

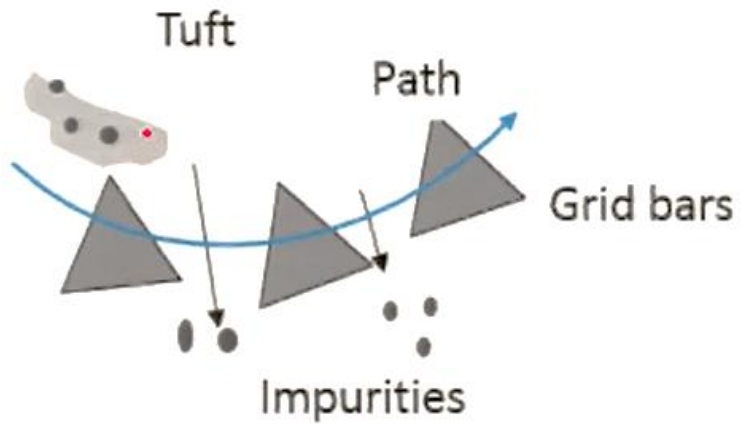
Trash Liberation



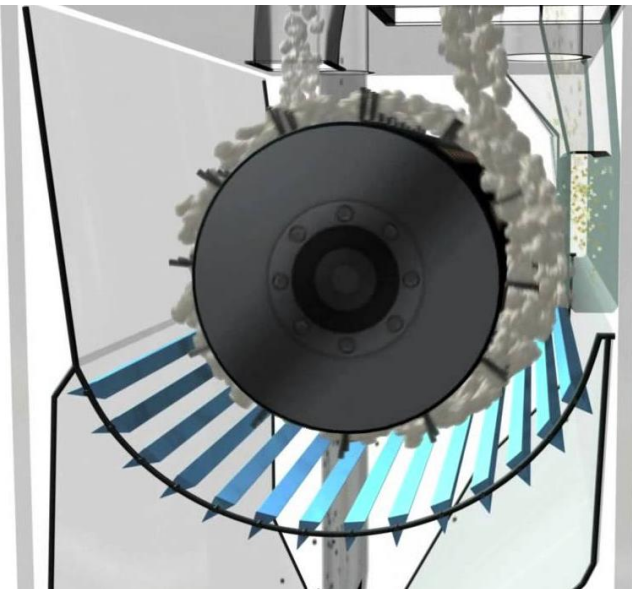
Trash Separation

## Mechanism of Trash Liberation

- ✓ Loss of kinetic energy (scrubbing)
- ✓ Impulse (Beating)
- ✓ Centrifugal force
- ✓ Pneumatic force



- ✓ Fibre tufts are guided over stationary grid bars
- ✓ The kinetic energy of trash particles after impact becomes almost zero and liberated from fibre tufts

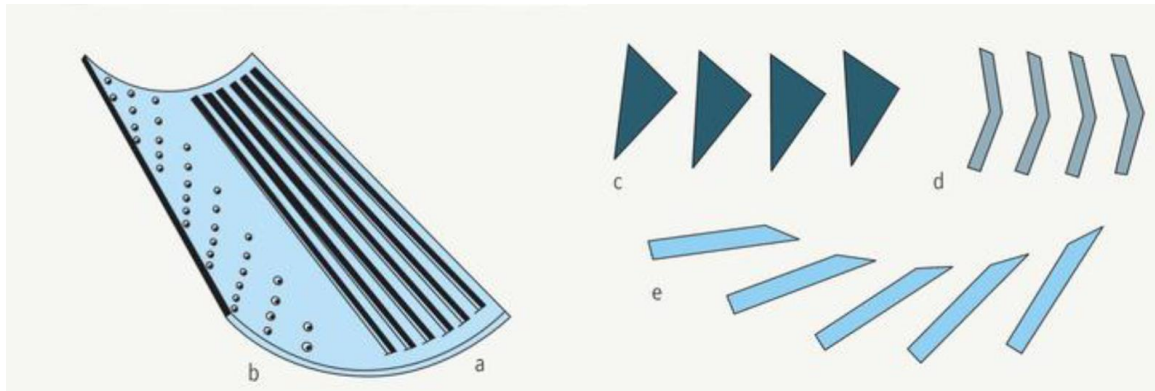


**What is separation mechanism?**

The liberated particles fall down due to **gravity** and separated

# Mechanism of Trash Liberation

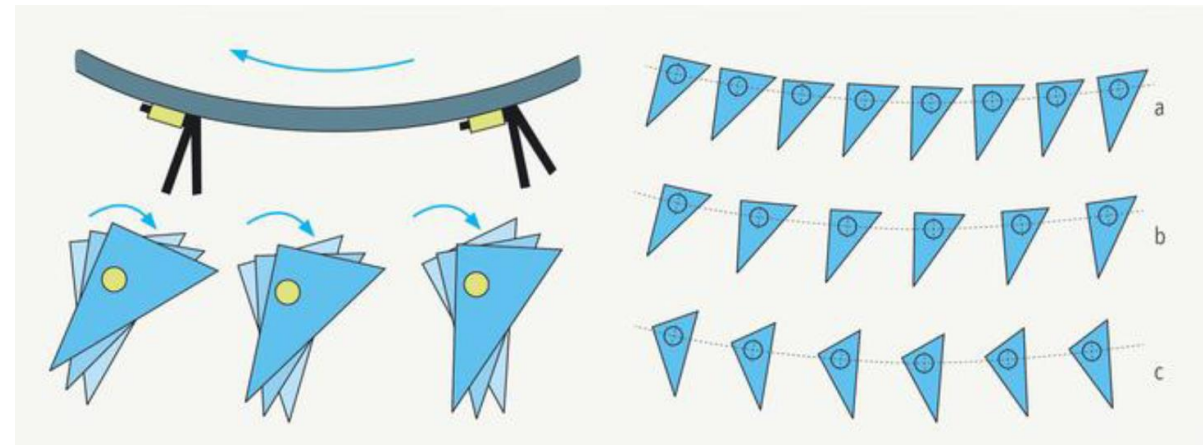
## Grid Bars



### Cleaning action depends on:

- ✓ Distance of grid bars from beater
- ✓ Gaps between the bars
- ✓ Setting angle related to the beater

