Pressing

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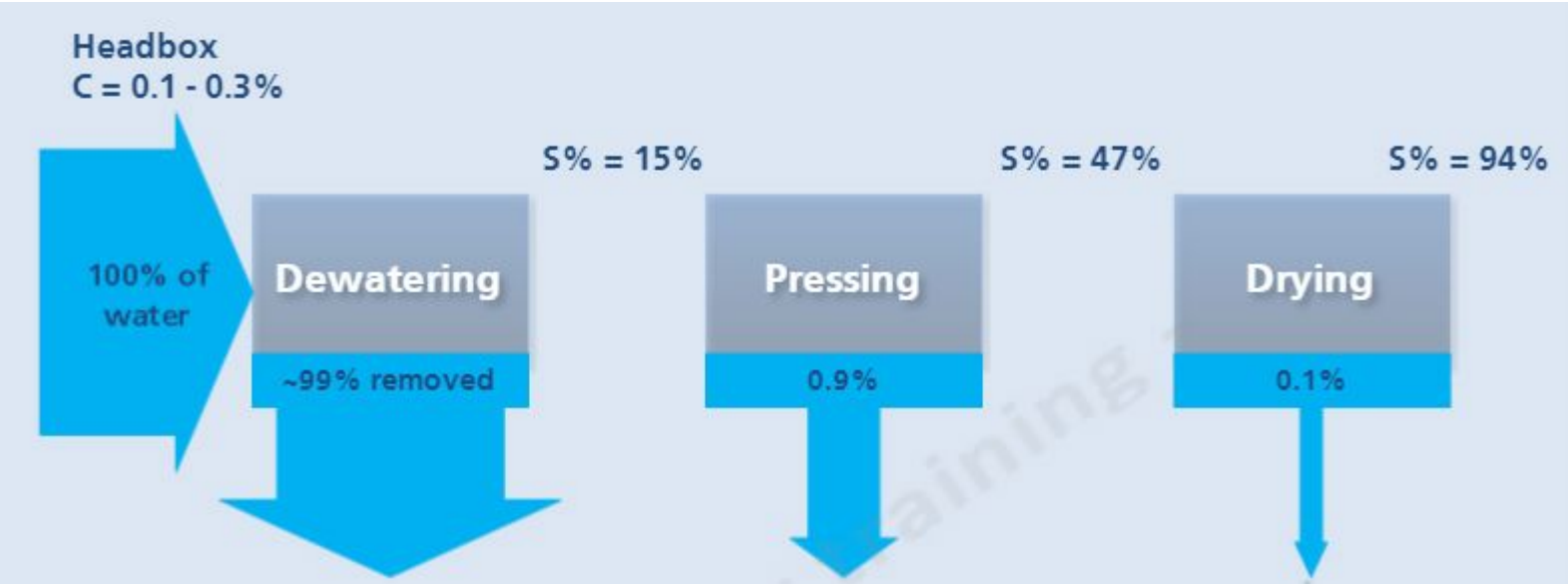
Objectives

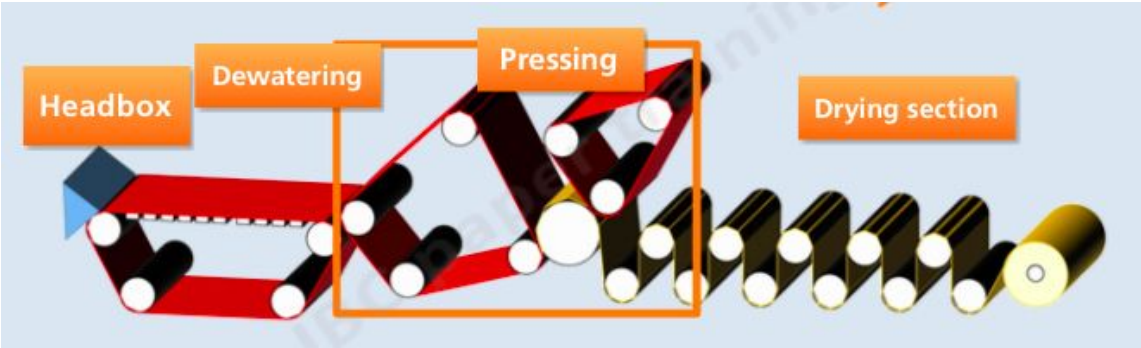
1. View how the press section works
2. Get familiar of press section equipment and parameters' settings
3. Link the settings with the paper quality

Why pressing?

