Chapter II.

PREPARATION OF FIBERS BEFORE CARDING
(opening, blending, feeding etc…)

http://www.authorstream.com/Presentation/asif597k-1393714-drylaid-web-formation/

http://www.slideshare.net/awaisimran12/non-woven-textiles

* **PRINCIPLE**

Prepare optimal fibrous blend to next manufacturing (carding, random carding, wetlaid and airlaid forming methods). The imput of this processing is a bale of pressed fibers, the output is a uniform layer from defined blend of fiber flocks (not completely ceparated fibers).

TECHNOLOGIES

Not all technologies have to be included in the process because some machines have more functions. Also listed oreder can be changed.

- Bale opening
- Mixing and storage
- Blending of different fibers
- Cleaning
- Opening
- Refinement
- Feeding

Bale opening

Description: The raw fiber flocks are plucked from the pressed bale and partly opened. It is possible to blend different fibers.

Machines

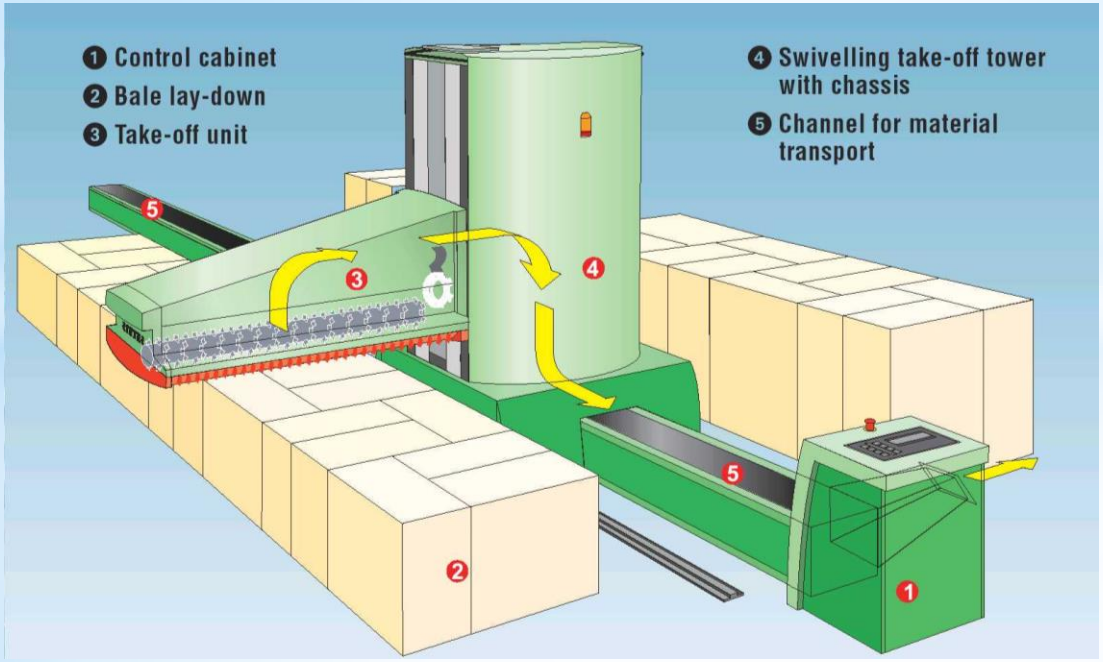


Fig.1: Scheme of bale opener (and mixing machine) Rieter UNIfloc A 11. The production is up to 1000 kg/hod for synthetic fibers (1200 kg/hod for cotton).

