Kennesaw, GA
Steve Hoffmann, Milliken, LaGrange, GA
Wayne Gjerde, MN Office of Envir. Assistance

Panel Discussion: Industry's Effort on Waste Minimization & Recycling

The Industry has set a goal to recycle 1.5 billion pounds of carpet per year by 2012. Panelists from industry and government will discuss efforts on waste prevention and recycling, and on procurement practices to encourage the use of products with recycled content.

Frank Guindon, BASF Canada, Arnprior, Ontario
Arnprior Nylon 6 Plant Recovery Processes

BASF's Arnprior site manufactures nylon 6 polymer and BCF products. Since 1966, millions of pounds of post-industrial and post-consumer nylon 6 waste has been depolymerized back to caprolactam. The recovered caprolactam has been used to manufacture polymers for a wide variety of end uses, including

BCF yarn products. The Nylon 6 Recovery operation in Arnprior is an integral part of the recent innovations that BASF has brought to the market such as the 6ix Again™ program, and the lines of SAVANT™ and Enviro6ix™ BCF yarns. This paper will focus on the Nylon 6 Recovery operation and its many associated developments over the years.

John Muzzy, Youjiang Wang, Melinda Satcher, Bryan Shaw, Andrew McNamara, Kun Jin and Josh Norton, Georgia Tech, Atlanta, GA

Composites Derived from Post-Consumer Nylon 6 Carpet

Over 2 million tons of post-consumer carpet is landfilled each year. This waste carpet is a potential resource for composites. This paper focuses on the processing and properties of nylon 6 post-consumer carpet. The carpet is cleaned, shredded and extrusion pelletized. This feedstock is compounded with glass fibers and compatibilizers. Based on the properties achieved and the projected costs, applications are identified.

3:30-3:50 Break

3:50pm-5:30pm Session IV
Chair: Walter Thomas, Southern Polytechnic St. U.

Gary Hinshaw, ASME Research Committee on Industrial and Municipal Waste, Washington, DC;
Matthew Realff, Georgia Tech, Atlanta, GA

ASME Carpet Recycling and Combustion Test Program

The American Society of Mechanical Engineers Research Committee on Industrial and Municipal Waste in conjunction with the Georgia Institute of Technology, carpet industry groups, and other interested parties has recently begun a program involving full-scale demonstration tests at cement kilns. The purpose of these tests is to evaluate the feasibility of recovering energy value and recycling materials from waste carpet. The results of this program will be available to parties interested in pursuing waste carpet as a feed for cement kilns or other combustion processes.

Matthew Realff and James Mulholland, Georgia Tech, Atlanta, GA; Paul Lemieux, US EPA Office of Research & Development, Research Triangle Park, NC

Carpet as a Fuel in Cement Kilns

The use of carpet in cement kilns is a potential mechanism to build infrastructure for carpet

recycling at a large scale. This presentation describes trials that were done at the EPA test kiln at Research Triangle Park. The trials focused on assessing the NO emissions and any associated polycyclic aromatic hydrocarbons (PAHs), or other products of incomplete combustion (PIC) emissions from burning Nylon 66 carpet. Preliminary analysis of the results showed that the conversion of nitrogen in the carpet to NO was only about 4-8% of the nitrogen content. There was only minimal increase in the emissions of benzene, PAHs, and other PICs. No mercury was detected from the combustion of the carpeting.

Ike Yancy, Cyntech Technologies, Duluth, GA

Cyntech Technologies' Highly Efficient and High Capacity System for Conversion of Mixed Carpet Fibers into Fuels

Cyntech Technologies is implementing technology that will convert mixed carpet fibers (or almost any mixed plastics) into fuels such as ethanol, syngas, low sulfur diesel fuel, LPGs, etc. This highly efficient and profitable system will convert upwards of 200,000,000 pounds of face fibers annually per module at a Cyntech installation. Multiple modules would increase capacity accordingly.

Surendra Khambete and Sandip Mehta, Colins & Aikman, Plymouth, MI

Development of Engineered Acoustically Tunable Lightweight Automotive Components Utilizing Waste Fiber/Yarn

This paper presents a case study of utilizing waste streams from diverse fiber/yarn products to create engineered automotive acoustic components. Cost, weight, acoustic performance and recyclability are important attributes in the automotive industry. Creating engineered products from waste streams requires a systematic approach, which takes into account factors such as material properties, material handling, process and logistics.

5:30-6:30 Reception (included)

May 13, 2003, Tuesday

8:00-8:30 Continental Breakfast

8:30am-10:20am Session V

Chair: Beth Connell, DSM, Augusta, GA

Ina Bauer-Kurz, Jean Skinner, and Joe Wallen, Freudenberg Nonwovens, Durham, NC

Freudenberg Recycling Activities with Carpet Backings

While keeping or enhancing the backing properties, Freudenberg has focused on using post consumer and post industrial recycled plastics as raw materials in carpet backing, and on eliminating polymers other than polyester from their backing so that the clean, one-material backing is easily recyclable. Freudenberg's ultimate goal is to produce from 100% recycled raw material and create no waste during manufacturing. This presentation describes the individual steps taken to realize these challenging goals. The up-to-date status worldwide is explained with examples. Difficulties encountered in this improvement process are listed, as well as solutions and actions to overcome them.