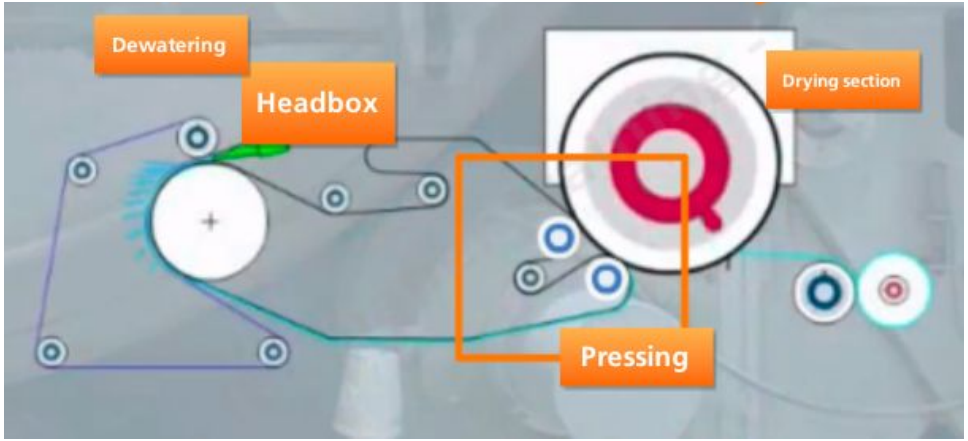


Press section

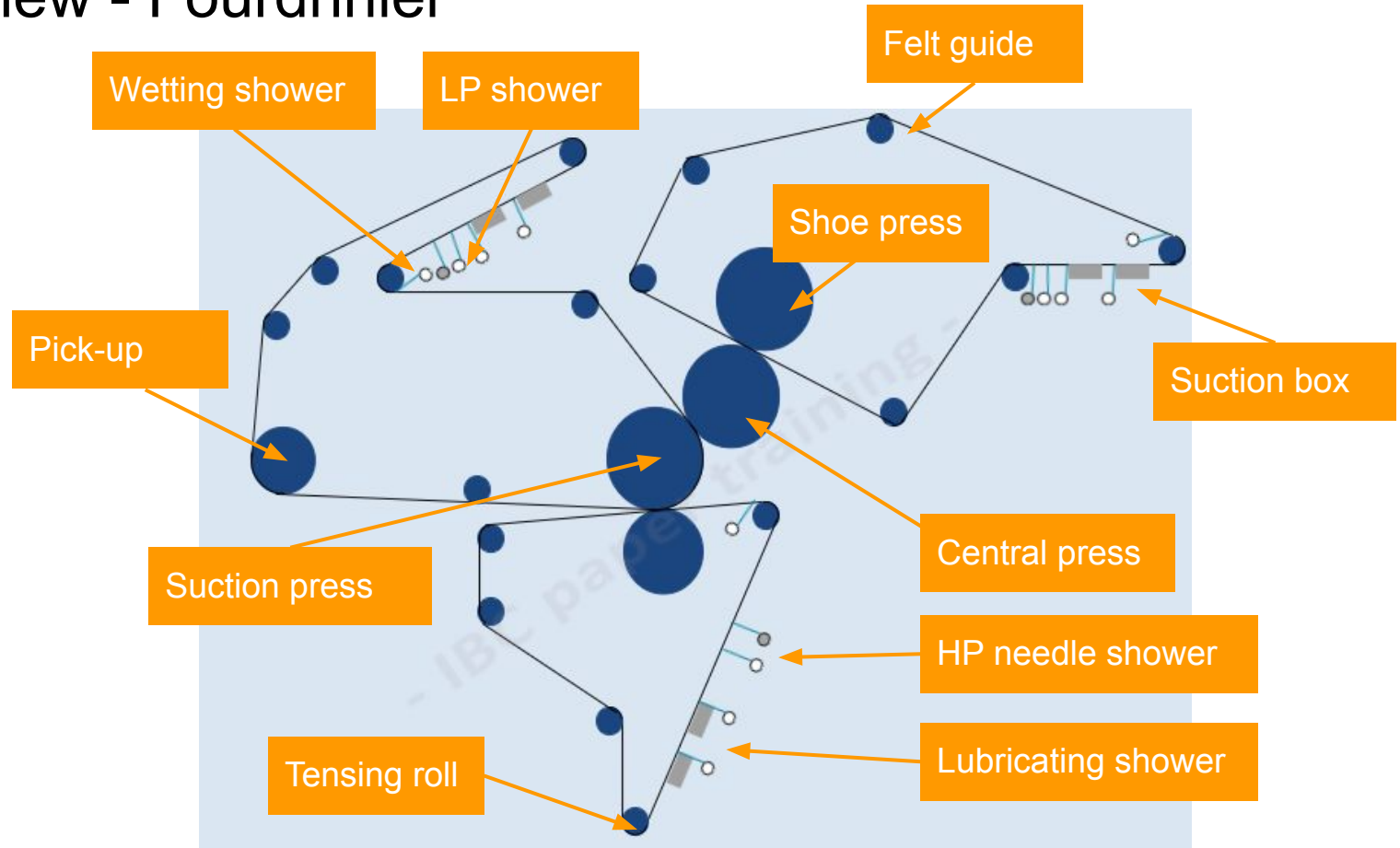
Pressing between two press rolls (Fourdrinier)