Fig. 2: Detail UNIfloc A 11 take-off unit

Machines

Fig.3: Bale opener Trütschler BLENDOMAT BDT 020

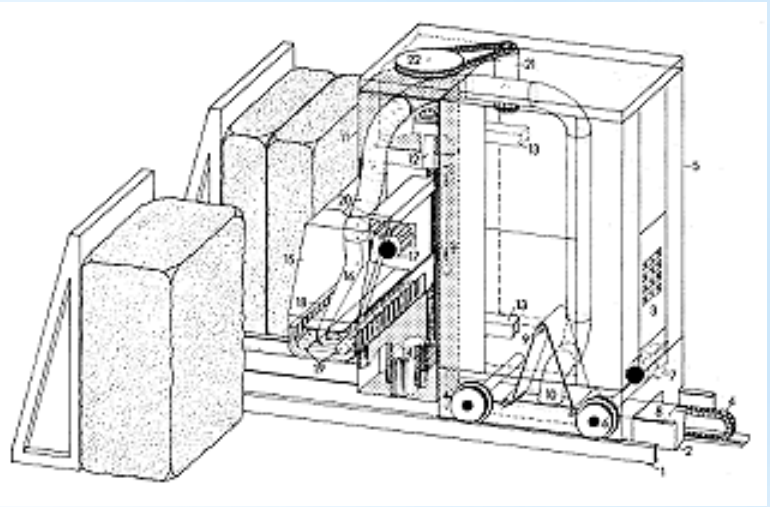


Fig. 4: Tower plucker H.HERGETH - OPTIFLOC for short staple fibers

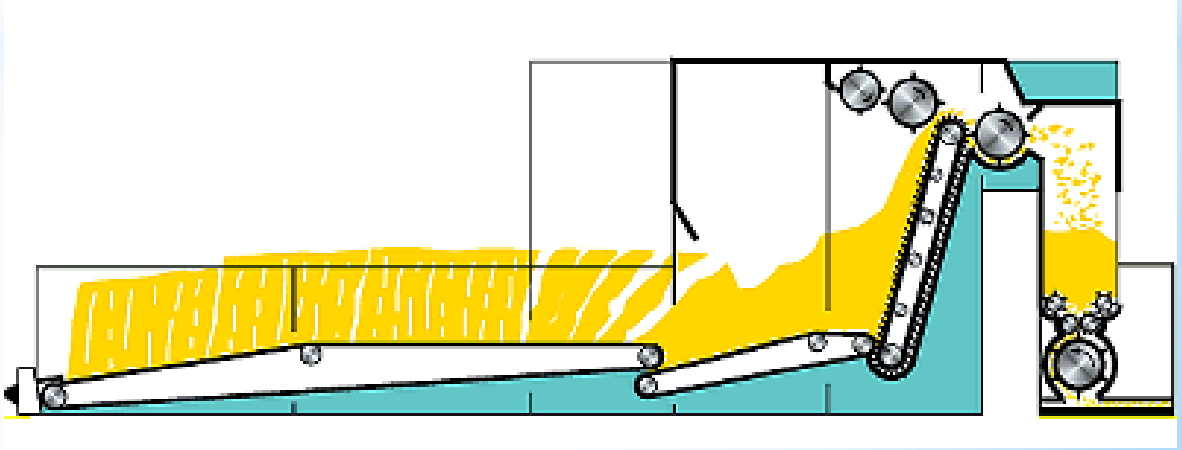


Fig. 5: Bale opener Trütschler BOL with high productivity opener FOL (without mixing)

Fiber blending

Principle:

When we use different types of fibers it´s necessary to make blend with exact proportion of each component. Final product of blending is necessary to homogenize by mixing.

Usually used technique is combination of bale opening, blending, feeding and opening process (see fig.6). Each type of fiber is opened and feeded according to it´s proportion by one machine (named Hopper) put on the conveyor belt and open.

