

A rectangular piece of light-colored, textured fabric, possibly a mesh or fine-weave material, is centered on a white background. The fabric has a slightly irregular, torn-edge appearance. Overlaid on the center of the fabric is the text "The Start" in a bold, green, serif font.

# The Start

**Q.** How much carpet goes to the landfill each year?

**A.** **5,518,259,473 pounds of carpet will be lost in 2005.**

**Q.** What is the negative environmental impact?

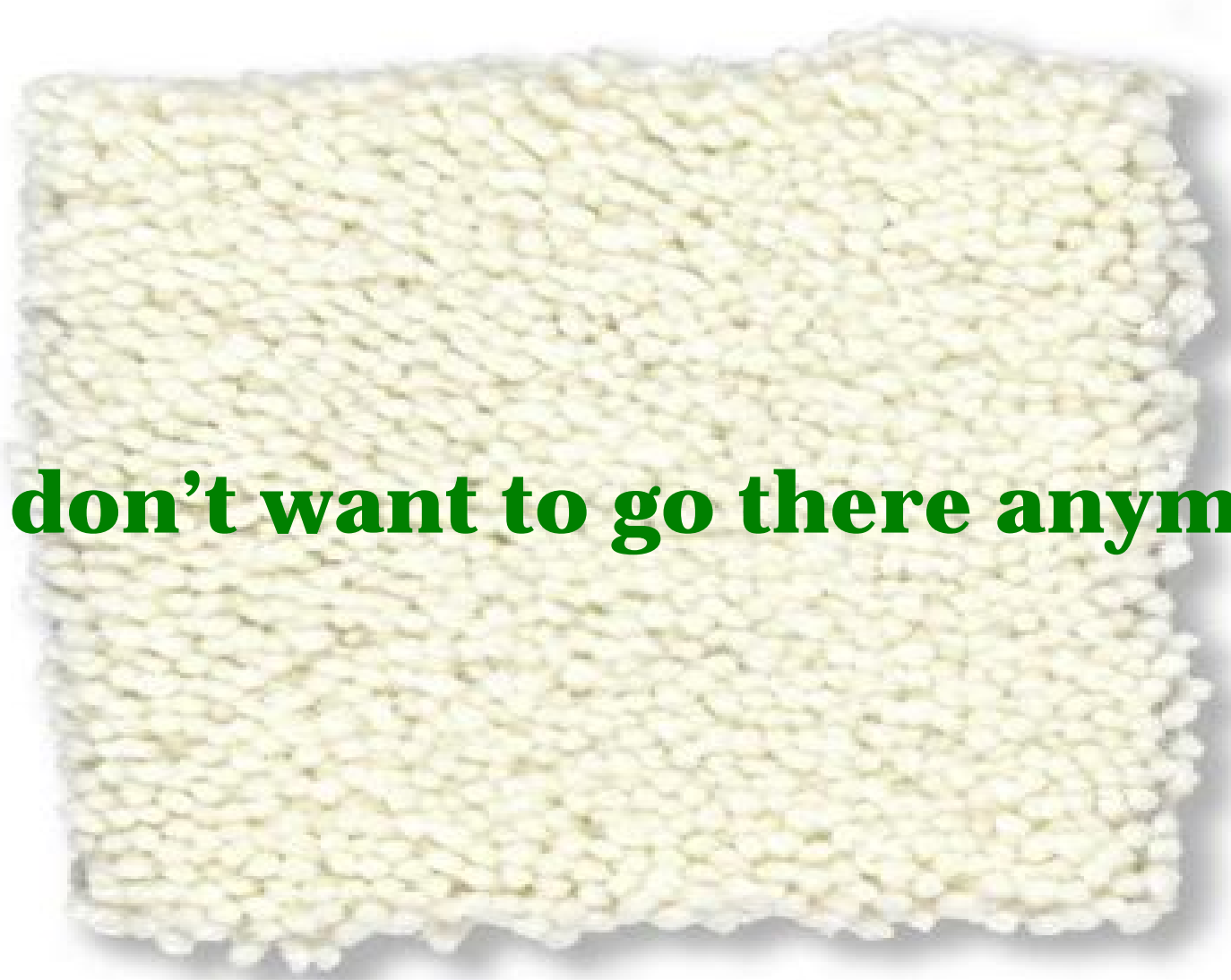
**A.** **50 years to decompose and methane gas is trapped under it.**



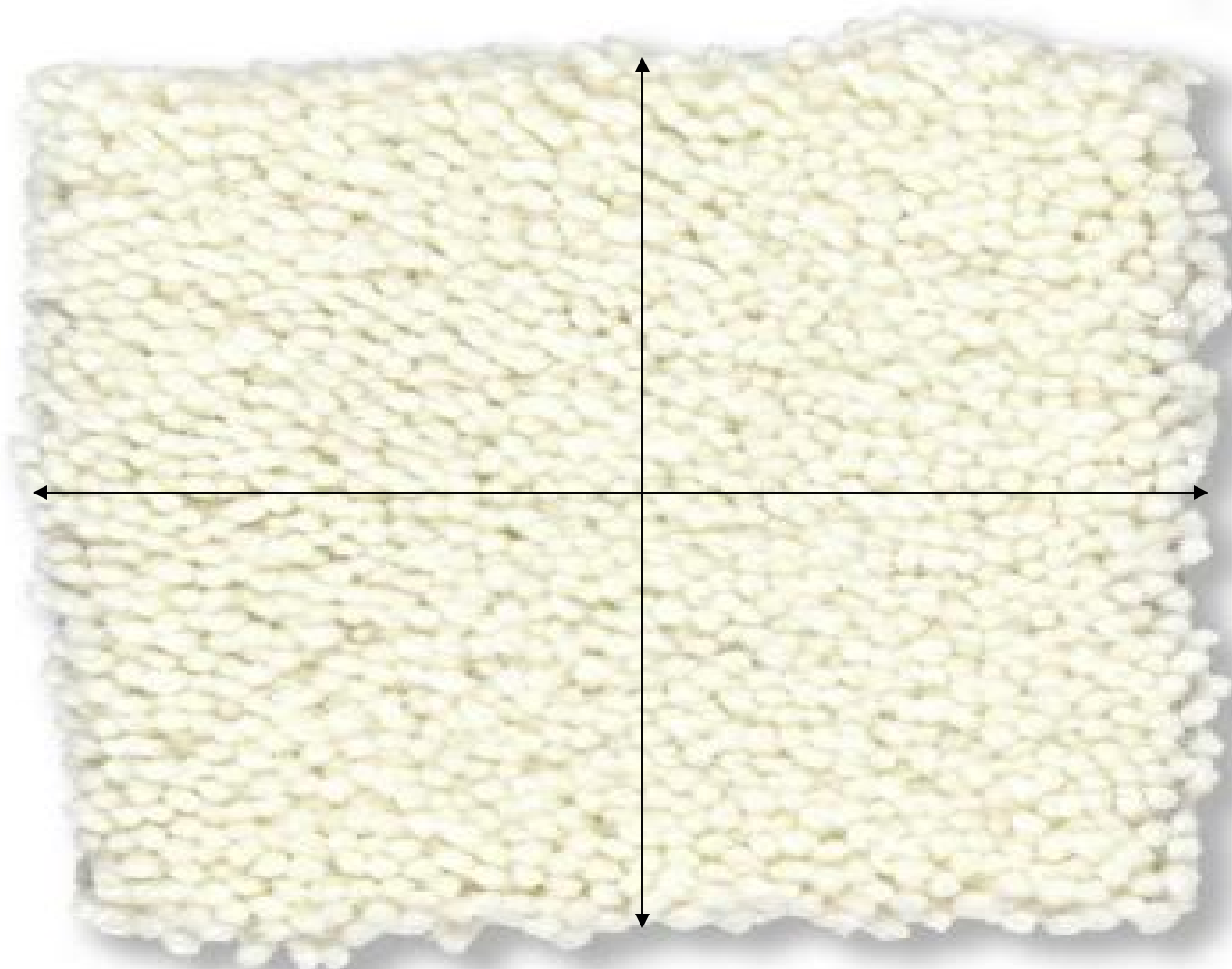
**Q.** What is the CARE goal for recycling old carpet?

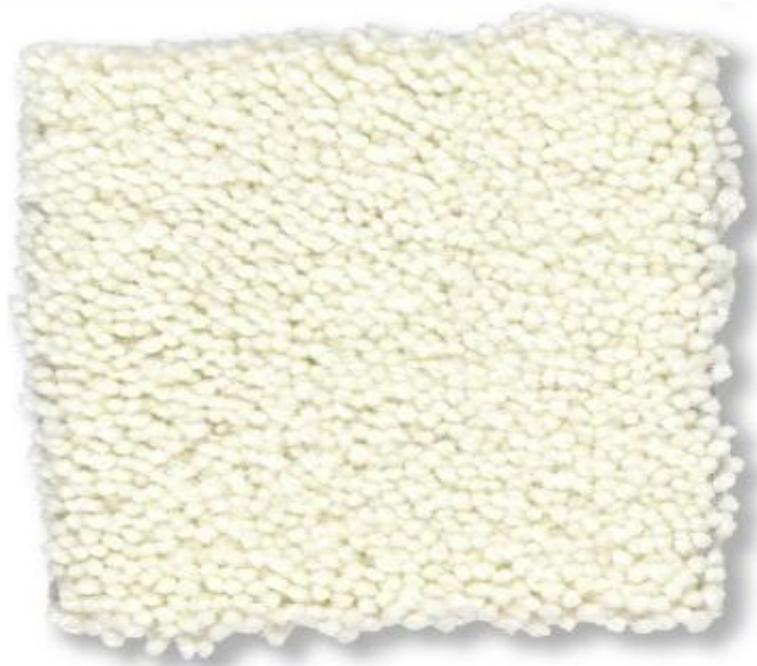
**A.** **A 40% diversion goal from the landfill by 2012.**

**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.**

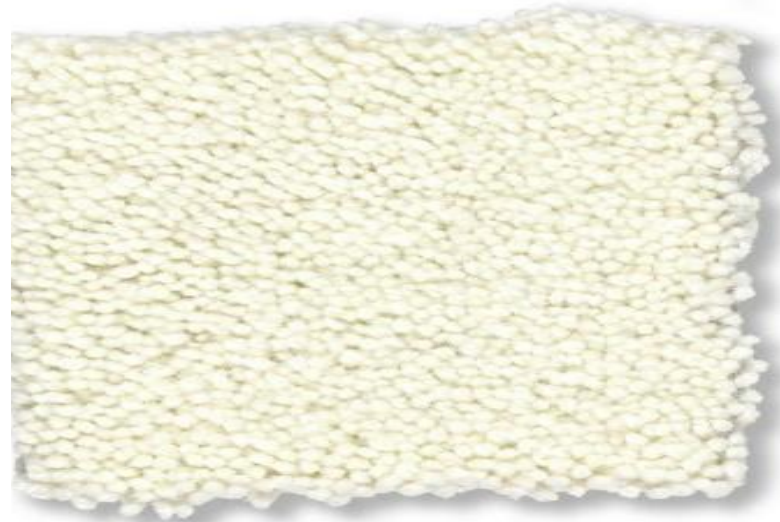






**What do we do now?**





**Doing nothing is not an option.**



Photograph below courtesy of R. W. Beck, Inc.