- ✓ Slotted sheets (a): Poor cleaning
- ✓ Perforated sheets (b): Poor cleaning
- ✓ **Triangular section bars (c): Mostly used**
- ✓ Angle bars (d): Moderate cleaning
- ✓ Blades (e): Strong and effective



# Mechanism of Trash Liberation

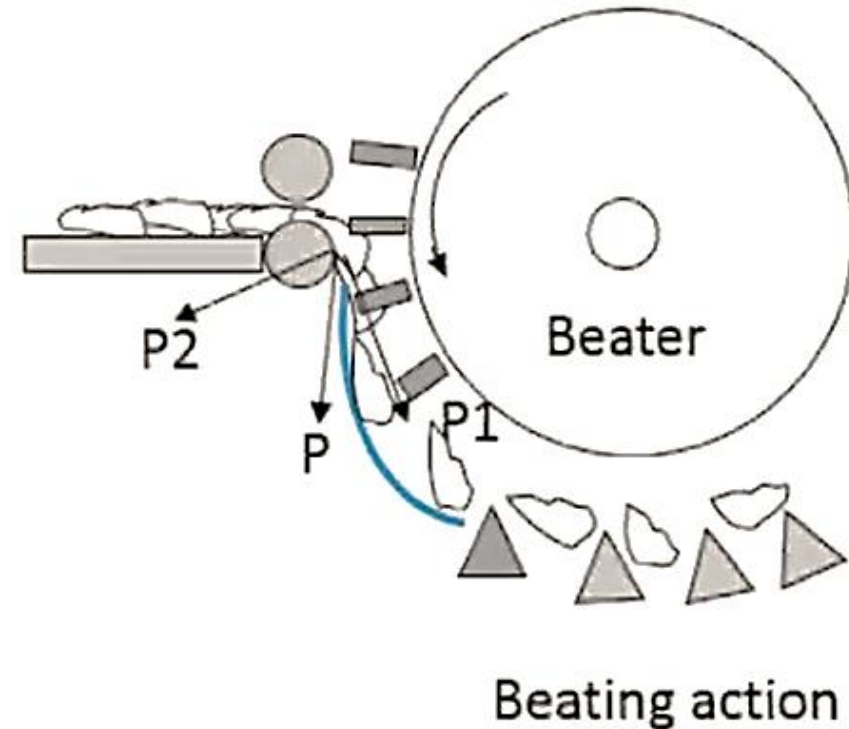
## Impulse (Beating)

- Flocks are fed by feed rollers and are subjected to strong blows by the blades of a beater.
- Velocity of tufts changes instantly (in microseconds)

**Impulse: change in momentum**  
$$= m(v_i - v_f)$$

$m$  is the mass of tuft,  $v_i$  is the initial velocity,  $v_f$  is the final velocity, i.e., feed roller surface speed, final velocity (surface speed of beater at the top of strikers)

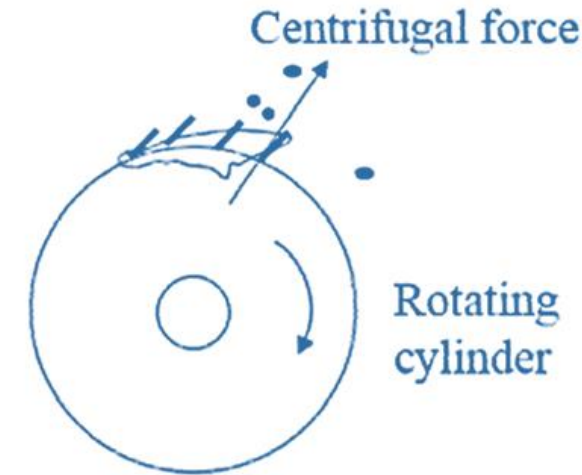
**How the trash will be separated?**



# Mechanism of Trash Liberation

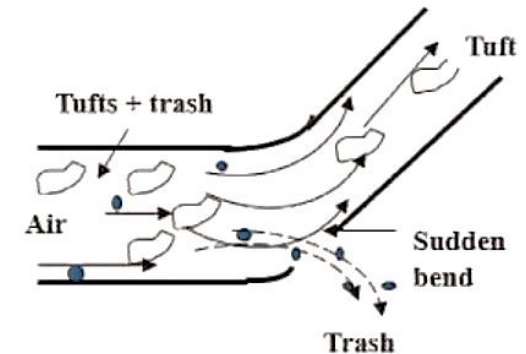
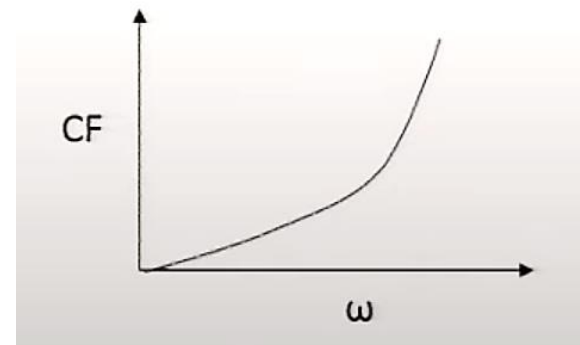
## Centrifugal force

- ✓ Trash particles resting on the saw tooth, strikers or blades are subjected to a high centrifugal force.
- ✓ Trash particles have low attachment with the striking elements.



$$CF = mr\omega^2$$

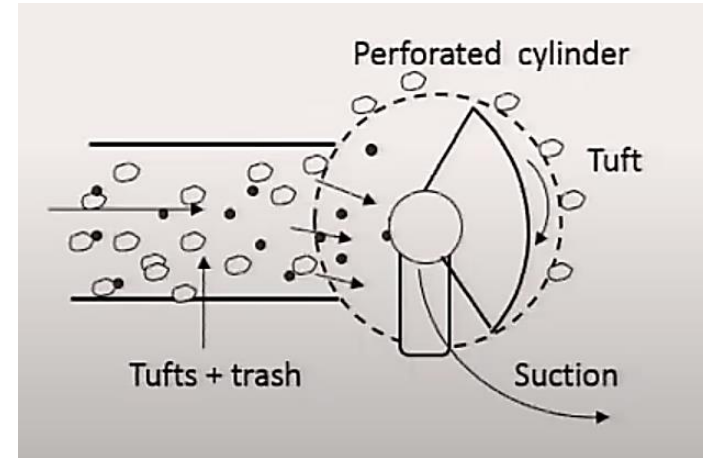
What is the trash separating mechanism?