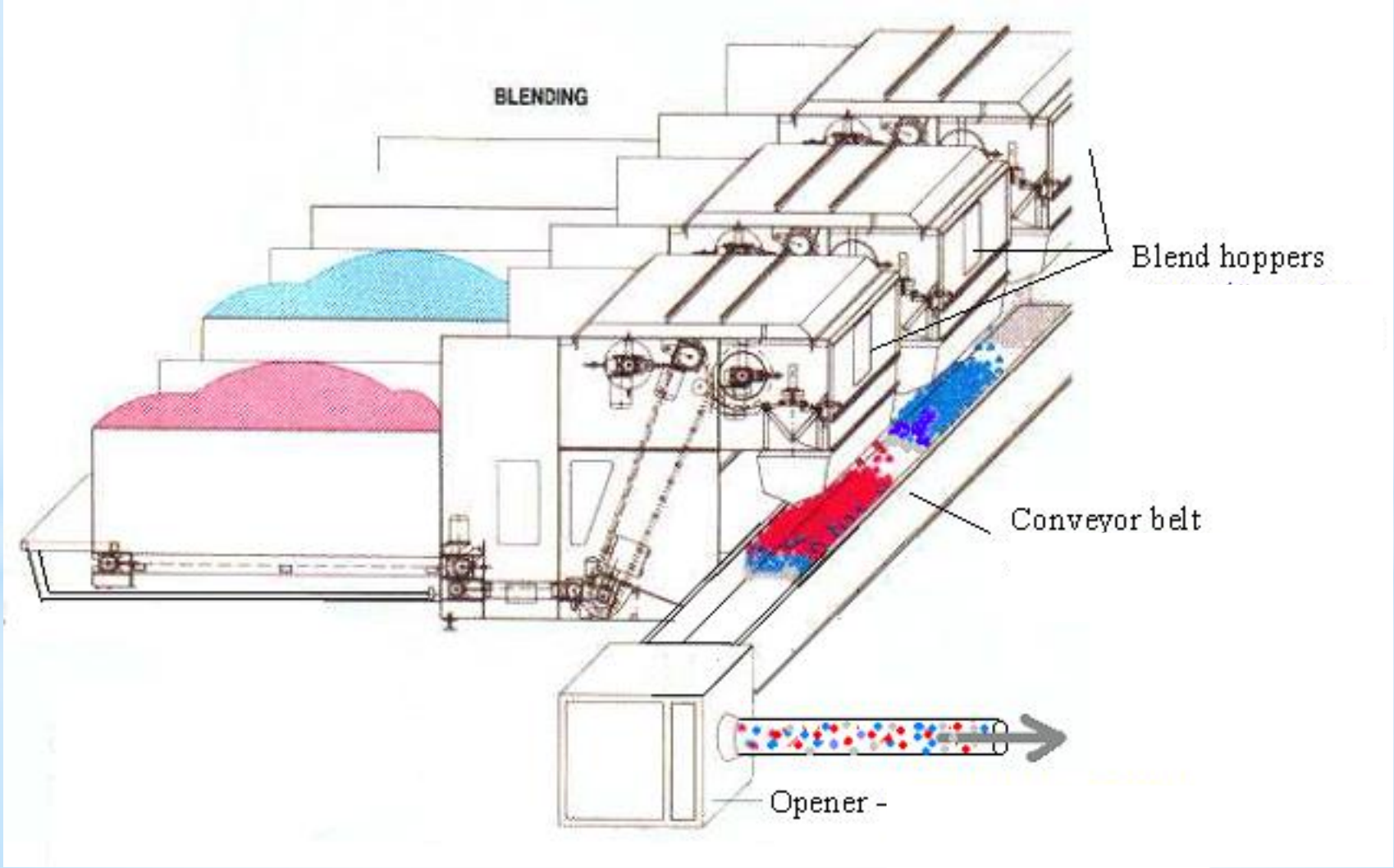


Fig. 6: Principle of blending process

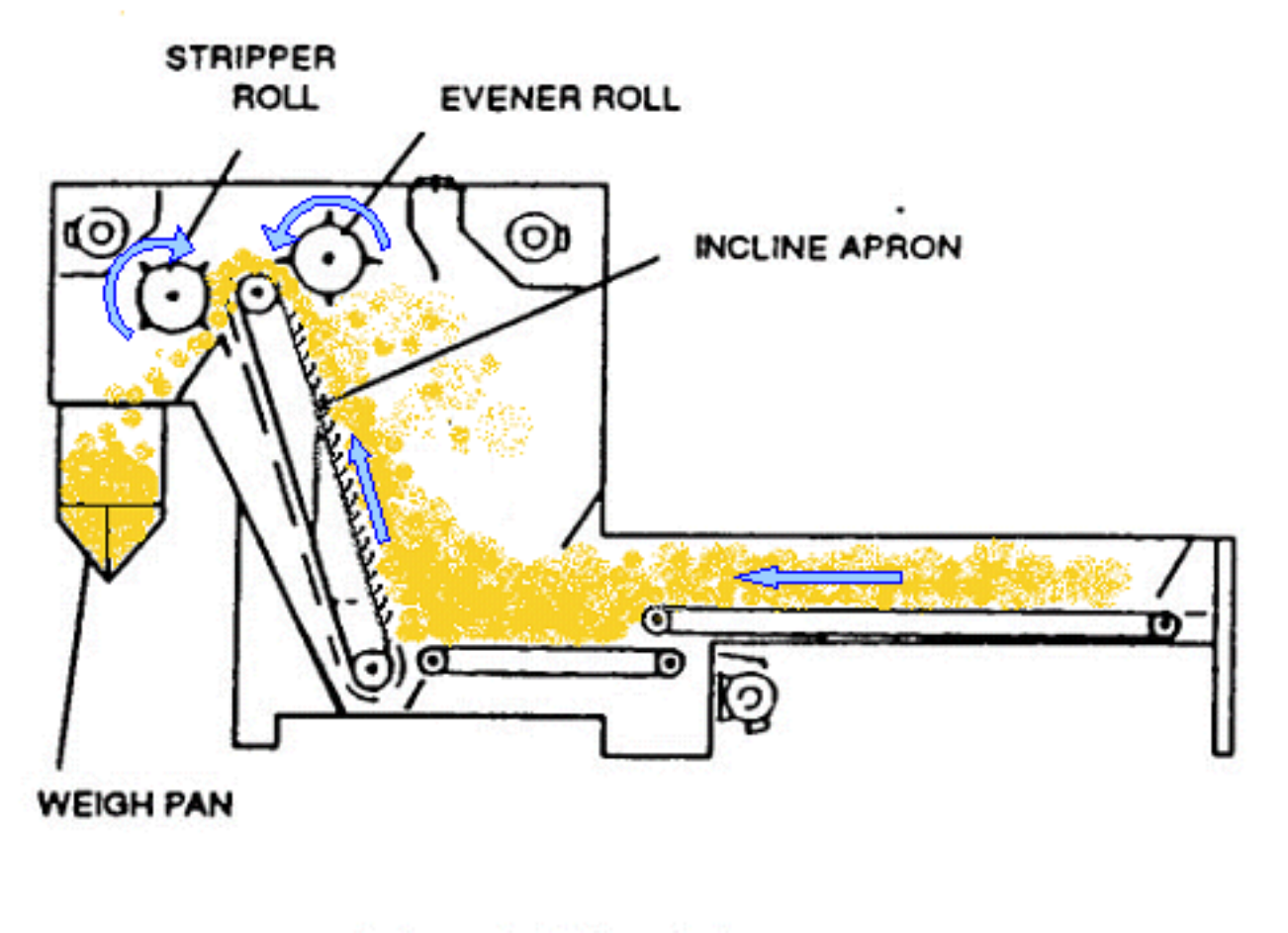


Fig. 7: Scheme of „Hopper“ (opening and feeding machine with inclined spiked belt).

Mixing and storage

Principle:

Main goal is a homogenisation of fiber blend (different fibers of the some fibers with different quality).

Usualy are fibers stocked in one direction and remove in perpendicular direction (see fig. 8 and 9).