**We've seen the mountaintop.**

Photograph below courtesy of R. W. Beck, Inc.



Photograph below courtesy of Schutte Buffalo



Photograph below courtesy of Schutte Buffalo



**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**

Mike Hanna  
National Sales Manager  
Cell: 601/200-2582  
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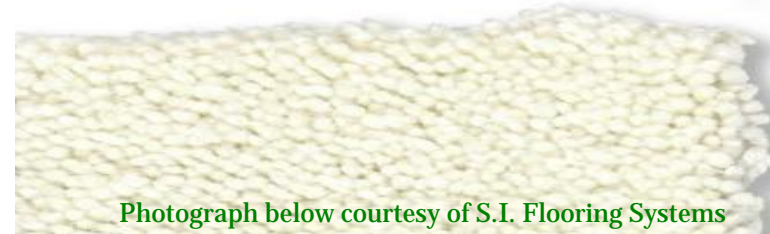
**SchutteBuffalo**  
HAMMER MILL

61 Depot St., P.O. Box 546, Buffalo, NY 14240-0546  
716/855-1555 • 800/46PIND4 • FAX 716/855-3417  
info@hammermills.com • www.hammermills.com

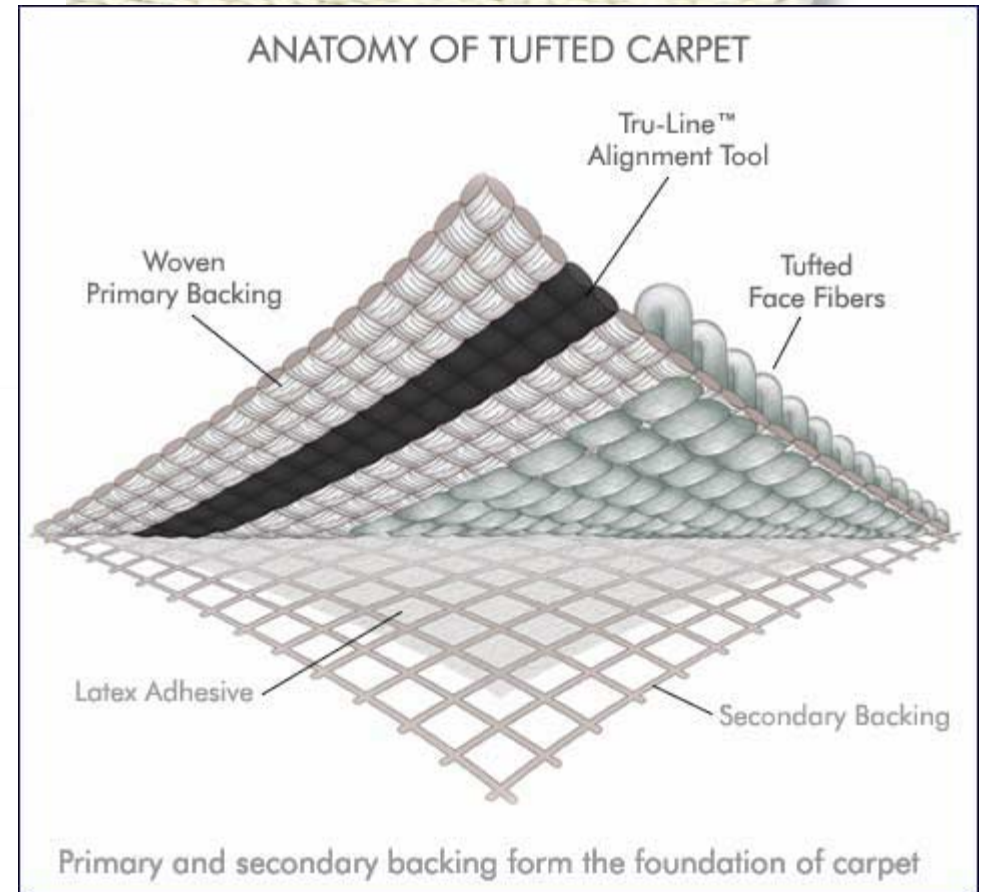
## Liberating the Carpet Matrix



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



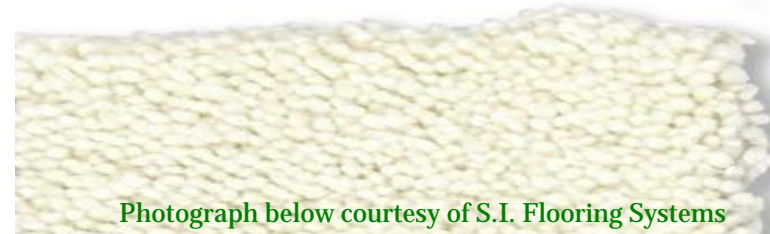
Photograph below courtesy of S.I. Flooring Systems