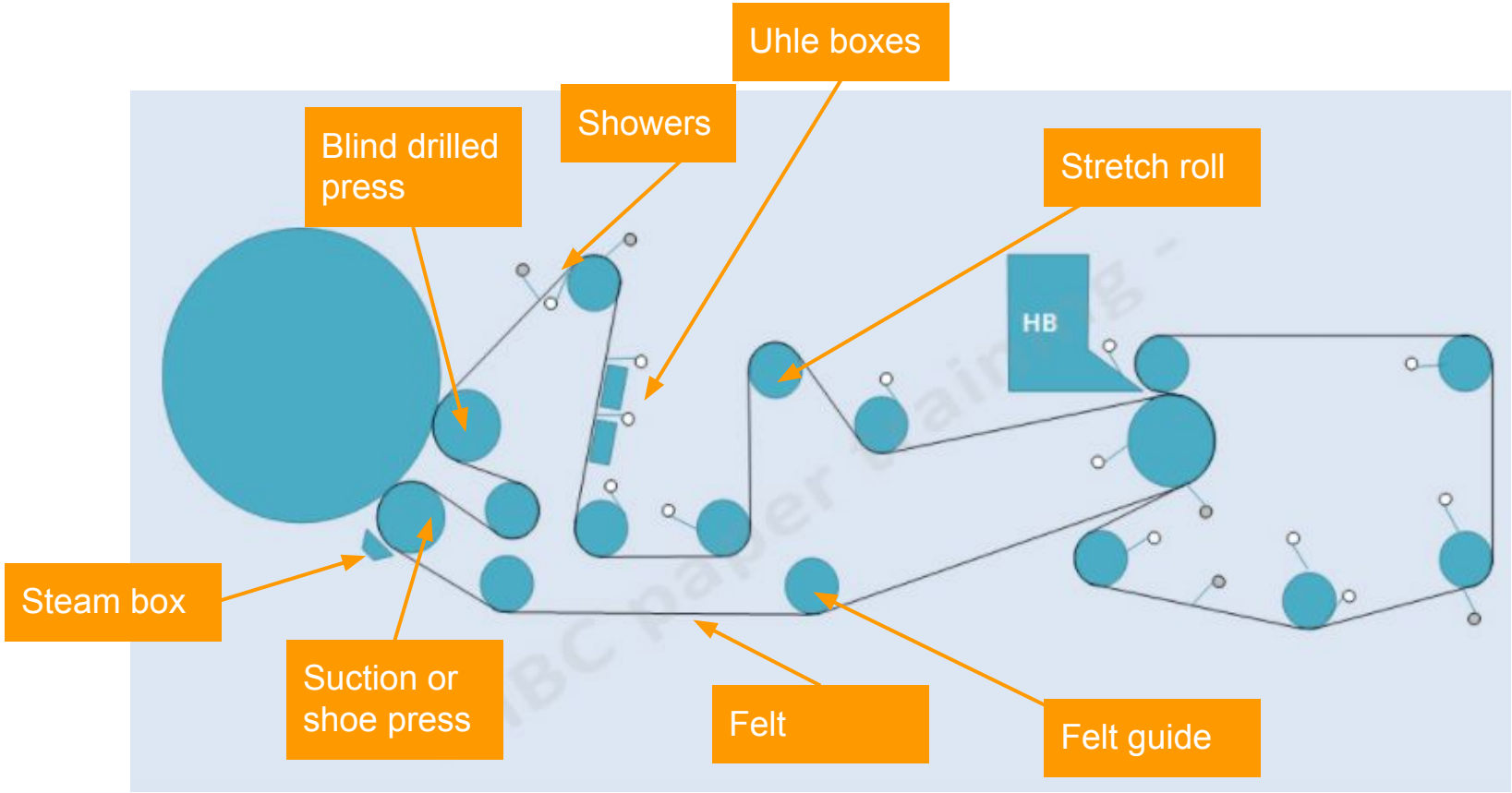
Pressing against Yankee (Tissue)