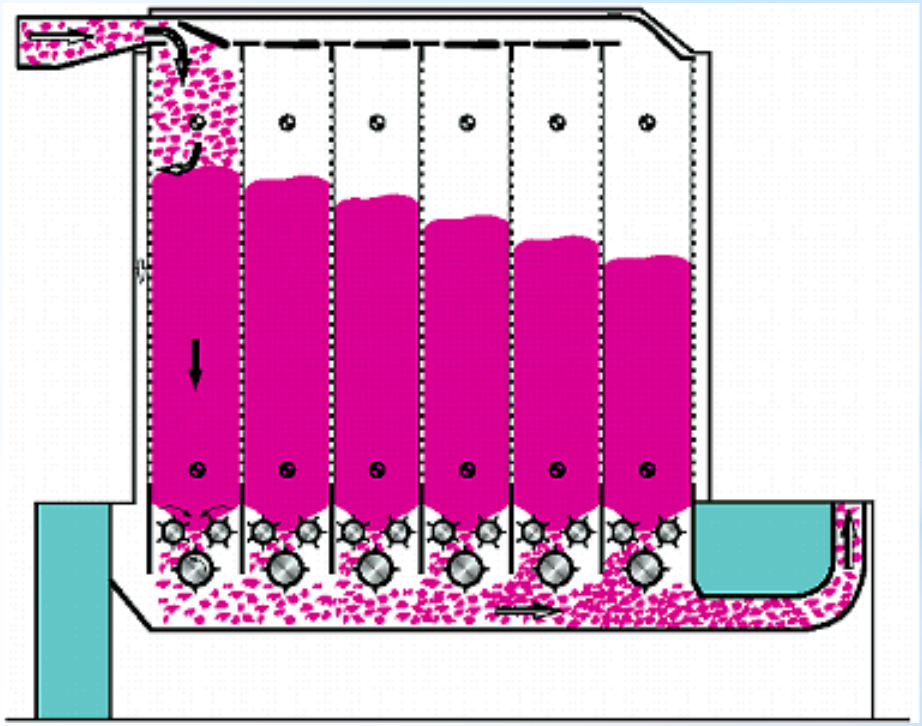


Fig. 8: *Multimixer Trütschler MPM 6*

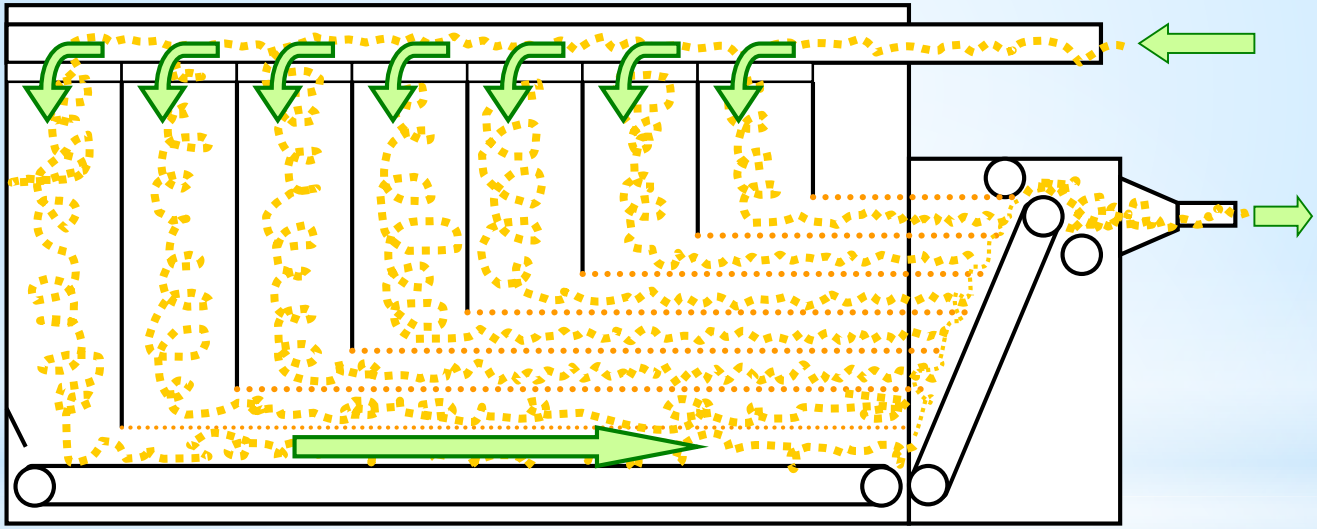


Fig. 9: Principle of mixing and storage chamber with horizontal storage and inclined withdrawing (example Rieter UNIMIX).

Cleaning

Principle

The aim is separation of nonfibrous waste from fibrous blend. The way of separation depends on this waste properties. For metal particles are used magnets. Non-fibrous shape particle fall through working parts of machines (whereas fibers are catched) or they are separated due to their different inertia. Example of separatio