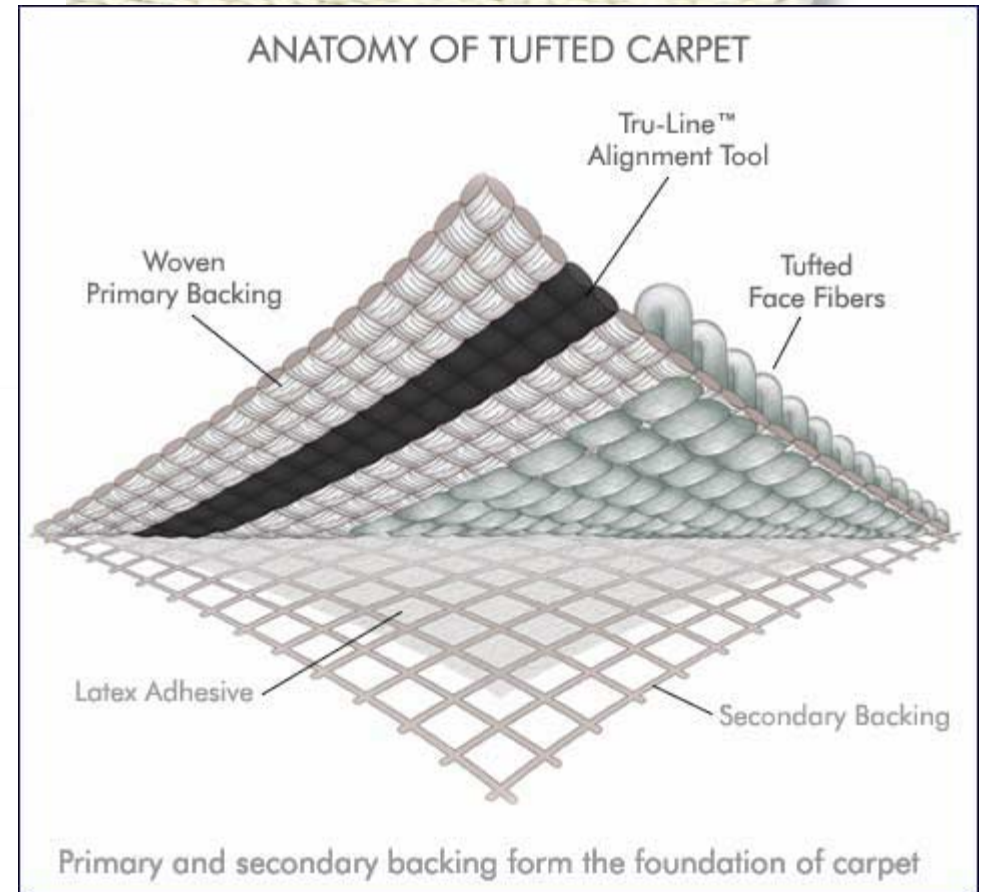
# Carpet matrix

## 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 inert filler.**



Photograph below courtesy of S.I. Flooring Systems

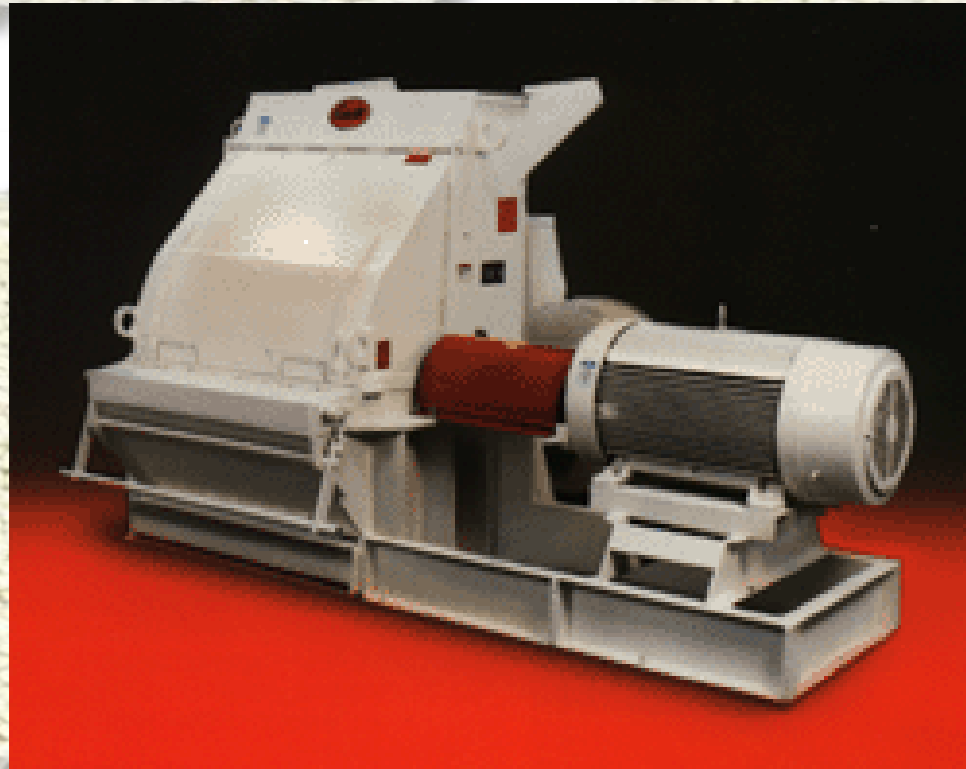


# Carpet matrix

Liberating the Carpet Matrix

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

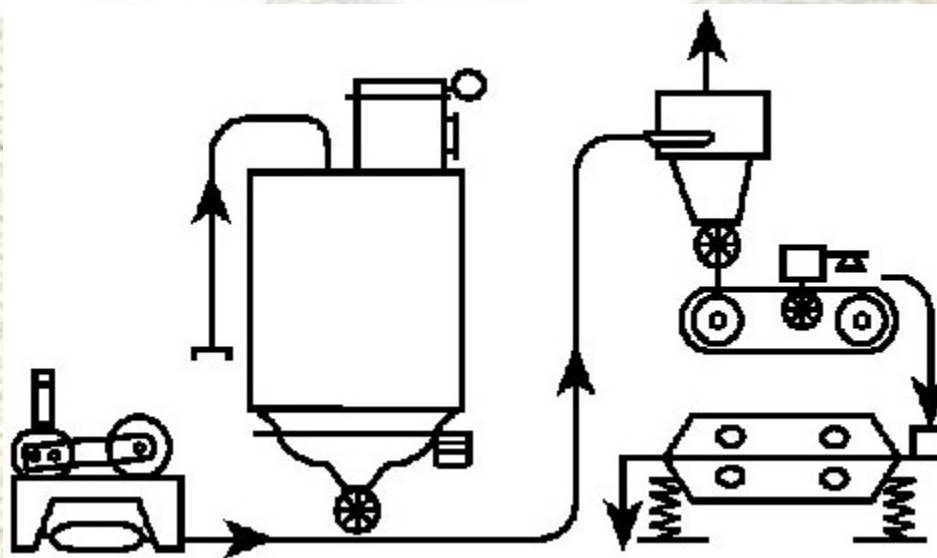
**Specially designed for this job, we will display it’s function and importance to the material process flow.**



**Schutte**Buffalo  
HAMMER MILL

**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.**



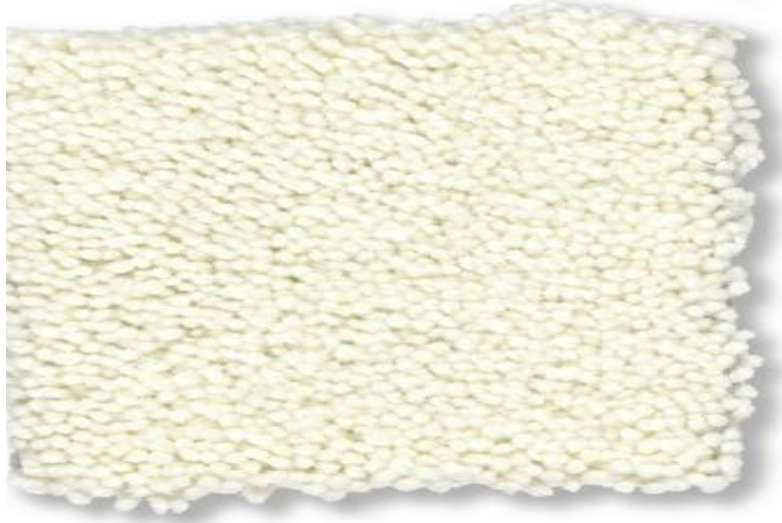
# Foreword

**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.**

# 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 flows to a primary shredder for size reduction of the carpet into shredded fluff.**

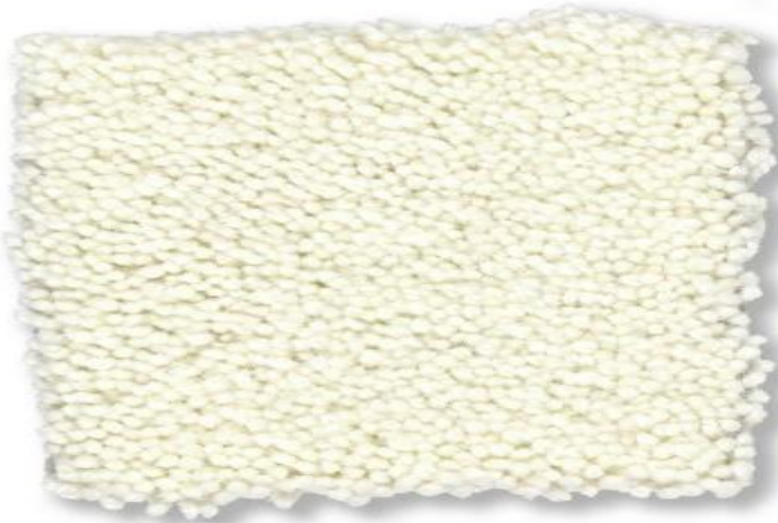
## ● Primary Shredder



Sizing grate manufactured from heavy duty 1/2" steel in sizes ranging from 3/8" to 3." Grates are easily accessible and replaceable in just minutes without special tools.

Dodge Torque Arm-II Gearbox

Oversize discharge area allows both pneumatic and mechanical removal of material

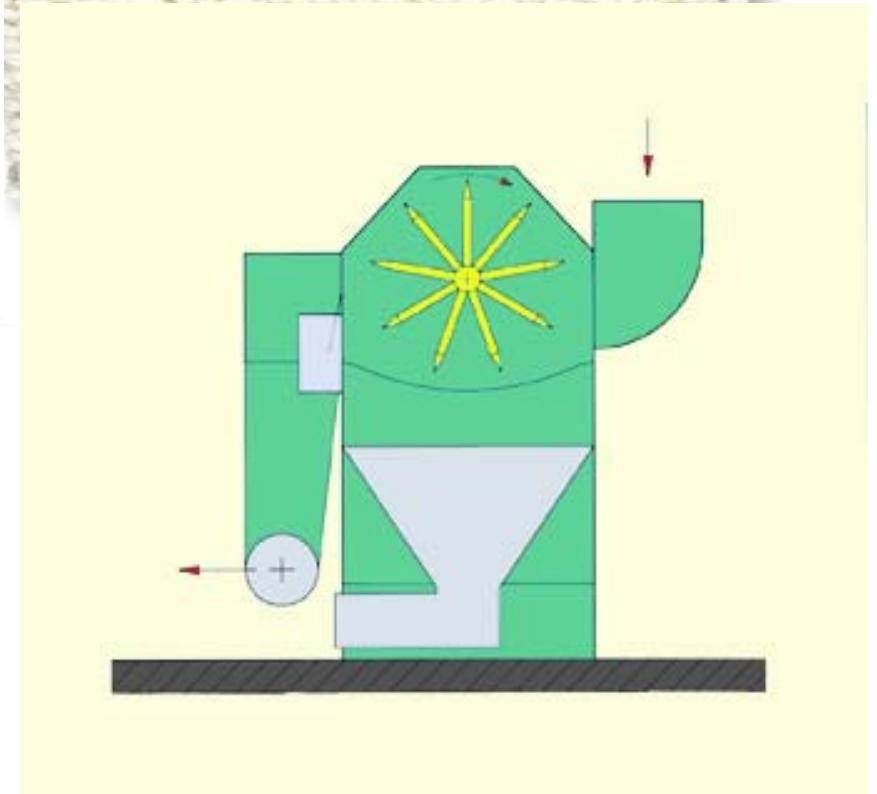


● **Beater/ Shaker/ Cleaner**



## ● **Beater/ Shaker/ Cleaner**

**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.**



**Schutte** Buffalo  
HAMMER MILL

Liberating the Carpet Matrix



● **“The Liberator” Hammer Mill  
(1 or 2 stage process)**



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

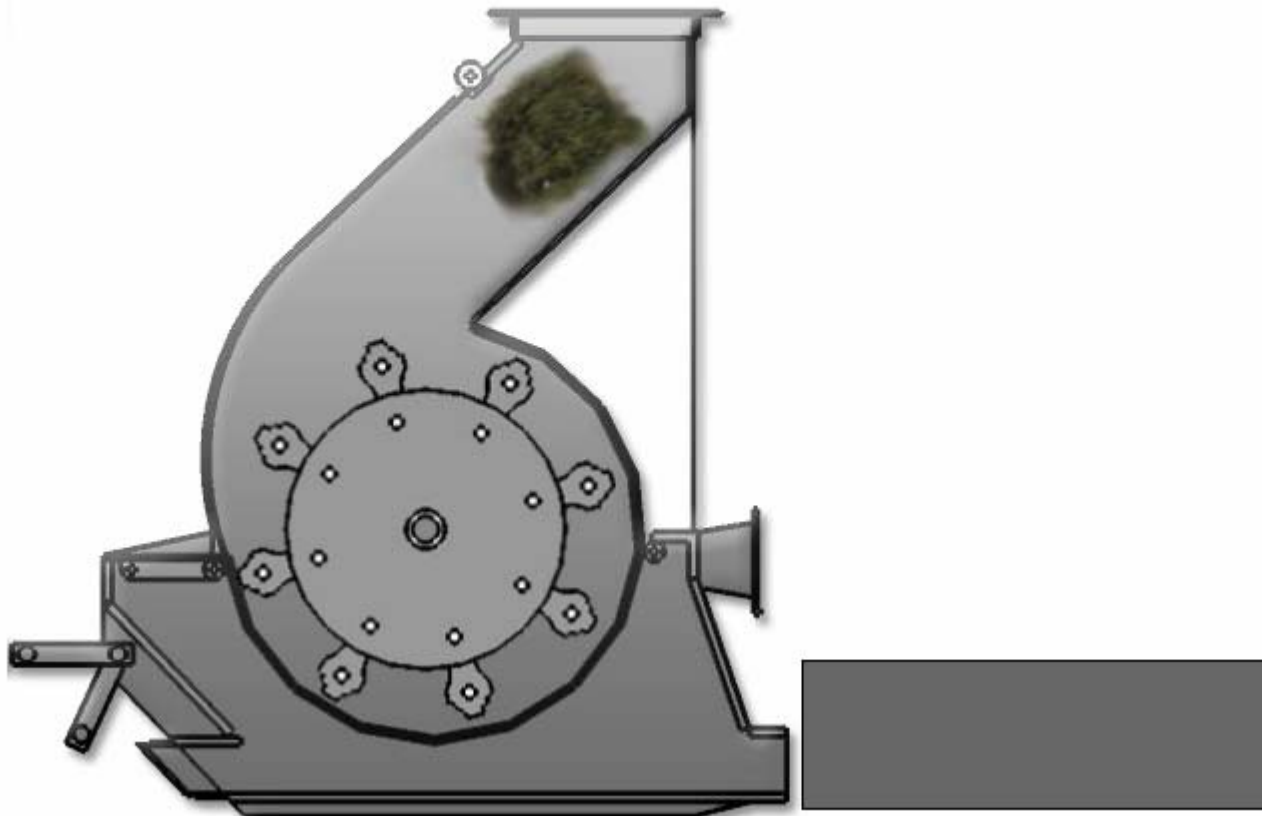
- **Impact**
- **Shearing**
- **Attrition**
- **Compression**
- **Liberation**