Overview - Fourdrinier



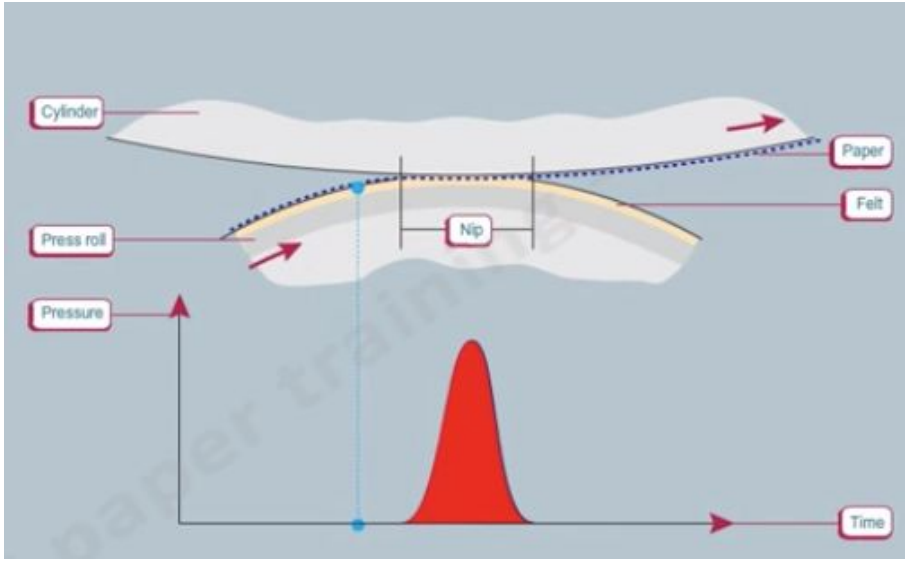
Overview - Tissue press



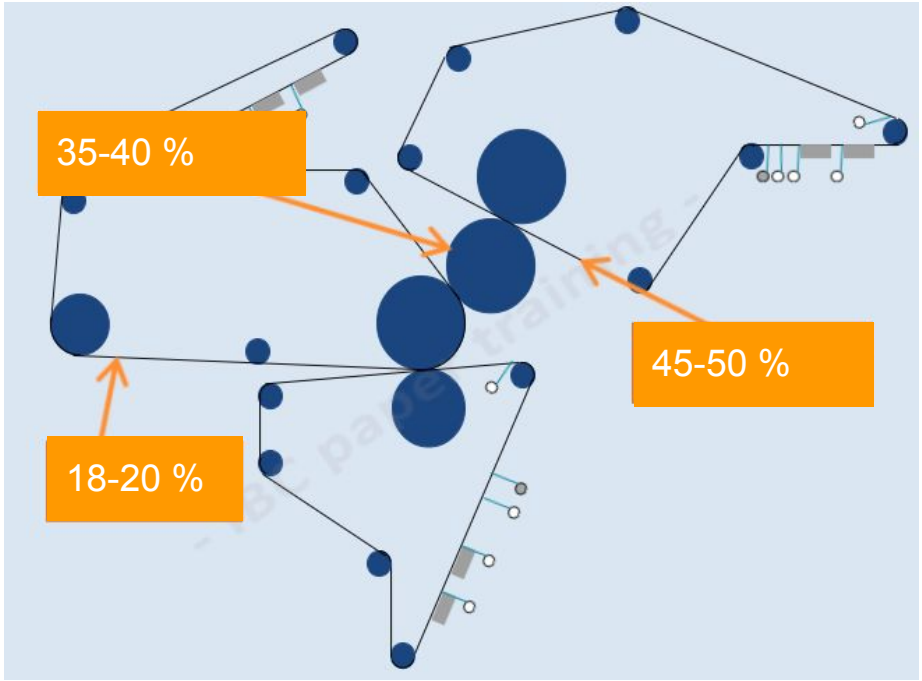
Concepts

Nip = pinching area between the press and cylinder

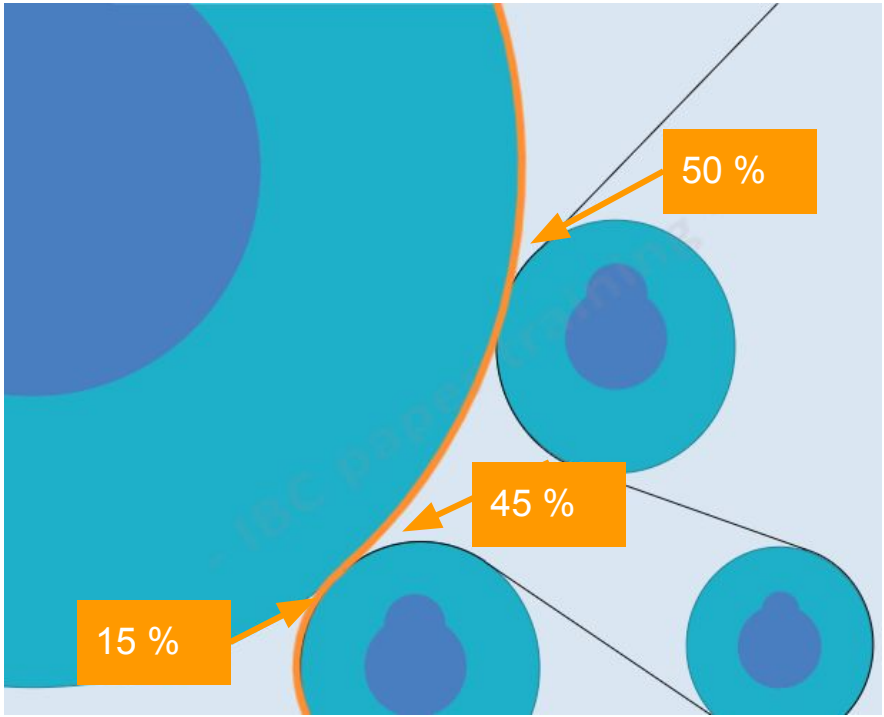
- Nip width
- Hydraulic pressure
- Linear pressure



