



Re-Start of Evergreen Nylon Recycling

Shaw Industries, Inc.

2006 CARE Conference

May 3, 2006

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Nylon Recycling

- Ev-er-green (ev' er-grēn)

Adjective:

- Something that remains perennially fresh, interesting, or well liked.



Evergreen Closed Loop Recycling





Evergreen Nylon Recycling initially a JV between Honeywell & DSM

- Started in late 1999
- Shut down in Sept 2001
 - Poor economics for caprolactam (monomer for N6)
 - Plant's inability to operate at full rate

PC Carpet Collection not the issue!



Shaw is restarting Evergreen

- Facility located in Augusta, GA
- Responsibilities
 - DSM operates the process
 - Shaw provides N6 PC & PI feed supply
- Shaw owns 100% of the Evergreen asset
- Plant restart will include a Life Cycle Analysis

Shaw will own 100% of recovered Caprolactam



Status of Evergreen Nylon Recycling Plant

- DSM identified substantial process improvements
- DSM's plant idle procedures were very thorough – system integrity and recovery has gone very good
- Shaw is investing significant funding to implement improvements

Resulting process more Flexible and Robust!

Evergreen Nylon Recycling Plant





Operational Targets

- 30MM ppy of world class Caprolactam
 - Requires approx 100M ppy of N6 PC carpet
- Plant will startup when all systems are fully functional. No targets published until full assessments are complete
- Since 2001, a great deal of development in PCC Collection has occurred
 - ENR's use of N6 PCC is believed to aid the supply/demand balance of all fiber types
- Quality and purity of the N6 stream are extremely important!

Shaw seeking serious suppliers



Shaw's Collection Support

- Patented Sorting Technology
- Diversity of vertical integrated carpet industry leader
- Distribution and Transportation Network
- Regional presence facilitates reverse-logistics

Economies of Scale



Feed Stock Requirements

- Quality > 98% N6 PC carpet
 - Level loop / cut pile expected at ENR
 - No N66, Urethane material to ENR
 - No tiles to ENR, but EcoWorx N6 stream is OK
- A formal quality program in place
 - Extensive testing at supplier & ENR
- Utilize CarPIDs for supplier sorting

Must build quality into every bale!



CARE instrumental in Re-start

- Shaw is very please to enter into this great effort
 - Sustainability by design vs. regulation
- CARE will help maintain focus on all aspects of recycling:
 - Market driven solutions
 - Outlets for all products
 - Identification of serious suppliers
 - Recognition of product / process improvements

CRI/CARE support CRITICAL to achieving sustainability



Summary

- Shaw IS re-starting Evergreen



Challenge





Summary

- Shaw IS re-starting Evergreen
- Evergreen is a Closed-Loop process
- Collection wasn't the issue last time...it won't be this time
- Plant upgrades will make process more flexible and robust
- Shaw will own 100% of caprolactam product
- Shaw actively starting to collect...seeking serious collectors
- Quality is essential
- CARE is vital part of the process!

Let's have a great time!



Waste-to Energy and Other Shaw Environmental Initiatives

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Steve Bradfield





Carpet Gasification Unit in Dalton, GA

- Partnership with Siemens Building Automation & Technology
 - Clark Wiedetz, Business Dev Mgr for Energy & Environ Solutions
- First gasification facility in carpet industry
 - Will provide 50,000 lbs/ hr. of steam to Plant 81 dyeing operations
 - Designed to utilize up to 16,000 tons/yr carpet waste and 6000 tons/yr of wood flour from laminate operations
 - Primary steam source for plant allows reduced use of coal-fired boilers
 - Savings of over \$1 million/ yr. (avoids volatility of natural gas prices)
- Served by Shaw PC Carpet Collection System
 - Gets Shaw largely out of Dalton landfill and will also utilize PC carpet waste
- Featured in WSJ article and CNBC video



Carpet Gasification Unit in Dalton, GA Environmental Benefits

- Gasification leaves greenhouse gas pollutants in the ash as synthetic gas liberated for combustion.
 - Expect emissions profile similar to natural gas
- Carpet waste has same pound for pound BTU range as coal
- Nearing end of final testing phase. Fully operational.
- Plans to extend technology to other Shaw locations that may include cogeneration.
- Enhances efficiency and lowers cost of PC carpet collection
 - Important step in recovering energy value, collecting all carpet types, and providing access to sorted materials for higher value uses.
- Transitional strategy in Shaw's cradle to cradle efforts.