- 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.

## **Impact:**

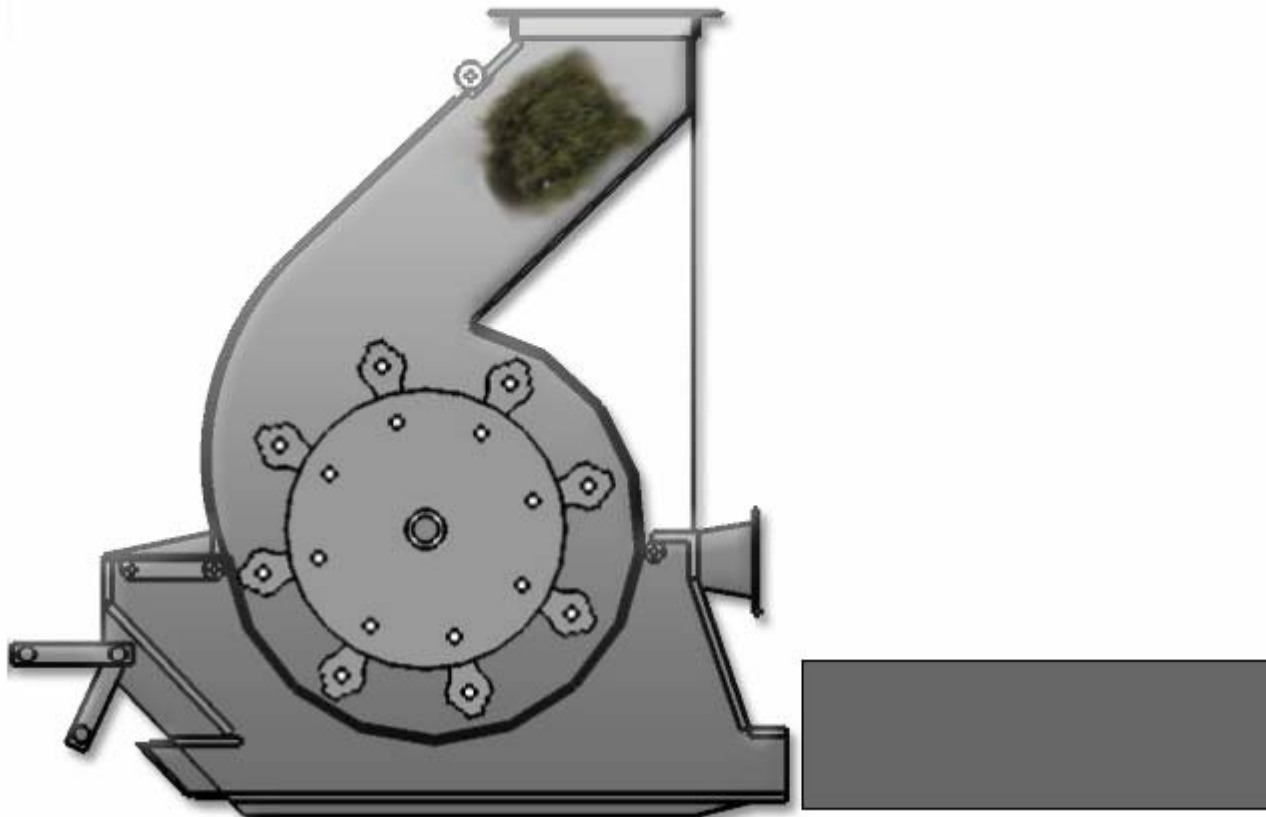
**Refers to the immediate or instantaneous impingement of one moving object against another.**

- **The impact area is the single most important factor of achieving liberation.**



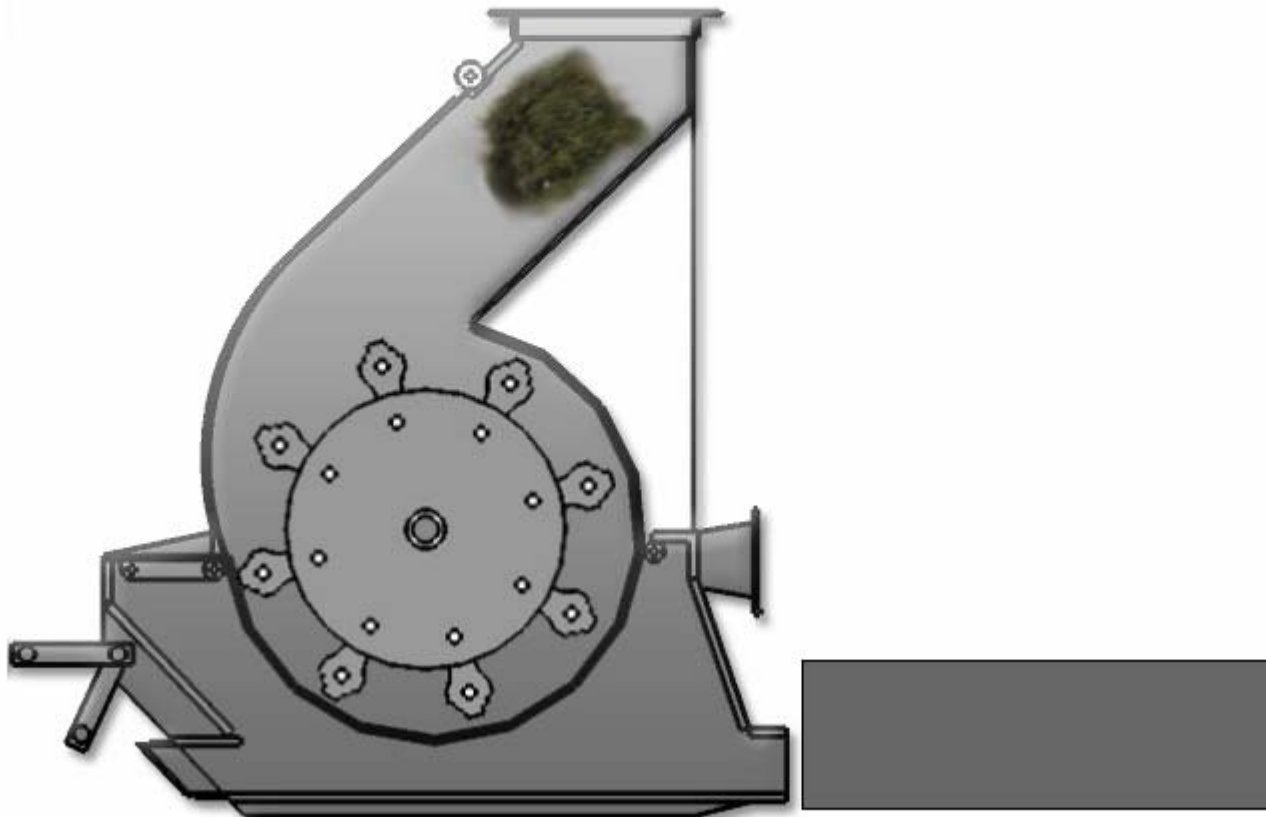
## Shearing :