Dry solid contents in press

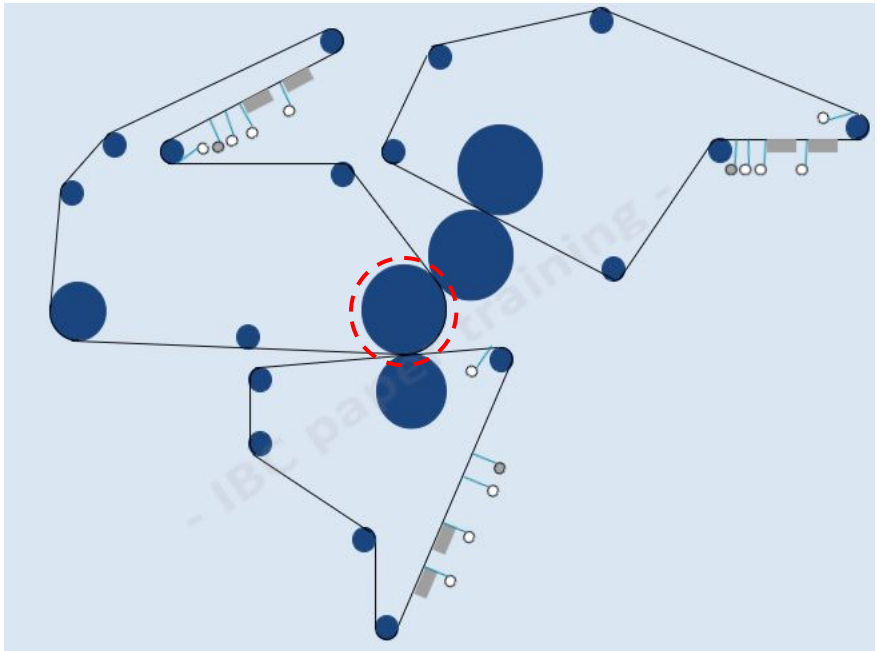


Fourdrinier

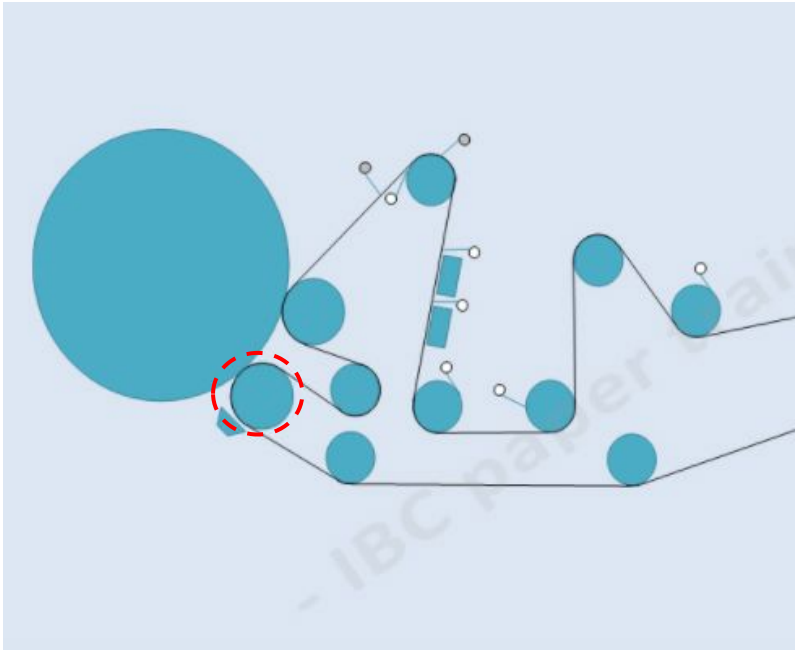


Tissue

Press configuration - Suction press



Fourdrinier