due to different inertia is cyclone separator (see fig 10). The circulating mass of air, fibers and particles is moved up so heavy particles can´t follow the air stream and fall down. Fine particles should be filtered. The cleaning process is substituted in machines for fibers opening. It is possible to use special cleaning machines (see fig. 11) especially when the input fibrous material is dirty.

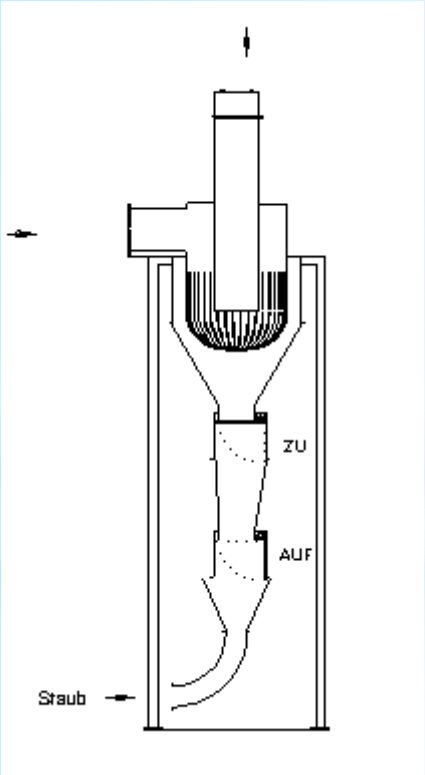


Fig. 10: Principle of pneumatic cleaner TEMAFA

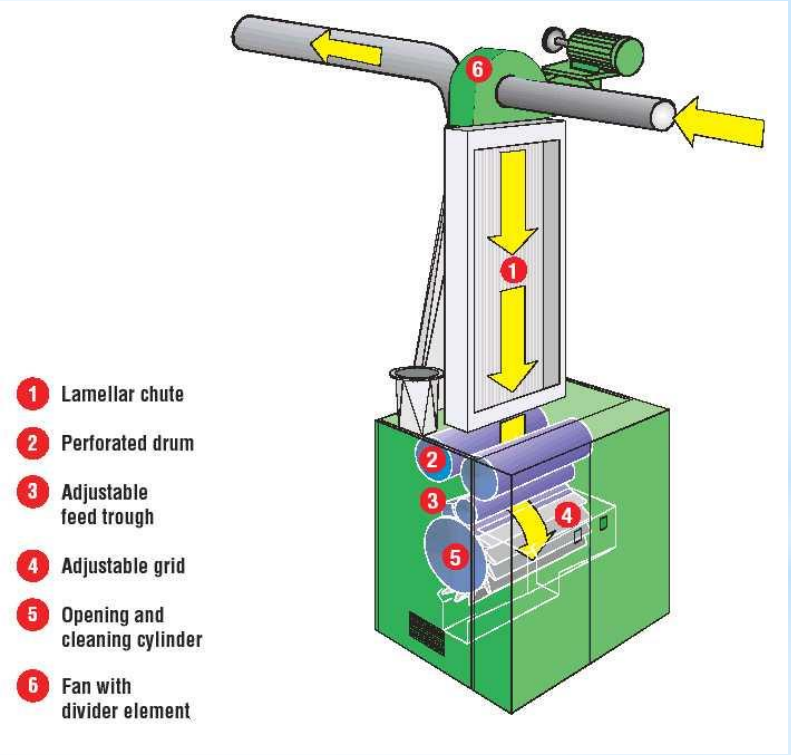


Fig. 11: Fine cleaning machine Rieter UNIclean.