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



## **Attrition:**

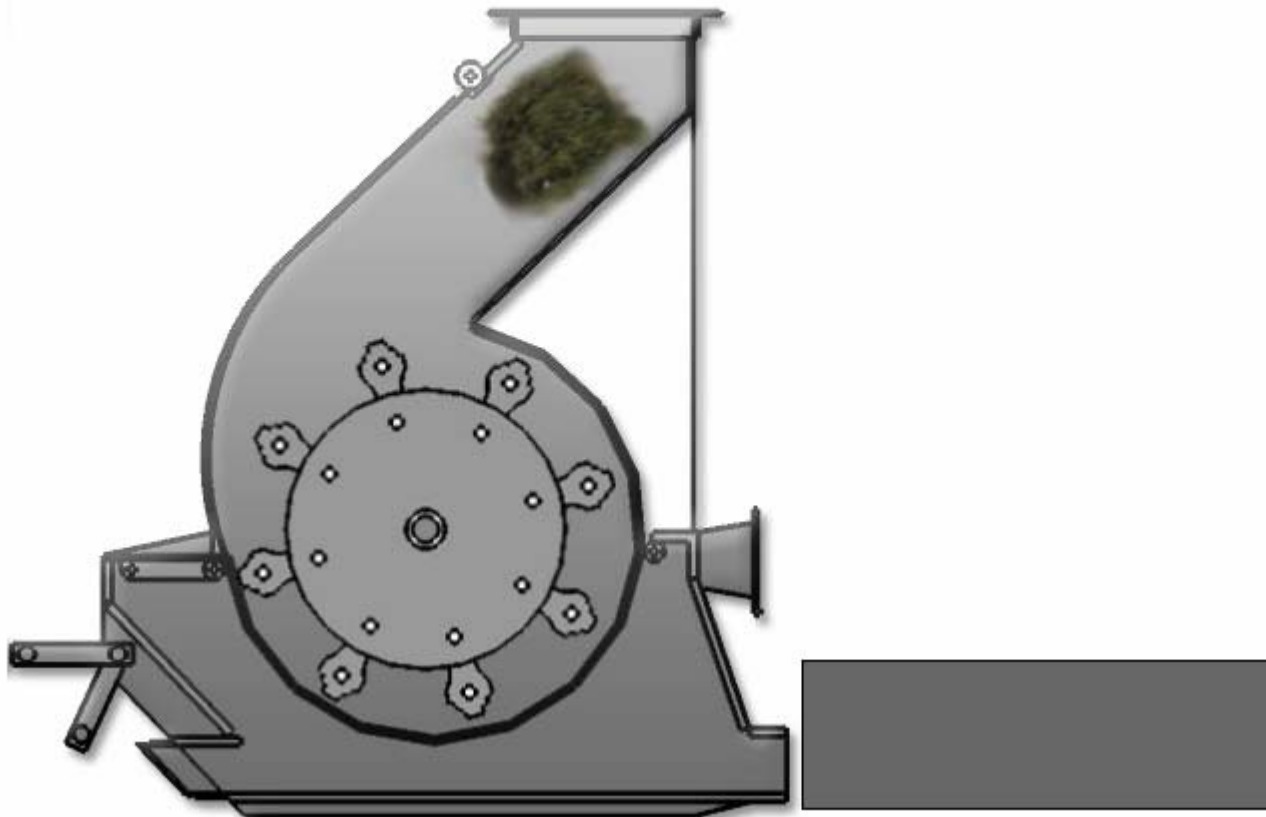
**Reduction of material by a rubbing action between two surfaces, and is primarily a “washboard” treatment by special design ribbed liner plates.**



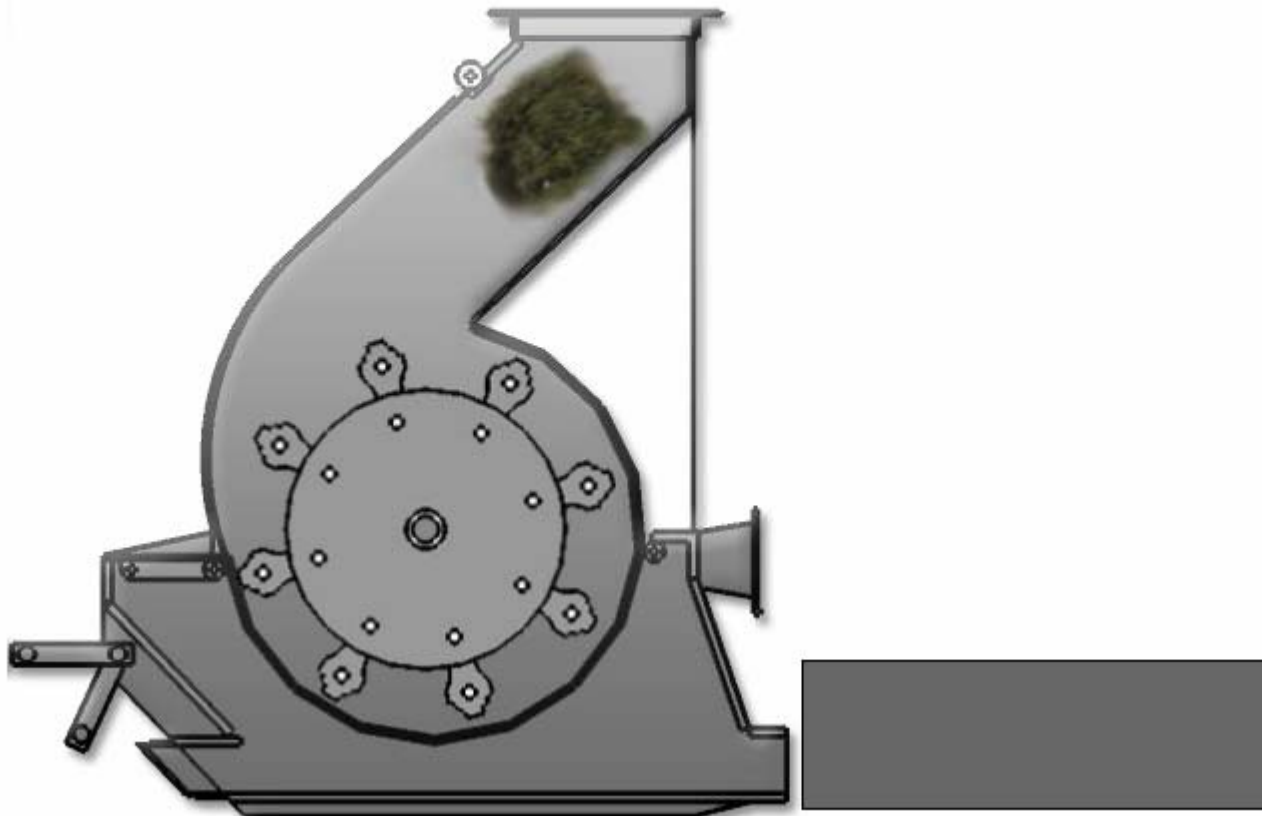
## **Compression:**

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

**(Hammers or screen)**

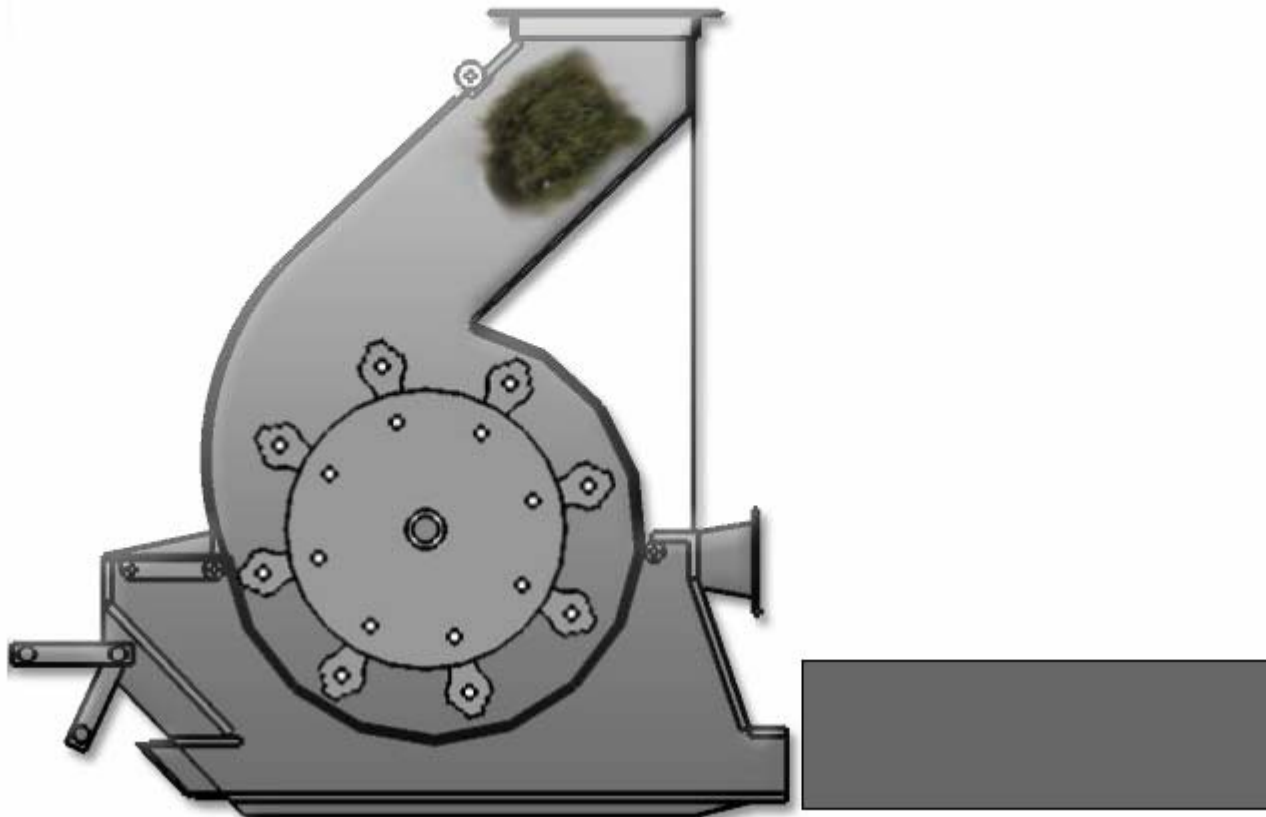


- **Hammer clearance between the walls of the machine and the screen must be precise for optimal performance levels.**
- **We determined what this distance must be after years of research and testing.**
- **A “closed” dimension causes a shredding and shortening of the carpet fiber; an “open” dimension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