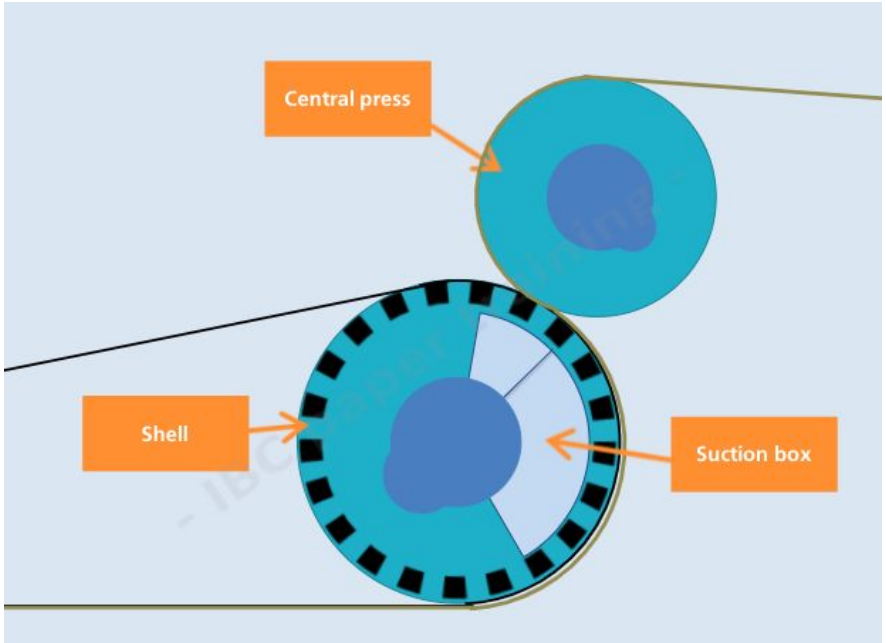


Tissue

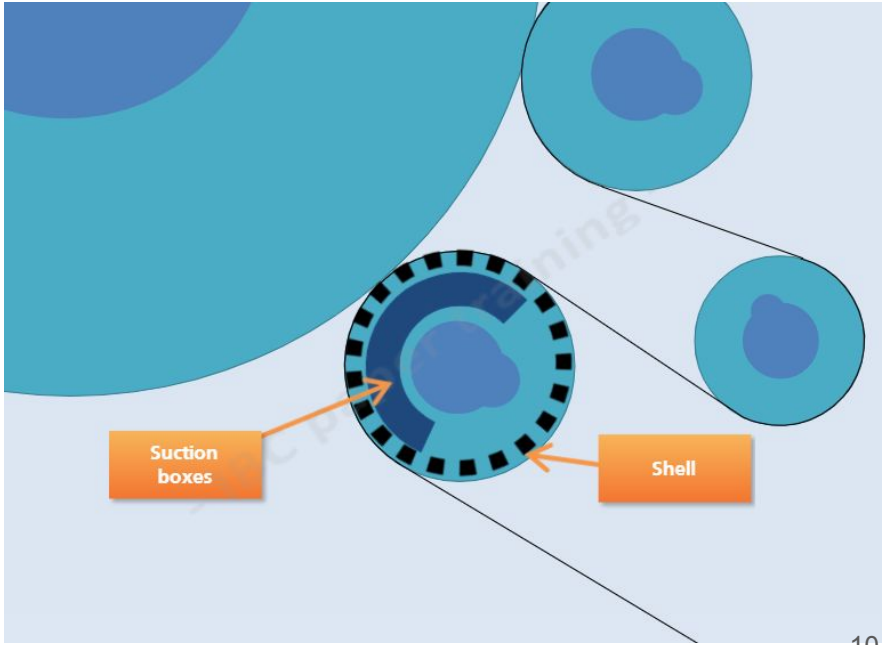
Press configuration - Suction press

- removes most of the water in press section

Fourdrinier