Refinement

Principle:

The aim is to improve manufacturing properties of fibers especially better mechanical properties and low electrostic charge. Usually is used liquid agent which is sprayed by jet placed inside the tube where fibers are flowing. The agent is usually water emulsion which contain surfactants, oils etc…

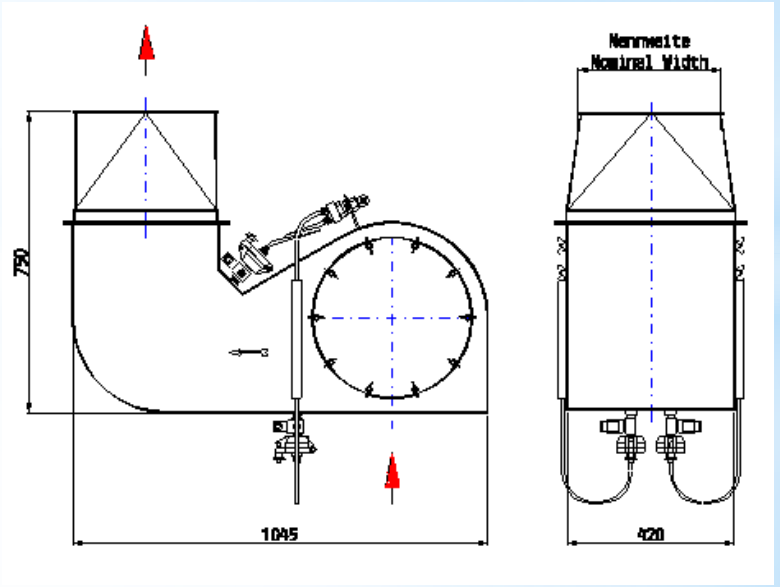


Fig. 12: Refinement machine Temafa.

Opening

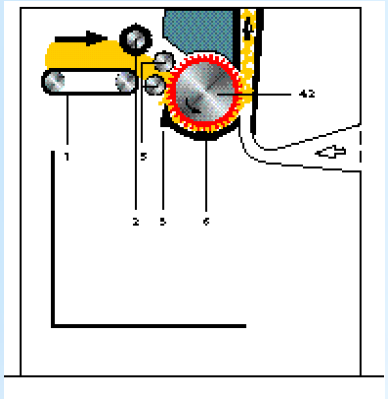
Principle

The aim is to open coarse fibrous material to small fibrous flocks (which consist of smal amount of not separated fibers).

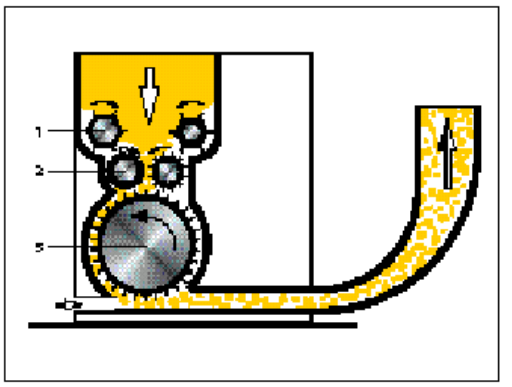
Fibers are opened due to mechanical work of spikes, tines or wires. It is possible to use various types of opening machines. Opening process can be connected with other processes (for example spiked belt of hopper). Opening machines differ in type of used fibers, opening rate and productivity, which is between 500 and 4000 kg/hod.

Types of opening machines

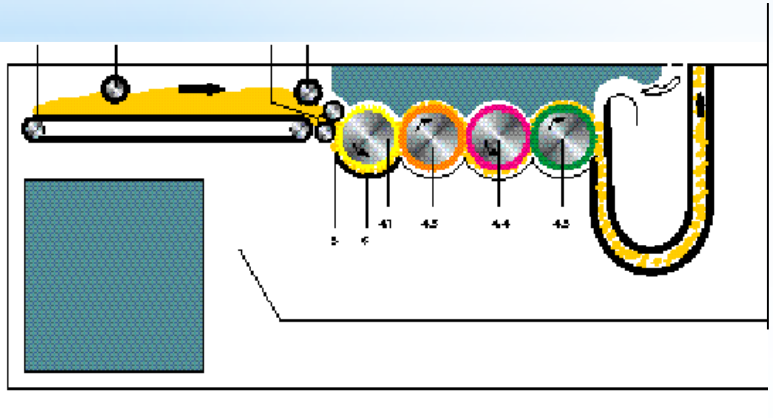
- Classical opening cylinder with entry rollers (see fig. 13, 14b). Fibrous material is hold by entry rollers and opend by rotating cylinder with spikes. Fibrous flocks are then transported by air.
- Pneumatic opener with two spiked rotors (see fig. , which rotate together (in reverse direction).
- Carding willow, which works in similar principe as the carding machine but the card willow clothes is more coarse and distances between rollers are bigger.