# Mechanism of Trash Separation

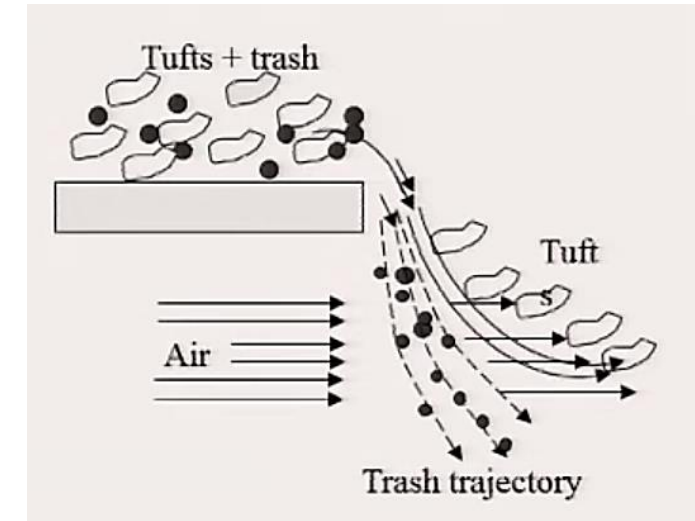
## Pneumatic force

- ✓ Trash with liberated trash particles are directed towards a moving perforated screen.
- ✓ Trash particles are sucked through the perforations



## Separation by buoyancy difference

- ✓ Mixture of tufts and trash particles are directed downwards
- ✓ A stream of air flow cross the path horizontally.



# Dust and Metal Removal

## Dust Removal

### Difficulties:

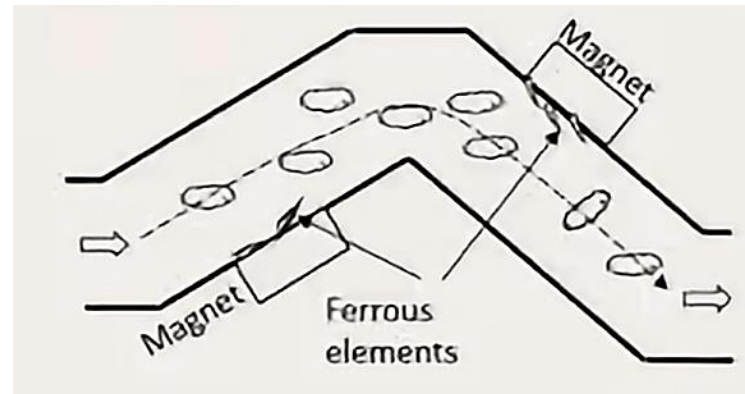
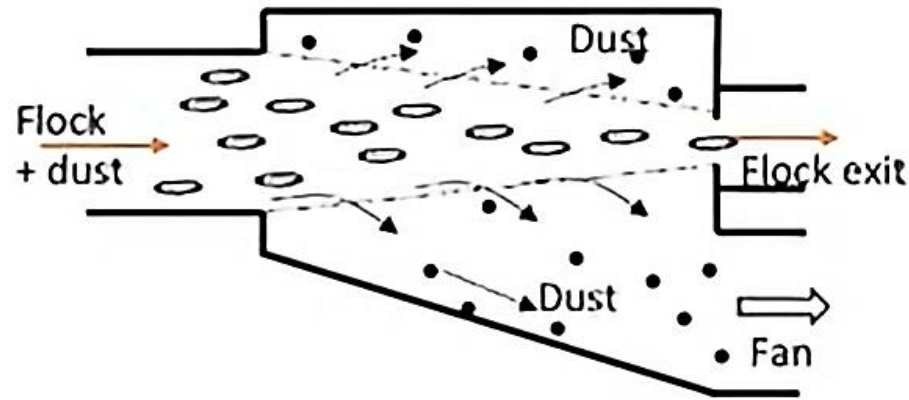
- ✓ Dust is lighter than fibres
- ✓ Strong adherence with fibres

### Liberation mechanism:

- High metal to fibre friction
- Fibre to fibre friction

### Separation Mechanism:

- ✓ Through suction



**Metal Extractor**

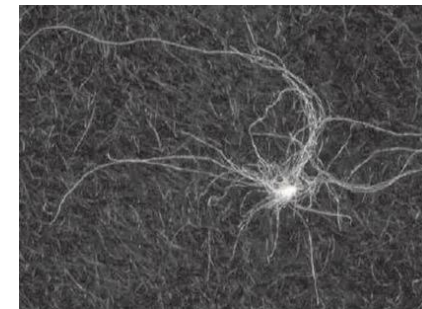


# Cleaning Efficiency



$$\text{Cleaning efficiency (CE \%)} = \frac{\text{Trash in feed (\%)} - \text{trash in delivery (\%)}}{\text{Trash in feed (\%)}} \times 100$$

- ❖ The CE % of individual cleaner varies according to their type and position
- ❖ The beater or cleaner in the beginning of the blowroom line shows  
- higher cleaning efficiency
- ❖ More cleaning means more waste and loss of good fibres (lint)
- ❖ Lint in the waste should be in the range of 20-30%.
- ❖ After opening and cleaning nep level in blowroom increases significantly





# Opening and Cleaning Principle

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What we have learnt so far.....

