The Start
Q. How much carpet goes to the landfill each year?
A. 5,518,259,473 pounds of carpet will be dumped in 2005.

Q. What is the negative environmental impact?
A. 50 years to decompose and methane gas is trapped under it.

Q. What is the CARE goal for recycling old carpet?
A. A 40% diversion goal from the landfill by 2012. At 7 billion pounds annually of old carpet to be generated we need to recycle or reuse 2.8 billion pounds each year.
We don’t want to go there anymore.
What do we do now?
Doing nothing is not an option.
We’ve seen the mountaintop.
Now is the time to make molehills out of mountains.
Now is the time to “Liberate the Carpet Matrix”
Liberating the Carpet Matrix

Mike Hanna
Liberating the Carpet Matrix

- **Tufted Face Fibers**
- **Woven Primary Backing**
- **Latex Adhesive**
- **Secondary Backing**

**Carpet matrix**
Liberating the Carpet Matrix

- The face fiber is the most valuable part of the carpet for recycling.
- Face fiber typically makes up approximately ½ of the weight of the carpet but this can vary with construction and increase to 60%.
- Common backing material is latex and PVC.
- There are also additional layers in the backing system, which are typically polypropylene.
- Calcium carbonate is used as an inert filler.

Carpet matrix
Our focus today will be on “The Liberator” Series 15 hammer mill manufactured by the Schutte-Buffalo Hammer Mill company.

Specially designed for this job, we will display it’s function and importance to the material process flow.
We will also discuss other areas upstream and downstream of “The Liberator”.

Schutte-Buffalo Hammer Mill, Bulk Process Equipment, Inc. & Dawson Textile Machinery have joined forces to provide a state-of-art system for this process flow.
Foreword

We respect our client’s private process design.

In keeping with current confidentiality agreements, we will not cover specific sensitive areas as to flow details, rate efficiencies, sifting of the impurities or downstream flows of the material after it is liberated and cleaned.
Liberating the Carpet Matrix

Process Flow

- Sorting
- Primary Shredder
- Beater/ Shaker/ Cleaner
- “The Liberator” Hammer Mill
  (1 or 2 pass process)
- Condenser/Cleaner
- Step Cleaner
- Dust Cleanup
- Emulsion Applicator
- Blending / Storage Box
- Bale Press or further processing
Sorting
Primary Shredder
The raw end process starts with sorting and conveys to a primary shredder for size reduction of the raw carpet scraps into shredded fluff.
Beater/ Shaker/ Cleaner
Liberating the Carpet Matrix

The reduced carpet is delivered to the Beater / Shaker / Cleaner by a condenser or conveyor.
Liberating the Carpet Matrix

**Beater/ Shaker/ Cleaner**

A coarse cleaning and heavy impurities ejection begins.
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“The Liberator” Hammer Mill
(1 or 2 stage process)
Liberating the Carpet Matrix

There are five types of grinding actions that must be designed & controlled for proper matrix reduction:

- Impact
- Shearing
- Attrition
- Compression
- Liberation

- The impacting of the pre-shredded carpet is the single most important factor of achieving liberation of the backing without shortening the fiber length of the face fiber.

- Shearing, attrition, and compression, while playing an important role, must be controlled to achieve desired performance. These design features have been exclusively engineered into “The Liberator” Series 15 Hammer Mill.
Liberating the Carpet Matrix

Impact:
Refers to the immediate or instantaneous impingement of one moving object against another. The impact area is the single most important factor of achieving liberation.

Shearing:
Accomplished by a trimming action between moving material and a stationary edge (Hammers or Screen).

Attrition:
Reduction of material by a rubbing action between two surfaces, and is primarily a "washboard" treatment by special design ribbed liner plates.

Compression:
Squeezing material between two surfaces. This work may be done by either or both surfaces.

Hammer clearance between the walls of the machine and the screen must be precise for optimal performance levels. We determined what this distance must be after years of research and testing. A "closed" dimension causes a shredding and shortening of the carpet fiber; an "open" dimension reduces the liberation capability.

Liberating:
Free material evacuating from screen area (with air assistance) after passing through hammer mill to the downstream flow for further separation.

The aggressive action of the specially designed "Liberator" rotor separates the backing from the face fiber without matting the fiber, leaving the carpet fibers intact for further processing (Away from the Hammers or Screen).
Liberating the Carpet Matrix

Process Flow

Chris Wojcik
Liberating the Carpet Matrix

Process Flow

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Liberating the Carpet Matrix

Condenser/Cleaner
Liberating the Carpet Matrix

Condenser/Cleaner

Liberated carpet fiber is transferred from the Hammer Mill’s air evacuation sweep to the condenser via either positive or negative pneumatic design means.

There is also some cleaning and separation done here.
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Step Cleaner

Schutte Buffalo
HAMMER MILL
Liberating the Carpet Matrix

Liberated carpet fiber is delivered by the condenser to a specially designed Step Cleaner.

The upstream liberation by the Hammer Mill reduced the impurities to dust while retaining fiber length enabling deep cleaning of the fiber.
Liberating the Carpet Matrix

Dust Cleanup
Dust Cleanup

Meeting and/or exceeding EPA requirements
Liberating the Carpet Matrix

Emulsion Applicator
Liberating carpet fiber is delivered by the Step Cleaner to a specially designed Emulsion Applicator.

The application of an antimicrobial or other emulsions may be required.
Liberating the Carpet Matrix

Blending/Storage Box
Liberating the Carpet Matrix

**Blending/Storage Box**

After the Emulsion Applicator the liberated carpet fiber may need to be blended and stored to enhance downstream processing.
Inside Box:

Liberated carpet fiber is layered in the Box by a moving condenser. This not only blends out inconsistencies but provides a reserve in case of disruption before or after the Box.
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• Bale Press

Schutte Buffalo
HAMMER MILL
Liberating the Carpet Matrix

Bale Press

The liberated clean carpet fiber can now be compressed into a Bale for ease of handling and transportation.
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Material Characteristic Review
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- Infeed raw shredded fluff
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Liberated fiber with backing powder
1st Pass
Liberating the Carpet Matrix

- Liberated fiber with backing powder
  2nd Pass
Liberating the Carpet Matrix

SchutteBuffalo Hammer Mill
Full Test Lab Facility
Buffalo, New York
SchutteBuffalo Hammer Mill
Buffalo, New York
Since 1928

A supplier to the fledgling carpet recovery industry for nearly 10 years.

During the past decade we have tested, refined, and re-tested various equipment designs until the ultimate working combinations were achieved and incorporated into “The Liberator” hammer mill.

We invite you to our full scale testing laboratory utilizing production size machinery, not bench-top equipment.

Any materials tested on your behalf will be repeatable and representative of what you can expect under full scale production.

Our free of charge testing service allows us to prove the capabilities of our equipment on your specific material.

In business for over 77 years, we now have over 15,000 mills operating in all major industries.
Liberating the Carpet Matrix

Owners

• Tom Warne & Jim Guarino
Liberating the Carpet Matrix

Inside SchutteBuffalo Hammer Mill

Fabrication

Welding

Quality Control

Assembly
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A Final Recap
Liberating the Carpet Matrix

- Infeed raw shredded fluff
- Liberated fiber 1st PASS
- Liberated fiber 2nd PASS
- Liberated Backing powder 1st PASS
- Liberated Backing powder 2nd PASS
Thank you and enjoy the conference.

Come see us at our exhibitor booth.
The End