Gouranga Banik, Southern Polytechnic State University, Marietta, GA

Use of Recycled Post-Consumer Carpets as Building Materials

In response to the need for developing and marketing products from post consumer carpets, we identified certain products as building and construction materials from the perspectives of designers (Architects and Engineers), contractors and manufacturer/suppliers. This presentation addresses the issues related to the use of building materials from PCC in terms of design, construction and manufacturing.

Jack Milgrom, Walden Research, Maywood, NJ

Compounds and Products from Carpet and Tire Waste

Compounds containing crumb tire rubber and 40-60% carpet scrap have been developed. They can be cured with peroxides in compression molding process to produce thermoset plastic products of varying flexibility, such as roof shingles, plastic lumber, decking, sub-flooring, sheathing, siding, door cores, highway sound barriers, or offset blocks for highway guardrails.

Raymond T. Hemmings, Hemmings & Associates, Atlanta, GA; Russell L. Hill, Boral Material Technologies, San Antonio, TX; and Jim Sprague, Jatec Industries, Dalton, GA

Coal Fly Ash — A New High Performance Mineral Filler for Improved Environmental Sustainability in the Carpet Industry

This paper discusses the role of coal fly ash as a high performance mineral filler for use in carpet backing that has the potential to provide significant improvements in environmental sustainability in the carpet industry, product performance, processing characteristics and cost reduction.

10:20-10:40 Break

10:40am-12:15pm Session VI
Chair: John Muzzy, Georgia Tech

Mark Willingham, United EFP, Shelby, NC

Proper Selection of Filter Media in Reclaim Fiber Operations

With the growing trend of using reclaimed synthetic fiber waste in the manufacturing of carpet fibers, manufacturers are recognizing the importance of effective filtration in their polymer extrusion processes. Selecting the optimum filter media for the screen changer and spin pack requires a comprehensive analysis of the application and users performance objectives. Users have a wide variety of filter media to choose from and each has unique characteristics that determine its suitability for a particular application. A review of currently available filter media and the process for selecting the optimum media for each application are discussed.

Chris Strzelecki, Advanced Extrusion Solutions, Alpharetta, GA

Latest Process Machinery for Recovery of Post-Industrial Fiber, Nonwoven & Carpet Scrap

This presentation covers the following topics: Tips for effective recovery of scrap-- a Checklist of important factors to consider; Latest breakthroughs for recovery of industrial fiber, nonwoven and carpet scrap; Recommended recycling processes for different polymers (PET, PA6, PA66, PP, PPS); Cost-analysis of polymer recovery (energy, labor, capital equipment investment, space); Typical effects of recycling on polymer properties (IV/Melt Flow Index, Color, Moisture); Future trends in post-industrial scrap recovery.

Dana Darley, Kreyenborg Industries, Lawrenceville, GA

Current Developments in Underwater Repelletization of Nylon, PET and High-MFI PP

This talk describes the latest underwater pelletizing technology in comparison with the more traditional strand pelletizing and water slide systems. Effects of the spherical shape of the underwater cut pellet verses the cylindrical shape of a strand cut pellet will be discussed in detail. Production considerations, such as line startup, process automation and system maintenance will also be outlined for each system. Conclusions will be drawn as to the application of each pelletizing technology for the reclaiming of Nylon, PET, PP and other fibrous waste.

12:15 Sessions Adjourn

12:15-1:00 Lunch (included)

1:10-2:30 Post-Conference Tours of C&A Floorcoverings, Dalton, GA

Post-Conference tours are offered by C&A Floorcoverings to those interested in their recycling and yarn manufacturing operations. Please note the guidelines and sign up for one of the tours at the conference registration desk if interested. For security reasons, you must wear your name badge during the tour.

Tour 1: Center for Environmental Innovation (CEI).

This tour highlights a closed-loop recycling process that manufactures ER3, a 100% recycled content carpet backing system. (Note: Restrictions apply. Because this tour shows some proprietary technologies, it is open to attendees from academic, government and non-profit organizations only).

Tour 2. Yarn Processing Plant. This tour highlights the processes of carpet face yarn manufacturing, including air-entanglement texturing, twisting, heat setting, and dyeing featuring the new space dyeing technology. (There is no restriction for this tour).

Directions (Royal Dr., Dalton, GA 30721):

- Take Walnut Ave, go past I-75, and continue for 2.3 miles (from I-75)
- Turn left (after railroad) to South Glenwood Ave (US-76), and continue for 2.1 miles (S. Glenwood becomes North Glenwood)
- Turn right to Legion Dr (Wendy's at corner),go 0.2 mile
- Turn left to Royal Dr.
- Center for Environmental Innovation is on left, and the Yarn Plant is on the right.
- 4.8 miles/11 minutes. Phone 800.241.4902