## Importance of Yarn manufacturing in India

- India is the world's second largest cotton producing country
- India has the world's second largest spinning capacity after China
- Ample opportunities in Technical Textiles (NTTM), entrepreneurship, machine manufacturing, etc.

## Different Steps in Yarn Manufacturing

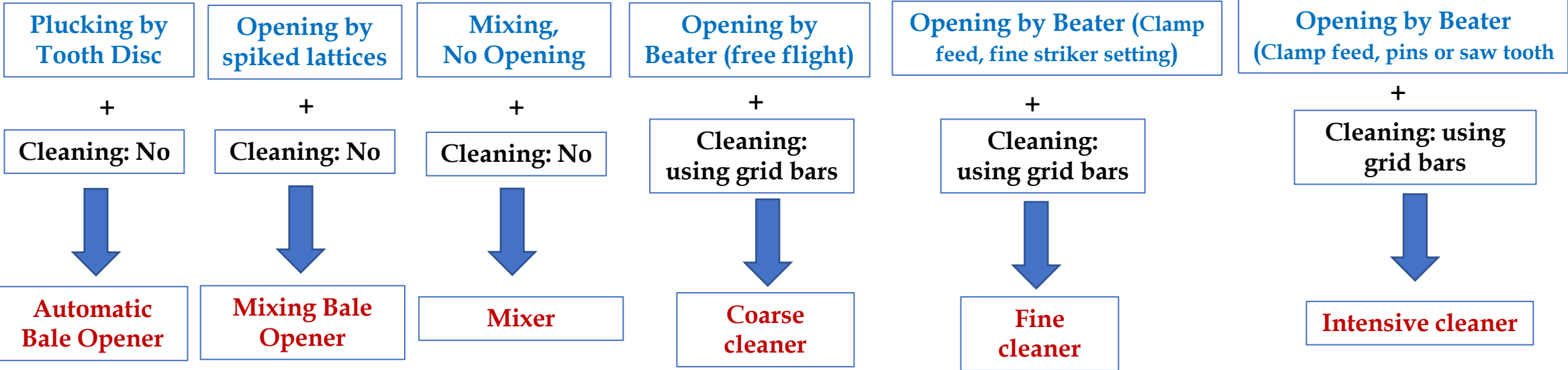
## Objectives and Principles of Opening and Cleaning

- What is opening?
- Why and how opening is done?
- Why and how cleaning is done?
- Why does a blowroom line need a specific opener and cleaner at a specific place?
- How opening and cleaning intensity are measured?
- What are the parameters which affect opening and cleaning intensity?

New Opening and Cleaning Principles.....