a) Cylinder opener for synthetic fibers

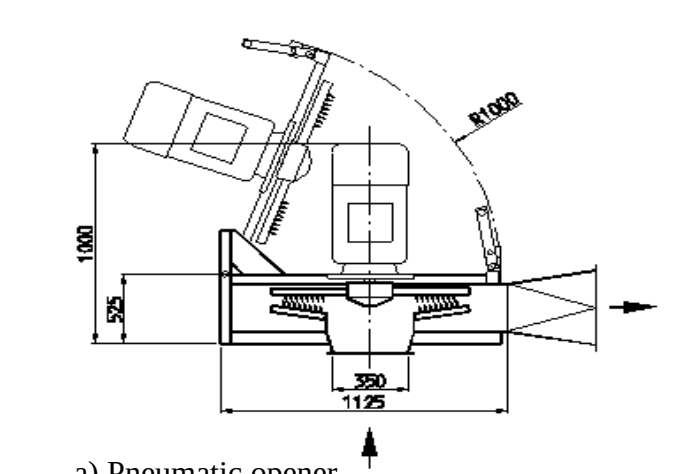


b) Coarse cylinder opener for high production

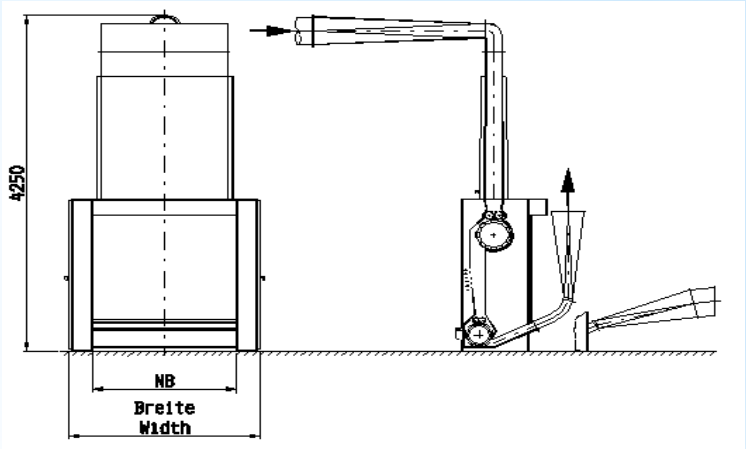


c) Fine cylinder opener for short fibers

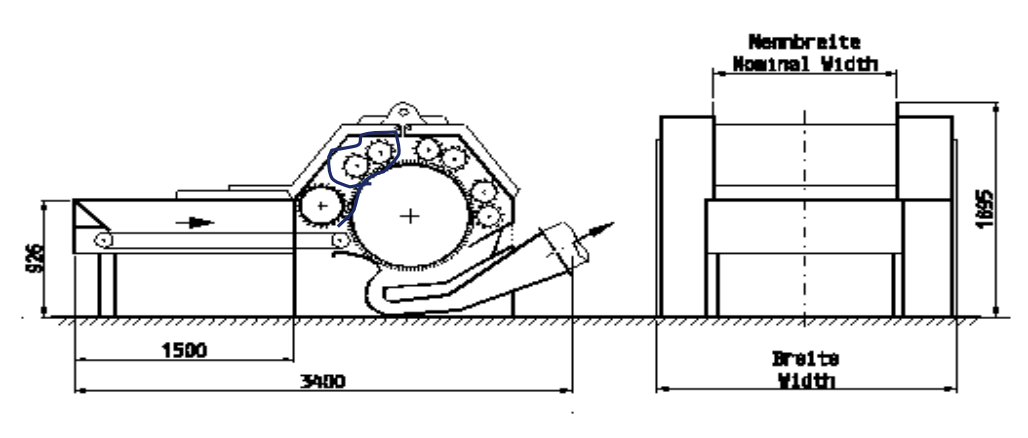
Fig. 13: Cylinder openers Trütschler



a) Pneumatic opener



b) Fine cylinder opener



c) Carding willow

Fig. 14: Openers of Temafa

FEEDING

Principle:

The feeding machine determines uniform quantity of fibrous material before following processing. The output is uniform layer of fibrous flocks. Feeding machine is placed befor carding machine, airlaid, wetlaid, random card and as a part of blending machine but can be placed elsewhere (output of mixing chamber etc…). It is possible to regulate quantity of fibrous material across the fibrous layer.

Types of feeders:

Weight feeder
Fiber flocks are loaded into a container, which is opened when the weight of fiber flocks reach set value. It is suitable for rough feeding especially for coarse opened fibers (Hoppers).

Volumetric feeder
The light sensor scan amount of fibers between the feeding rollers and determine the speed of this rollers. This machine is suitable for fine feeding before card machine.