# **Liberating:**

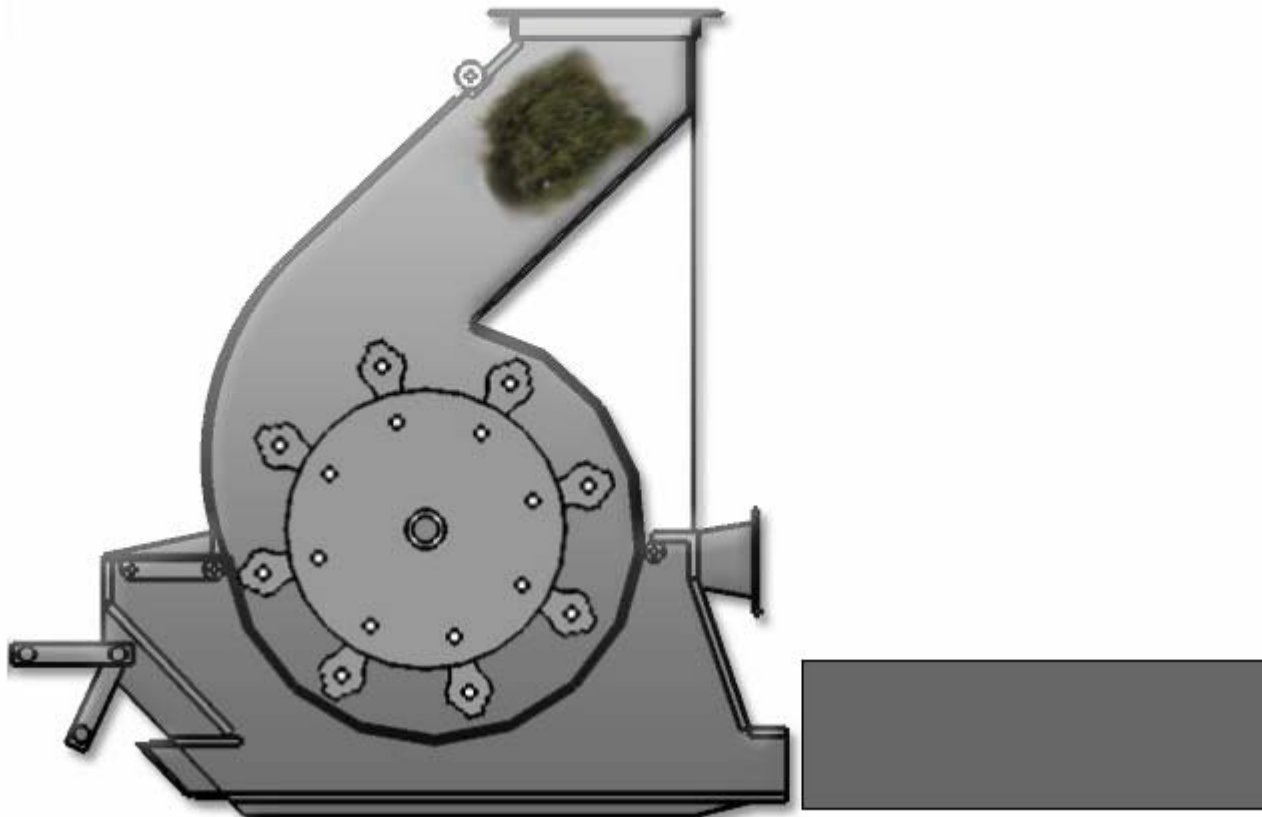
**Free material evacuating from screen area (with air assistance) after passing through hammer mill to the downstream flow for further separation.**



## Liberating the Carpet Matrix

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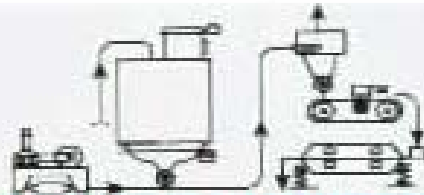
- **The aggressive action of the specially designed “Liberator” rotor separates the backing from the face fiber without matting up the fiber.**
- **The result is highest possible degree of separation with the least amount of powder entrapment.**



Liberating the Carpet Matrix

# Process Flow

**Chris Wojcik**



**BULK PROCESS EQUIPMENT, INC.**

BULK MATERIAL HANDLING & POLLUTION CONTROL

Chris Wojcik - President

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**Schutte** Buffalo  
HAMMER MILL

Liberating the Carpet Matrix

## Process Flow

## Claude Dawson



**DAWSON**  
TEXTILE MACHINERY

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Liberating the Carpet Matrix



● **Condenser/Cleaner**



● **Condenser/Cleaner**

**Liberated carpet fluff enters flowing from the Hammer Mill's air evacuation sweep and "pushing" to the condenser and/or by the condenser's vacuum sweep "pulling" through both units to the downstream process.**

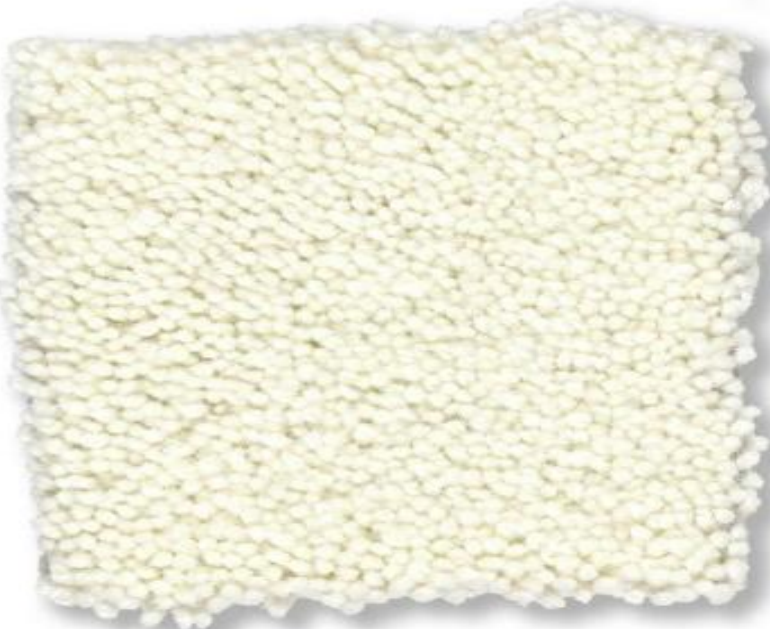
**There is also some cleaning and separation done here.**



Liberating the Carpet Matrix



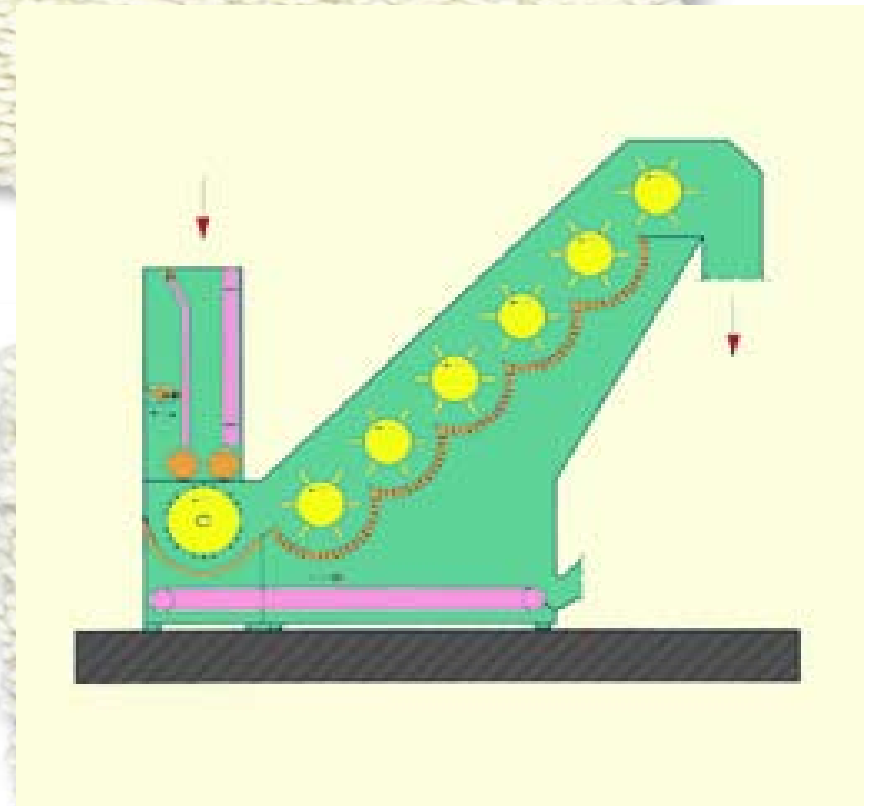
● **Step Cleaner**



## ● Step Cleaner

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

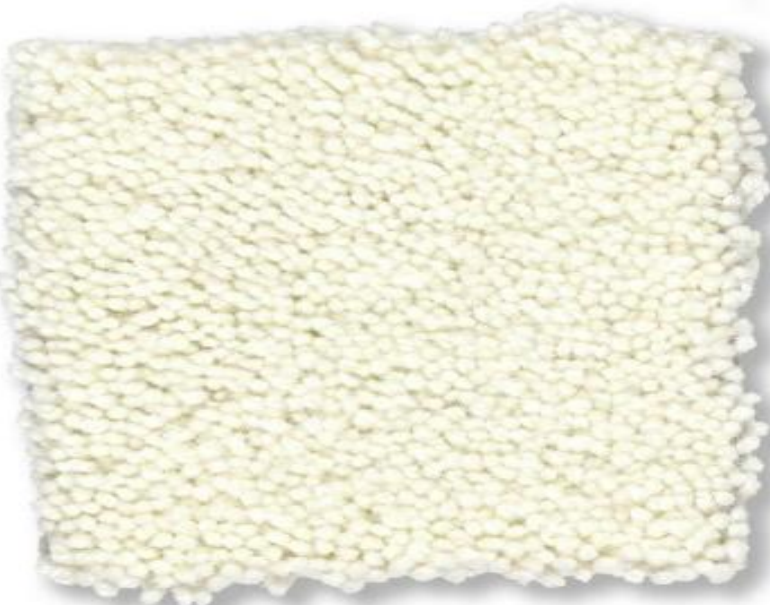
**The upstream liberation by the Hammer Mill reduced the impurities to dust while retaining fiber length enabling deep cleaning of the fiber.**