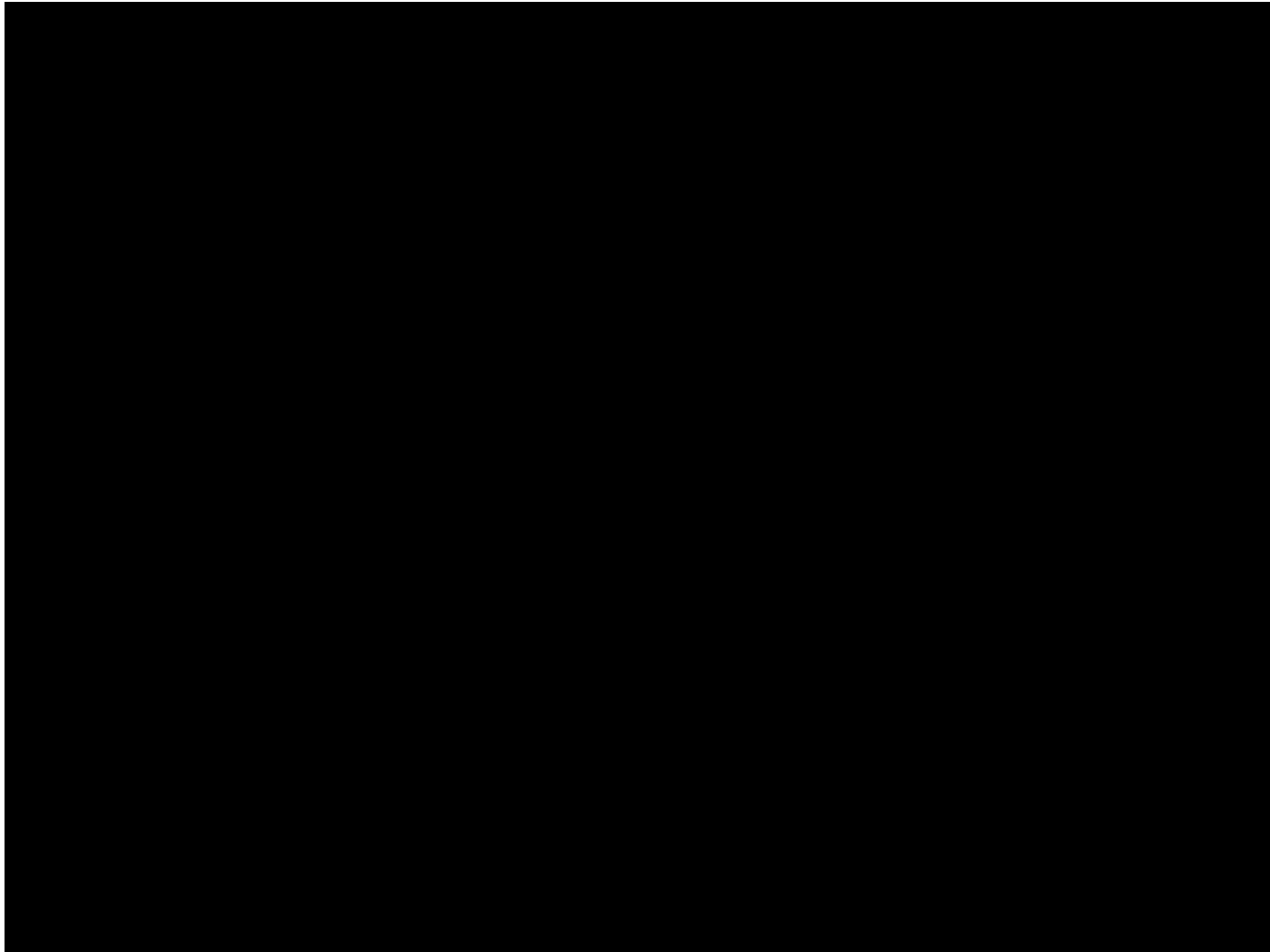


# Blowroom Machines



# Blowroom Machines

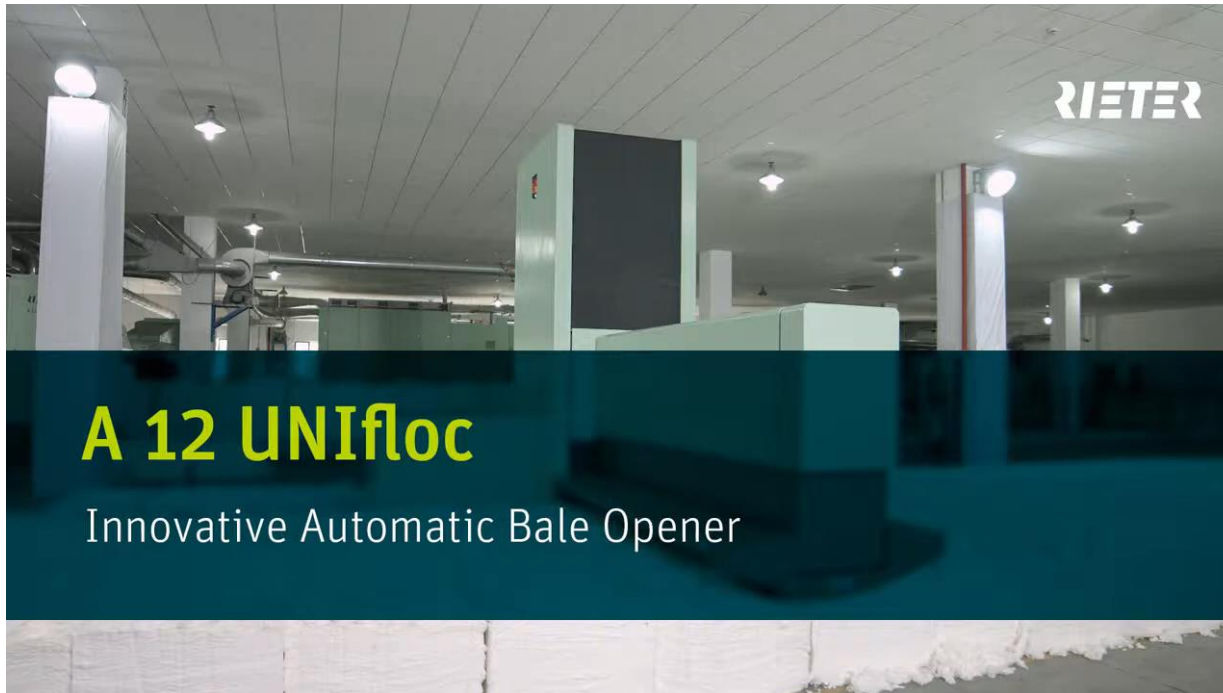
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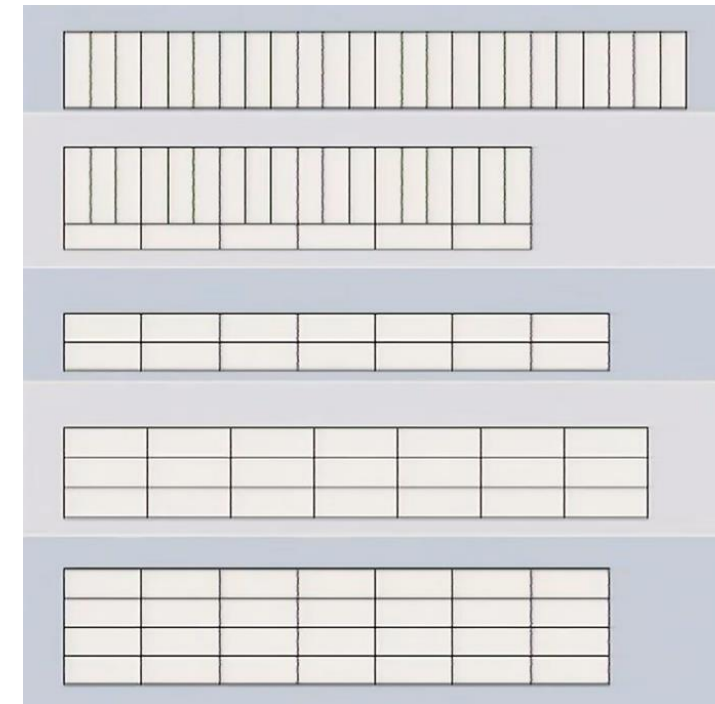
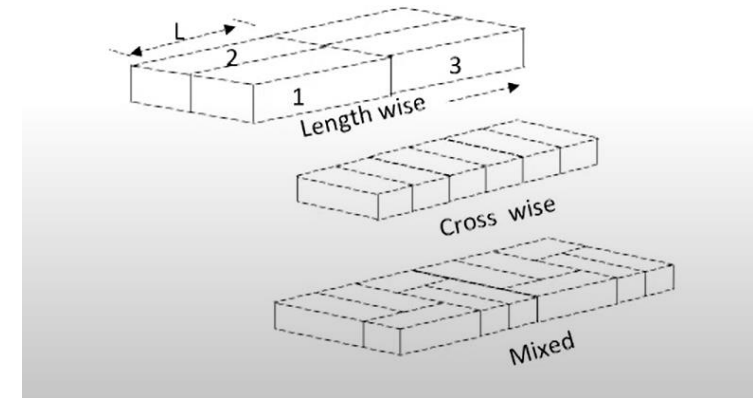
# Blowroom Machines