EcoWorx Carpet Tile

- Introduced in 1999
- Market success allowed Shaw to completely exit PVC by end of 2004.
- Fastest growing part of Shaw's business
- Presidential Green Chemistry Award 2003
- Design For Sustainability Award from Society of Plastics Engineers 2006
- Every backing and nylon 6 input over 100 ppm tested and optimized under MBDC toxicity protocol for human and environmental health and safety.
- Supply chain energy 3x lower than the Permabac PVC product it replaced, with 30% reduction in backing mass (3rd party LCI)



EcoWorx Carpet Tile Collection

- Utilizes same PC collection system as Evergreen and WTE
- PC thermoplastic polyolefin backing and nylon 6 fiber separated mechanically in Cartersville, GA
- Backing fraction sized and returned to EcoWorx backing extrusion.
- Nylon 6 fraction to be “campaigned” at Evergreen to recover EcoWorx co-product. (No compatibility issues.)
- “Campaigning” important for recovery of EcoWorx broadloom now under development. Same backing and fiber pathways as tile.
- EcoWorx limited to PI content until first generation polymer returned under Shaw “Environmental Guarantee”. Significant PC returns expected to begin in 2009.



Cradle to Cradle Redesign

- EcoWorx broadloom will offer a sustainable thermoplastic high performance broadloom
 - with high tuft bind unaffected by water
 - with pattern match and recovery similar to SBR latex
 - with lightest high performance broadloom weight
 - with same collection and recycling system as SBR broadloom, but “campaigned” backing recovered for reuse in tile.
- EcoLogix polyester cushion backing for tile
 - Produced in acquired Synthetic Industries facility
 - High PC recycled content from “Sprite” bottles
 - Laminated to greige goods with EcoWorx polymer
 - Working toward delamination technology to allow recycling



Other Environmental Developments: EMS Program

- Shaw began certification of its manufacturing facilities under an ISO 14001 compliant self-certification program in January of 2005.
- New EMS called Shaw Environmental System (SES), builds on Shaw ISO 9001 compliant quality management system (SQS).
- Shaw will have 52 manufacturing facilities certified or scheduled for certification by the end of 2006. (52 mfg facilities in 24 months)
- Plant 15, carpet tile facility, scheduled for third-party certification by BSI as a system check for SES.



Industry Environmental Issues

- Suggested recycled content incentives under CARE. Direct insertion and discussion of equivalence of mass balance (averaging).
 - Particularly important for solution dyed fiber recycled content claims that vary by color.
 - Important for tracking the molecular level blending of caprolactam found in Evergreen and other carpet materials where direct insertion tracking problematic.
 - Linking “credits” to market value (i.e. the same conditions approved for carbon credits applied to recycled materials)
 - Application to CARE, LEED, and SCAS.
- Reporting of multiple environmental impacts on a standard spider diagram format to show comparative impact reductions in addition to recycled content.
 - Provide a more complete environmental snapshot without de-emphasizing CARE goals.
 - Show effects of recycled carpet materials kept out of landfills, but recycled into noncarpet products.
 - Create a single industry report card that incorporates CARE’s mission.

EVERGREEN NYLON RECYCLING

Recycling Nylon 6

Closed

Post-consumer

Not just
Green,

Caprolactam **EVERGREEN**

Carpet

CARE

Sustainable

Recovery
Environmental

Stewardship

Loop Recycling