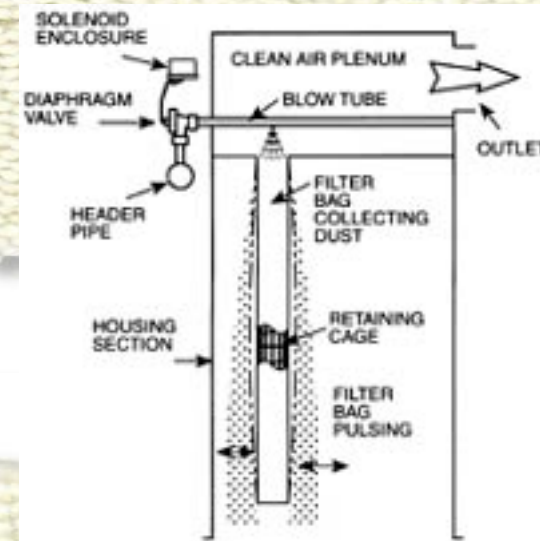
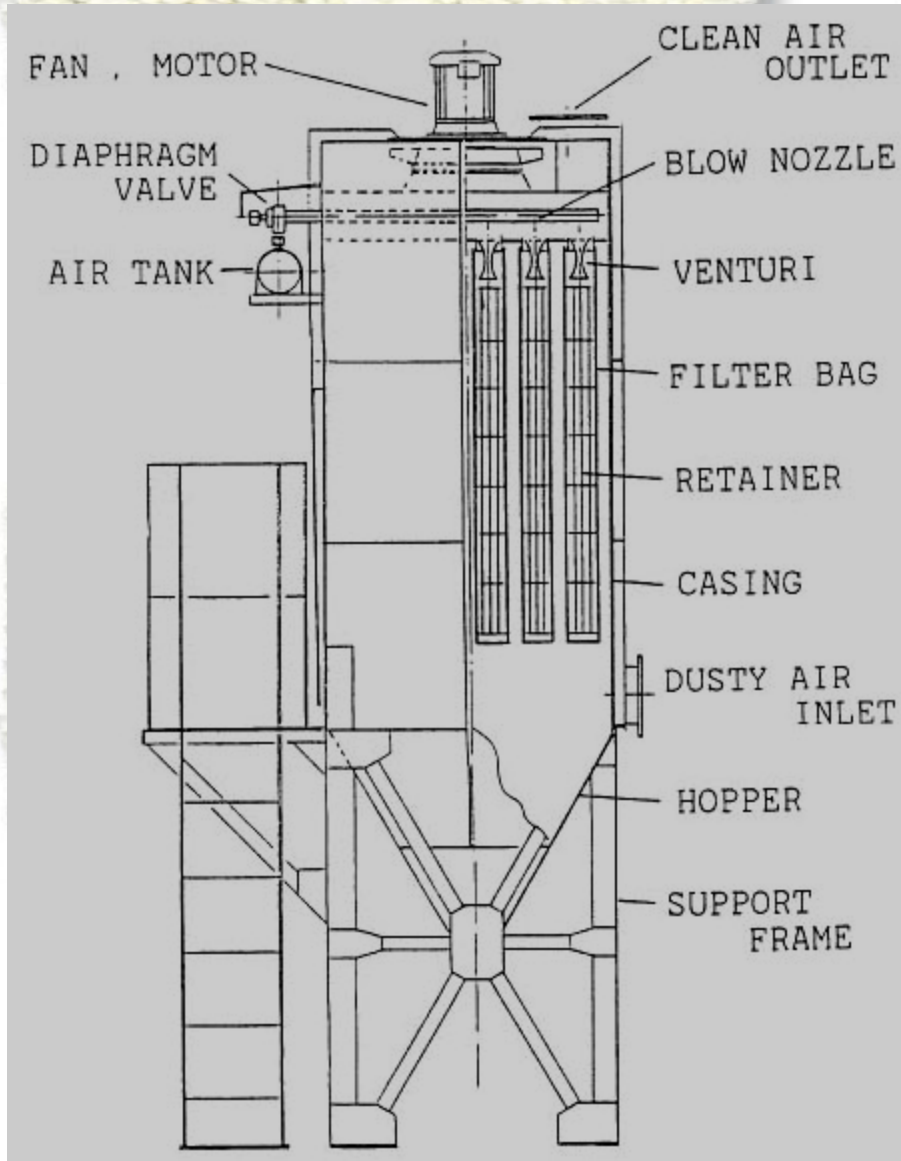
Liberating the Carpet Matrix



● **Dust Cleanup**



# Dust Cleanup



Meeting and/or exceeding EPA requirements

Liberating the Carpet Matrix



● **Emulsion Applicator**

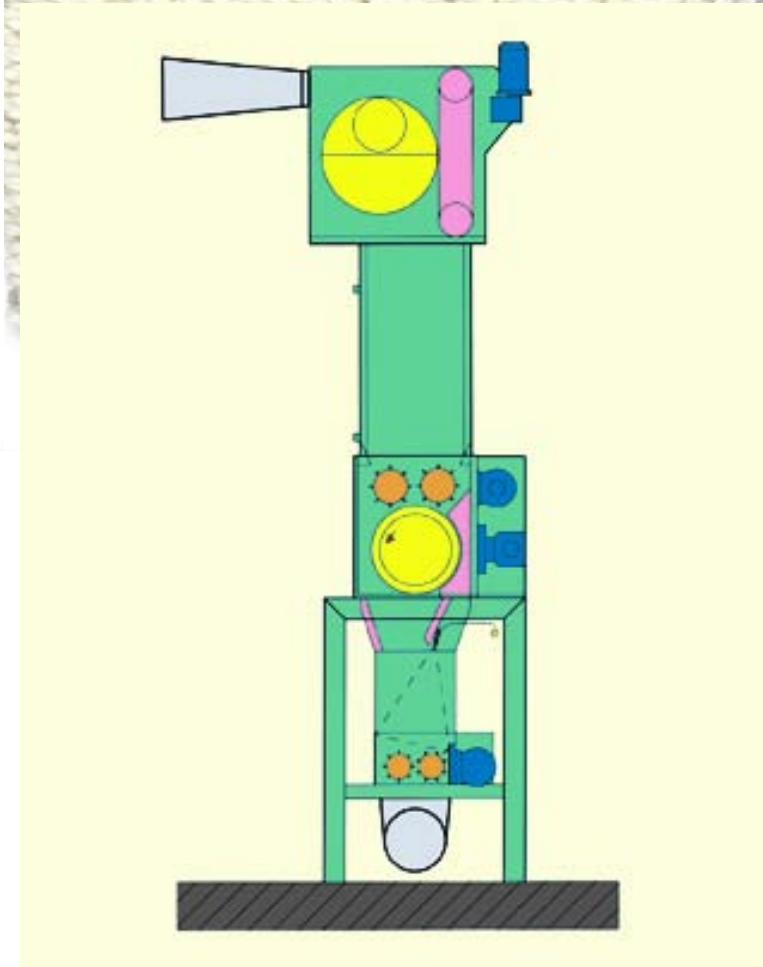


Liberating the Carpet Matrix

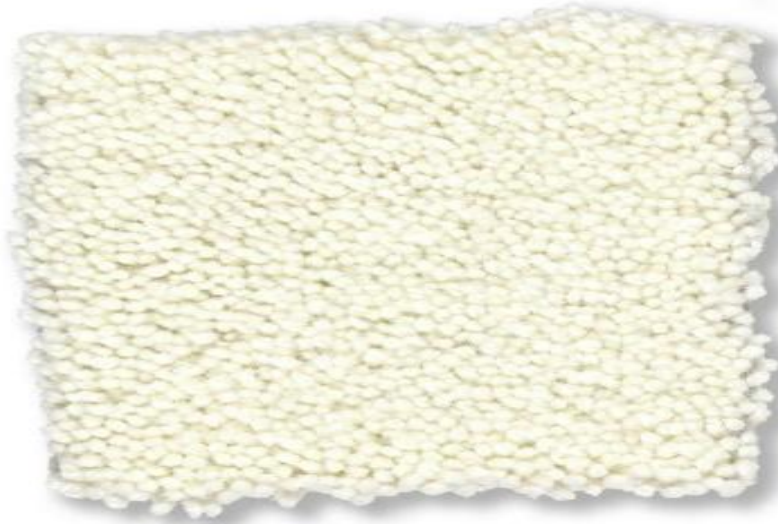
## ● Emulsion Applicator

**Liberated carpet fluff is delivered by the Step Cleaner to a specially designed Emulsion Applicator.**

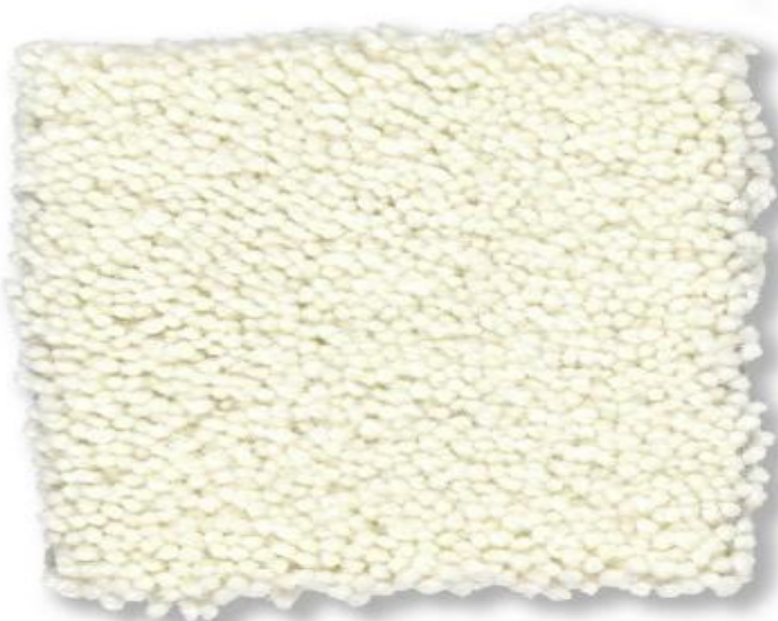
**The application of an antimicrobial or other emulsions may be required.**



Liberating the Carpet Matrix

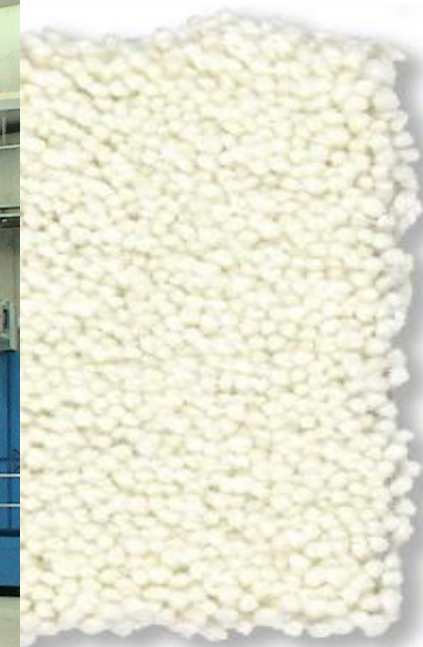


● **Blending/Storage Box**



## ● Blending/Storage Box

**After the Emulsion Applicator the liberated carpet fluff may need to be blended and stored to enhance downstream processing.**