## Automatic Bale Opener: Unifloc (Rieter)



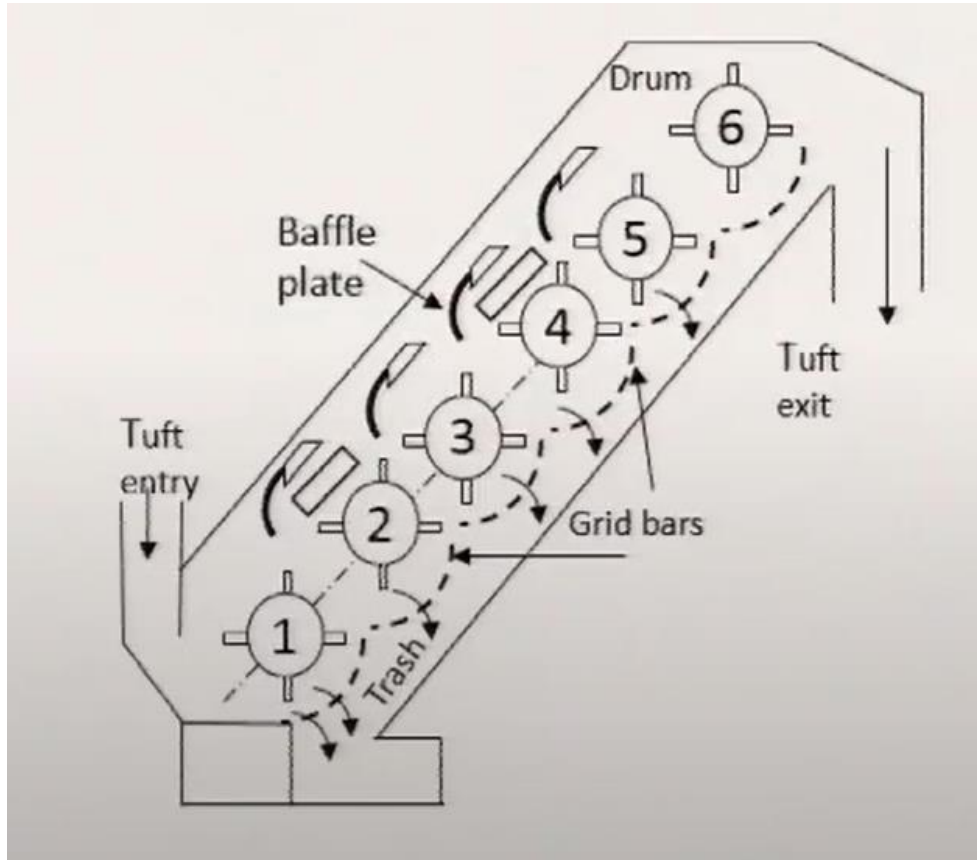
- ✓ Rotating tooth discs pluck out fibre flocks (**micro tufts**)
- ✓ **Bale height is automatically detected**
- ✓ Depth of penetration: 2-4 mm
- ✓ **Can turn by 180° to process bales on the other side**
- ✓ Production: up to 2000 kg/hr



Bale lay down

# Blowroom Machines

## Coarse Cleaner



Step Cleaner

- ✓ Consists of series of drums with four rows of striking elements
- ✓ Grid bars cover 25% of individual drum chamber
- ✓ Inclination angle 45 to 60°
- ✓ Beater speed: 500 to 600 rpm



# Blowroom Machines

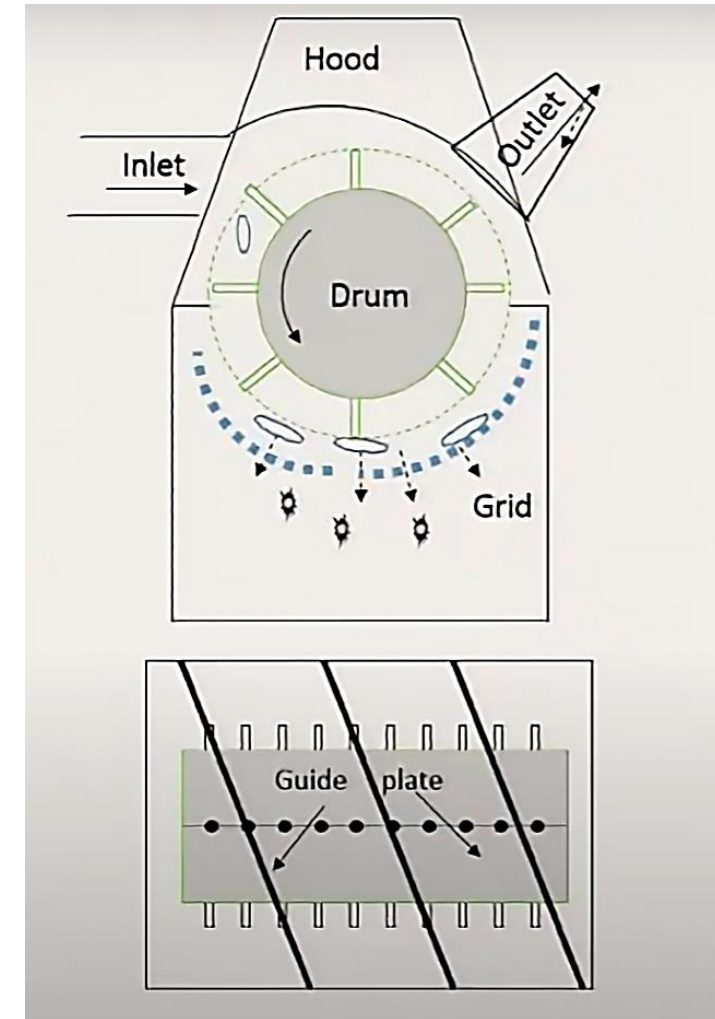
## Coarse Cleaner

- ✓ The drum surface is covered with 6-8 rows of striking elements
- ✓ The fibre tufts enters at right angle to the beater axis and receives strikes
- ✓ The guide plates ensure than the fibre tufts follow a spiral path. **Why?**