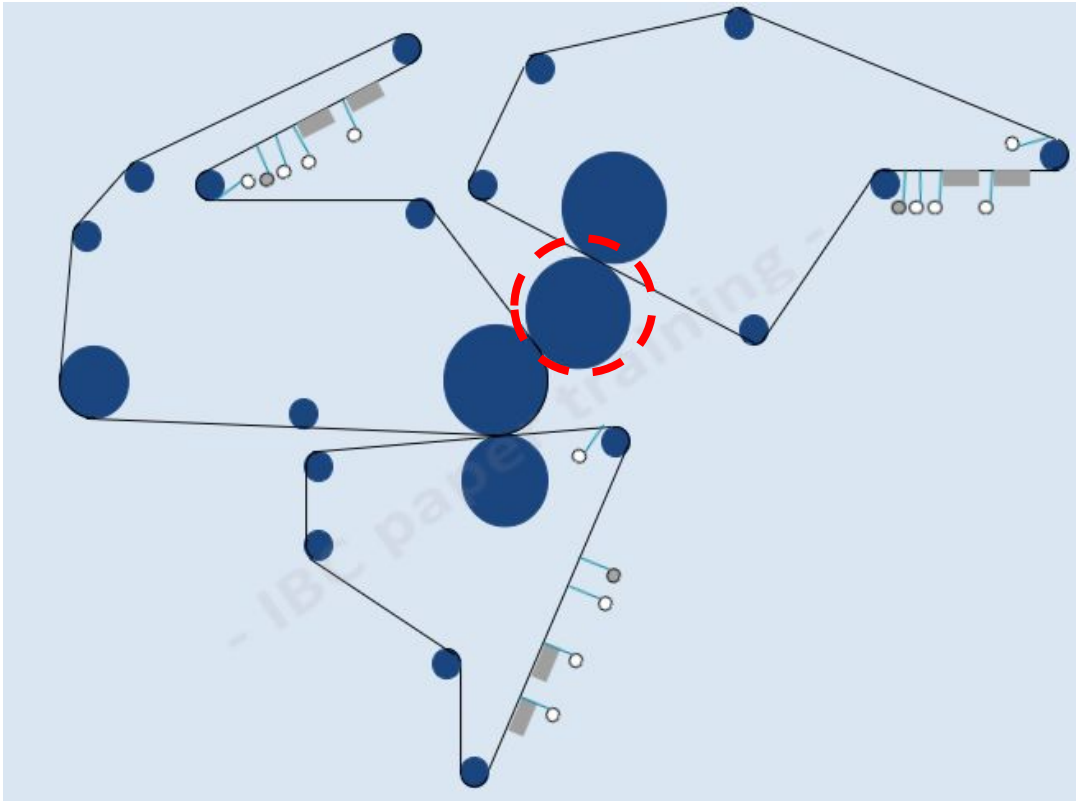


Tissue

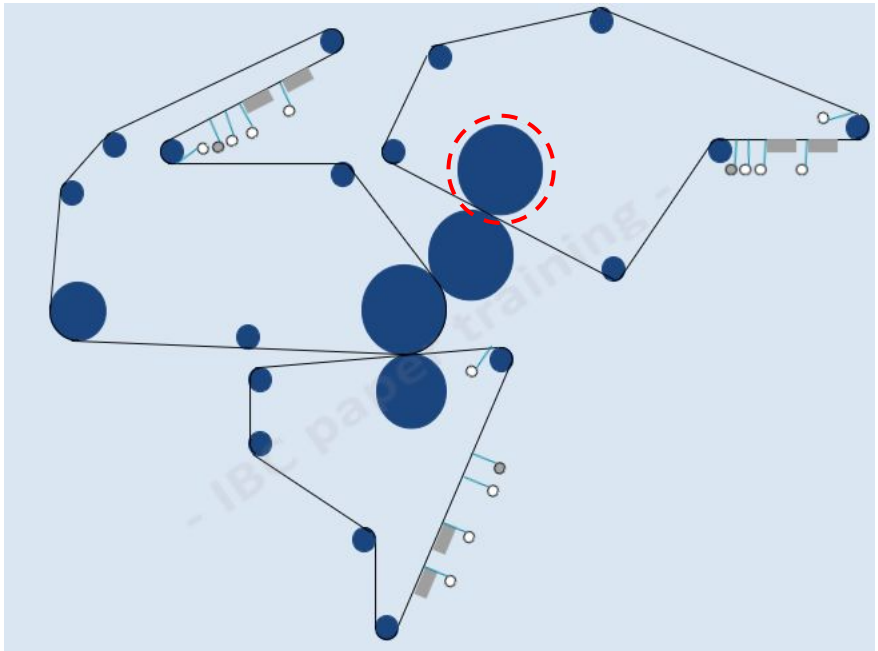


Press configuration - Central press

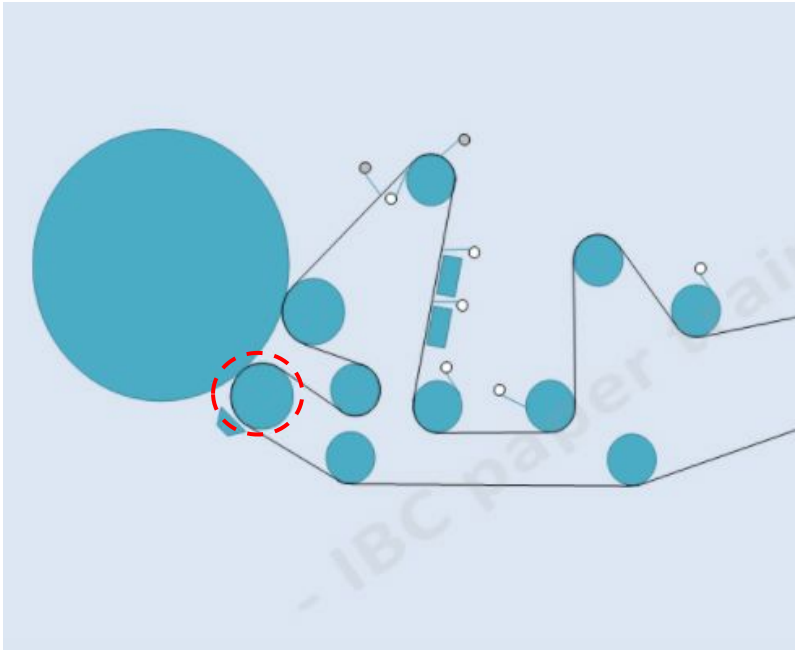
- works as a backpress for other presses