Liberating the Carpet Matrix

## **Inside Box:**

**Liberated carpet fluff 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.**

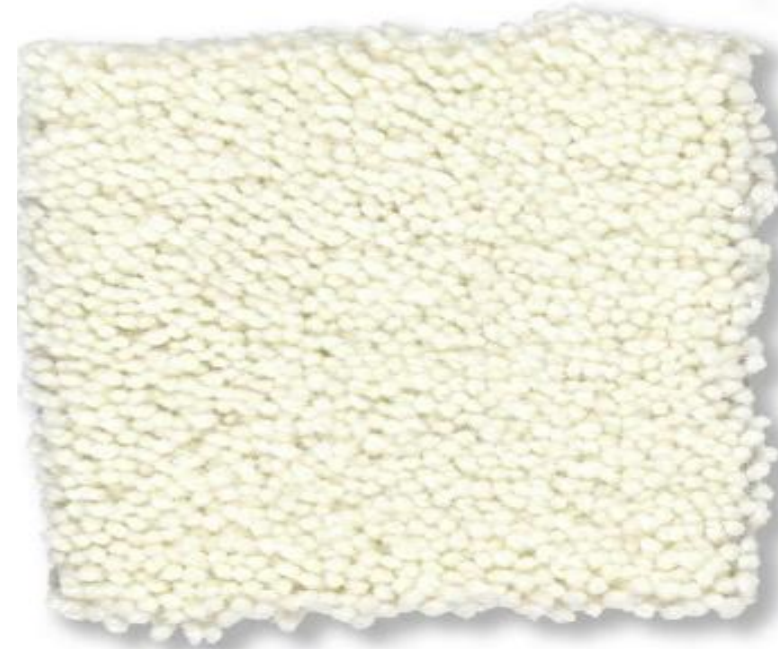
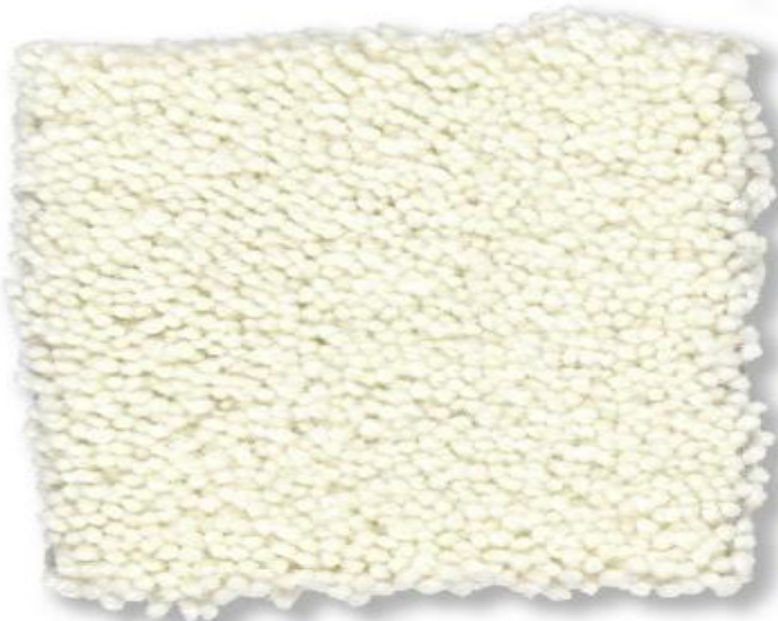


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Liberating the Carpet Matrix

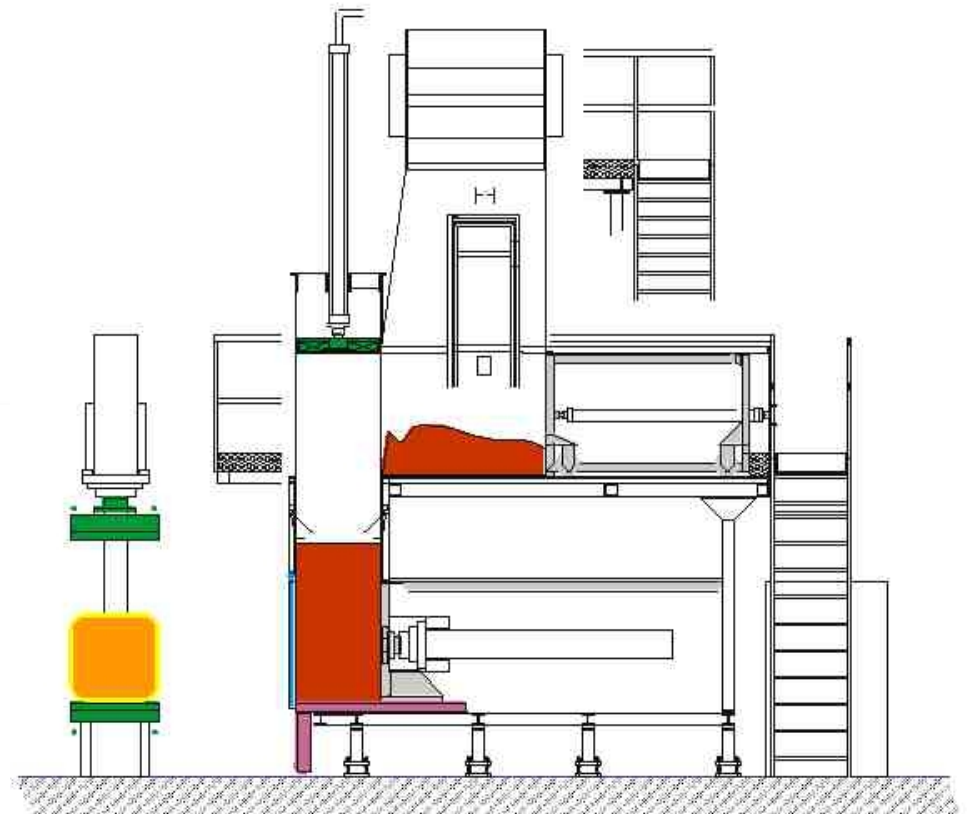


● **Bale Press**



● **Bale Press**

**The liberated clean carpet fluff can now be compressed into a Bale for ease of handling and transportation.**



Liberating the Carpet Matrix



● **Material Characteristic Review**



## Liberating the Carpet Matrix

- **Infeed raw shredded fluff**



## Liberating the Carpet Matrix

- **Liberated fluff 1<sup>st</sup> Pass**



- **Liberated Backing Powder 1<sup>st</sup> Pass**



## Liberating the Carpet Matrix

- **Liberated fluff 2nd Pass**



- **Liberated Backing Powder 2nd Pass**



Liberating the Carpet Matrix

- **SchutteBuffalo Hammer Mill  
Full Test Lab Facility  
Buffalo, New York**



**SchutteBuffalo**  
HAMMER MILL

# ● 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 in operation at all major industries.**



## Owners

- **Tom Warne & Jim Guarino**



Liberating the Carpet Matrix

# ● Inside SchutteBuffalo Hammer Mill

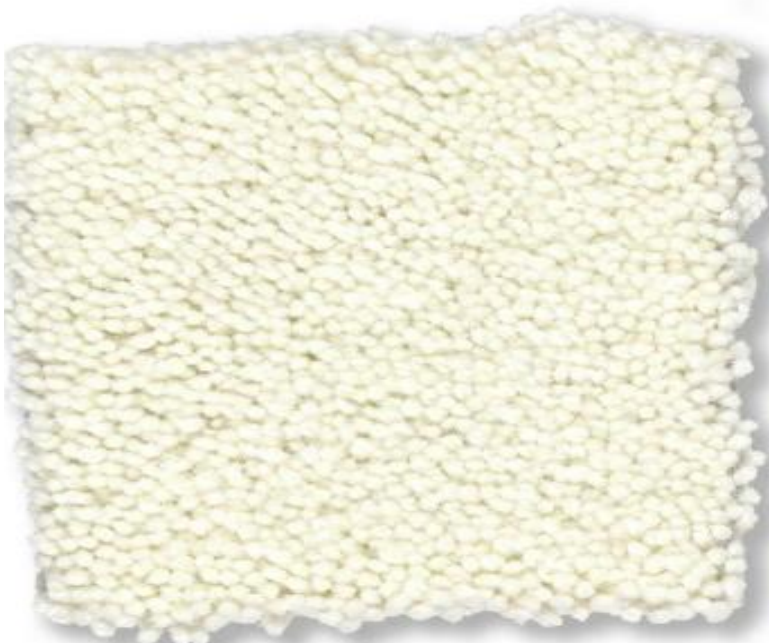


**SchutteBuffalo**  
HAMMER MILL

Liberating the Carpet Matrix



● **A Final Recap**



## Liberating the Carpet Matrix

● Infeed raw shredded fluff

● Liberated fluff 1st PASS

● Liberated fluff 2nd PASS



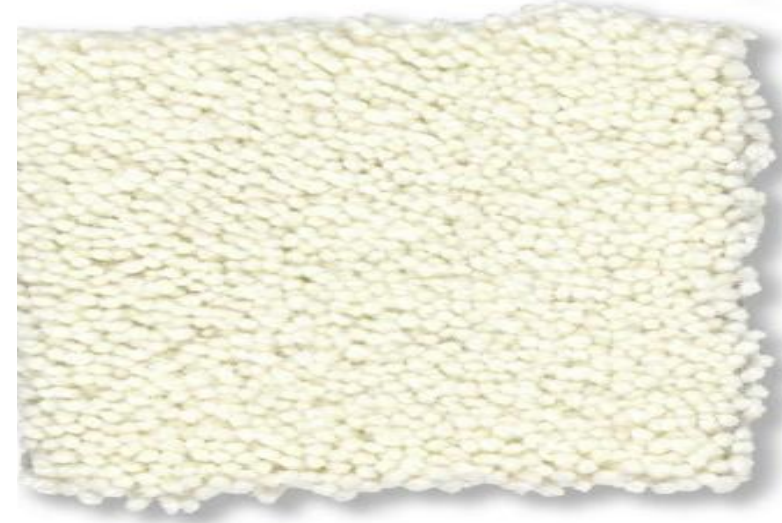
● Liberated Backing powder  
1st PASS

● Liberated Backing powder  
2nd PASS



● **Thank you and enjoy the conference.**

● **Come see us at our exhibitor booth.**



**The End**