RIETER

### B 12 UNIclean

Efficient and reliable pre-cleaning



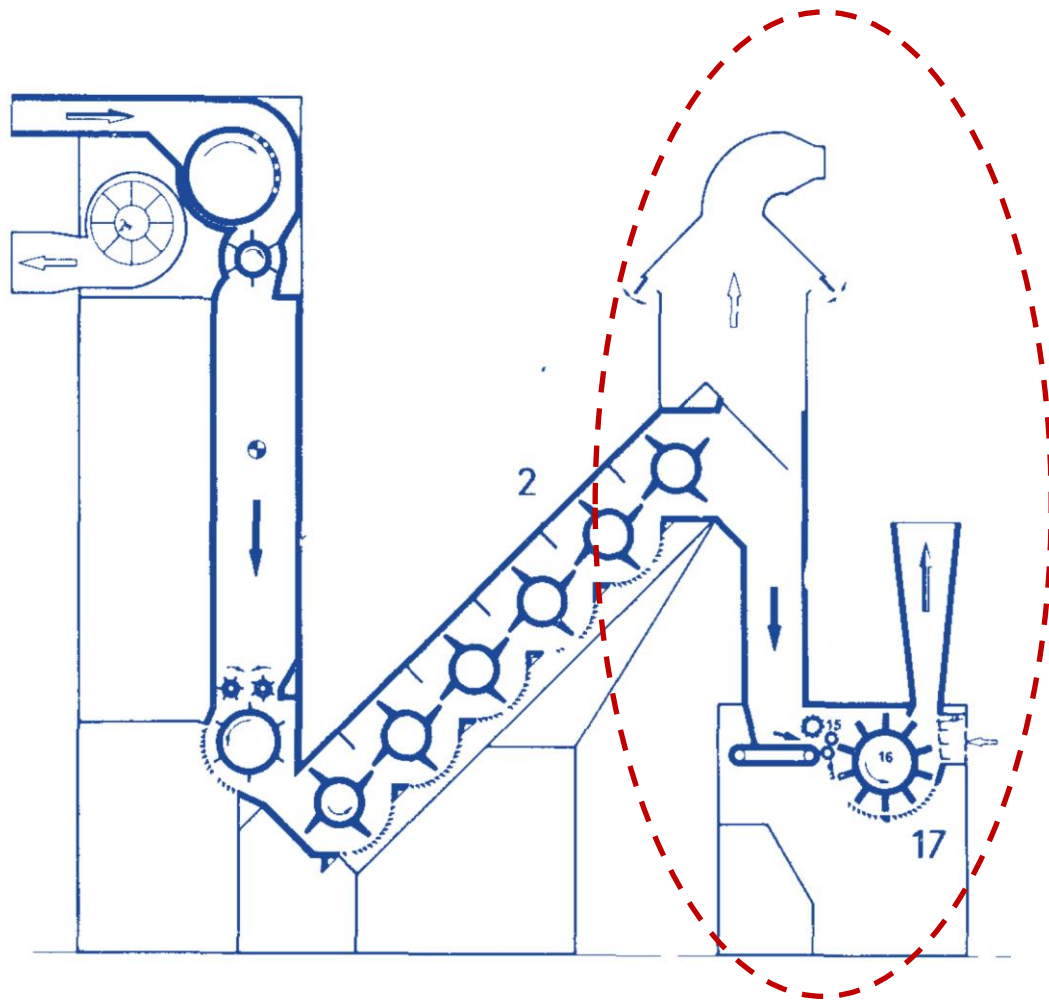
Monocylinder Cleaner



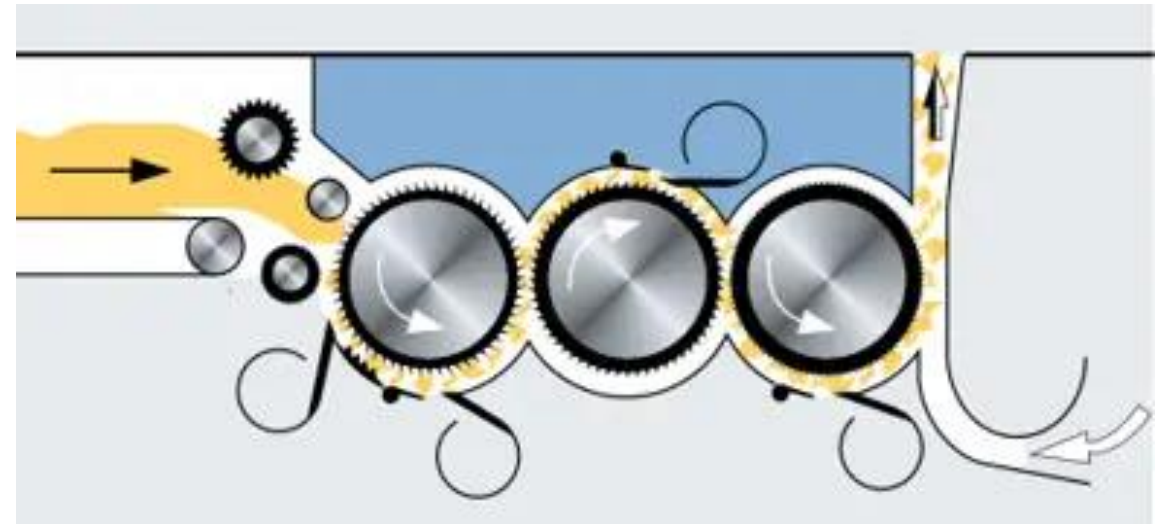


# Blowroom Machines

## Fine Cleaner



RN Cleaner (Trützschler)