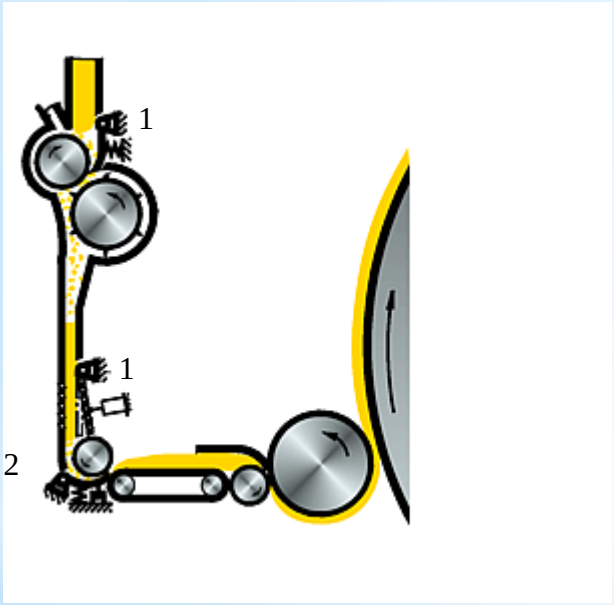


Fig.. 14: Volumetric feeder Trütschler where the sensors 1 drive the feeding rollers working 2.

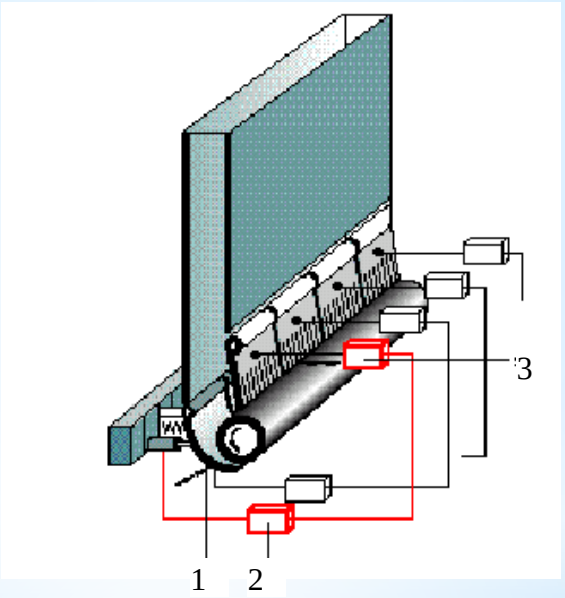


Fig. 15: Regulation of the fiber flocks quantity across the fiber layer width Trütschler. The optical sensors 1 by way of regulation units 2 changes position of thrust plates 3.

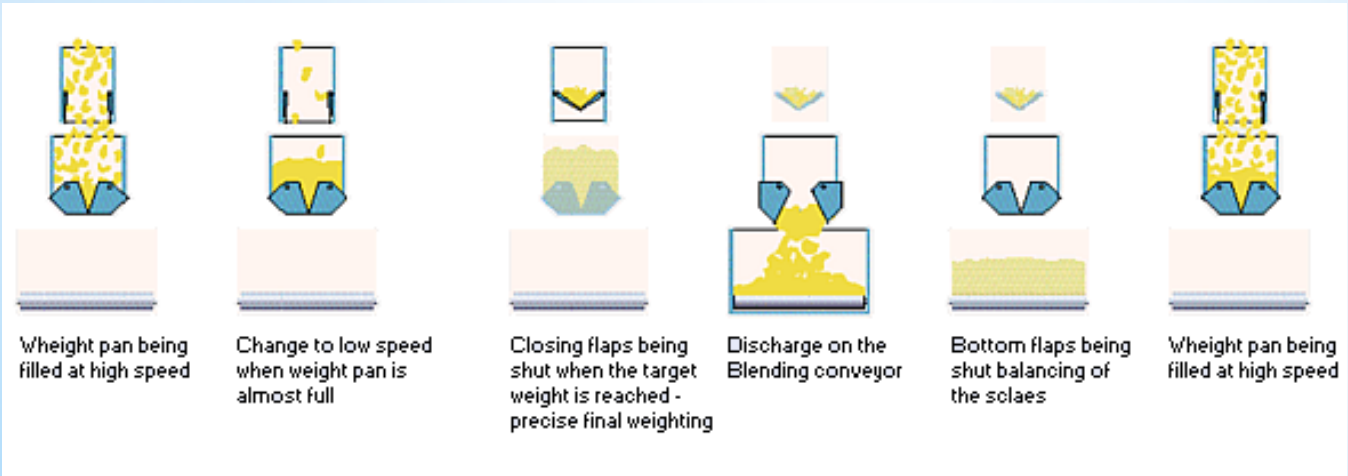


Fig. 16: Principle of weight feeder Trütschler