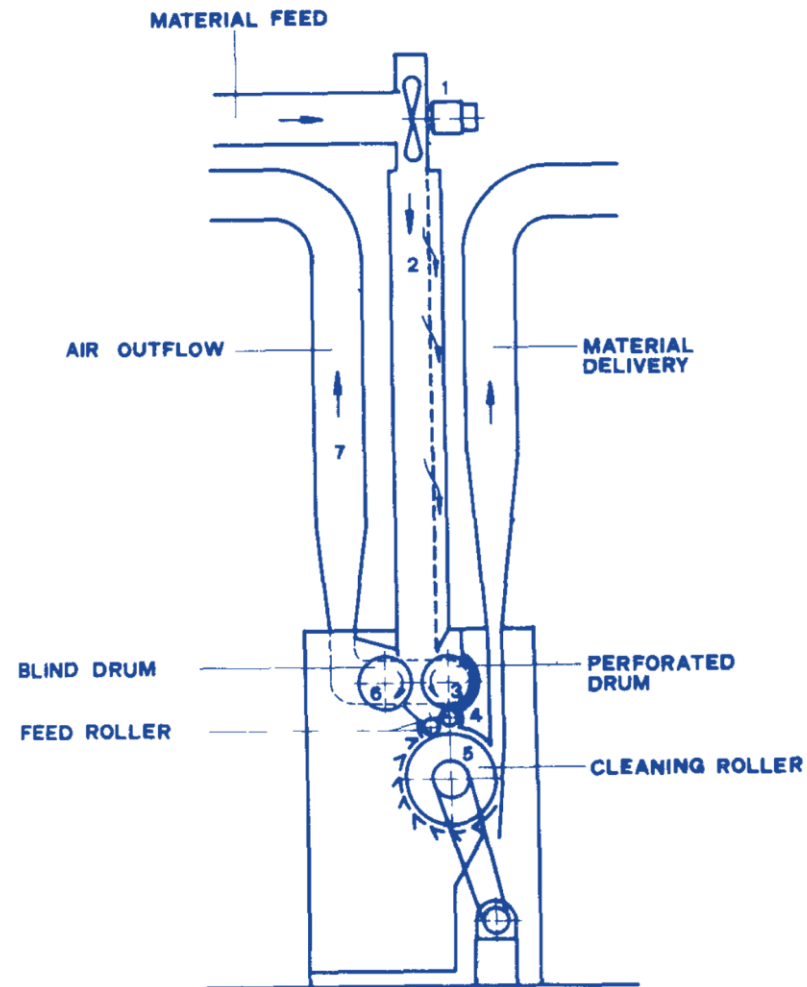


Cleaner CL-C3 (Trützschler)

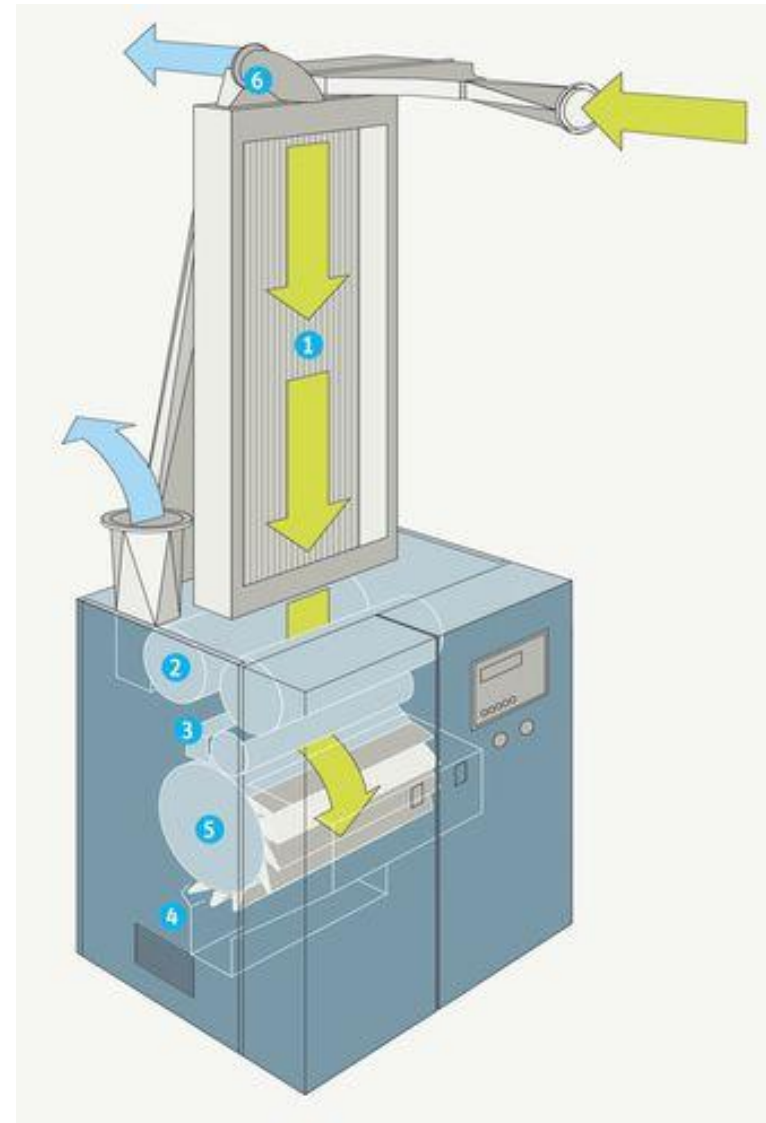


# Blowroom Machines

## Fine Cleaner



**ERM Cleaner (Rieter)**



**Uniflex (Rieter)**

Filing chute (1)

Perforated drum (2)

Feed roll (3)

Grid bar (4)

Opening cylinder (5)