Press configuration - Shoe press



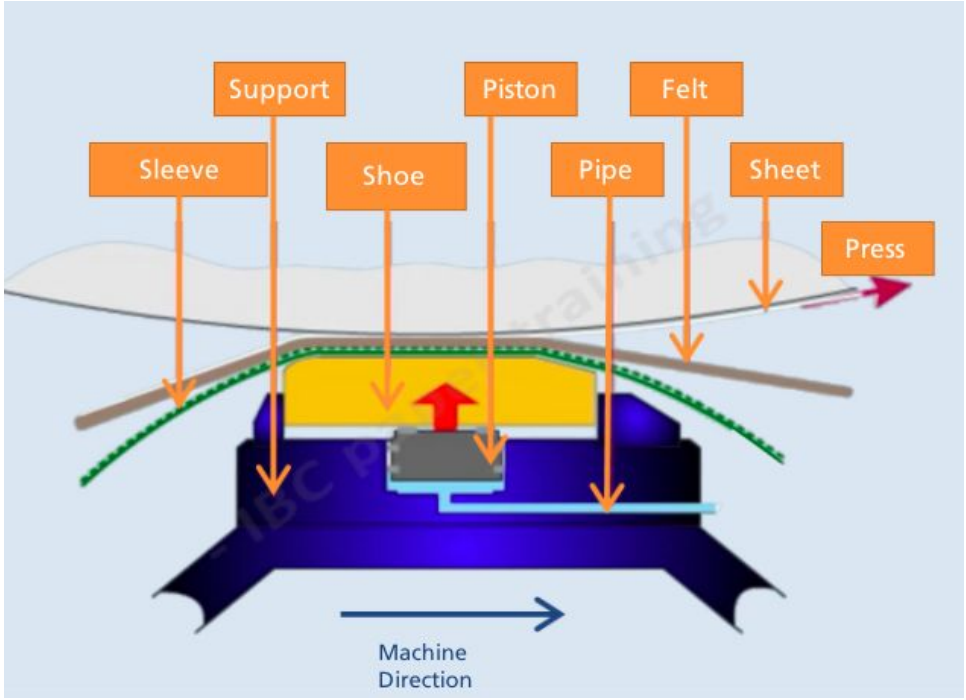
Fourdrinier

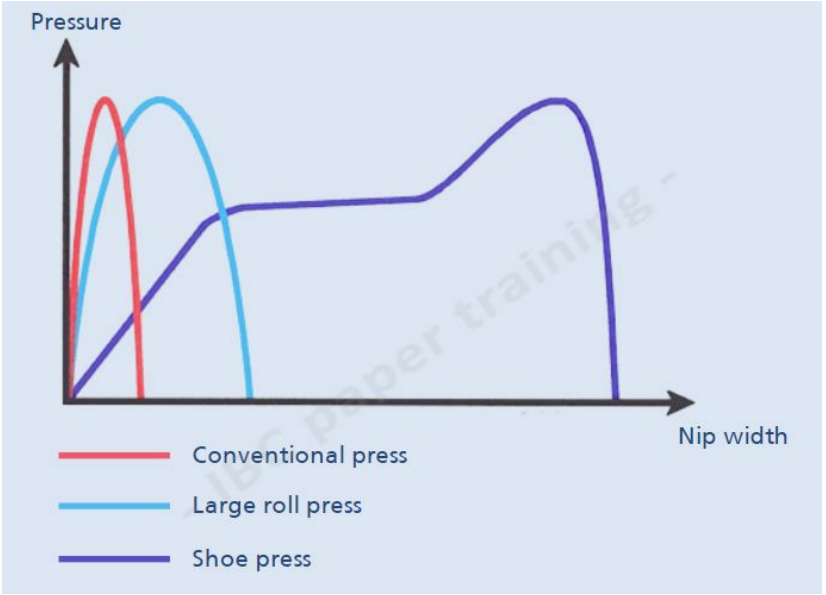


Tissue

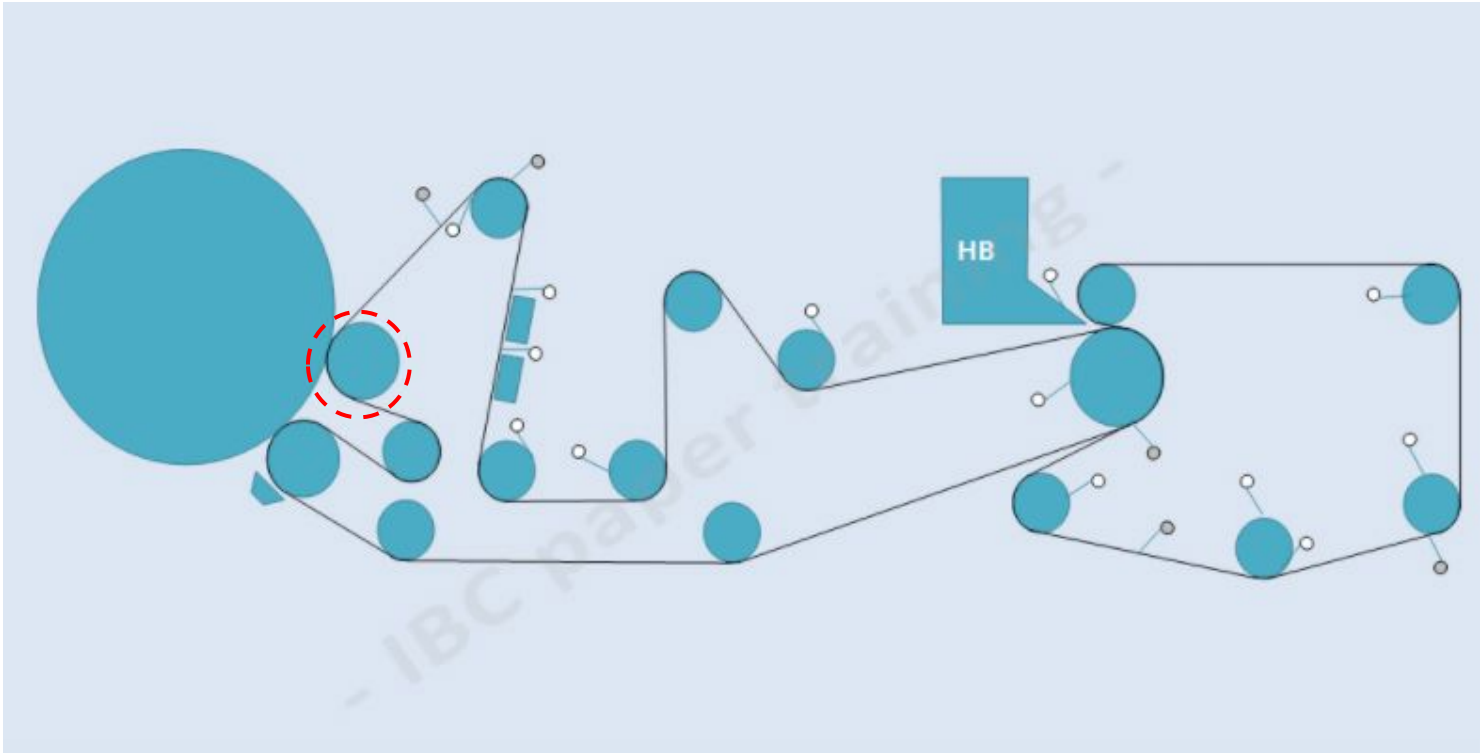
Press configuration - Shoe press

- removes water from the web





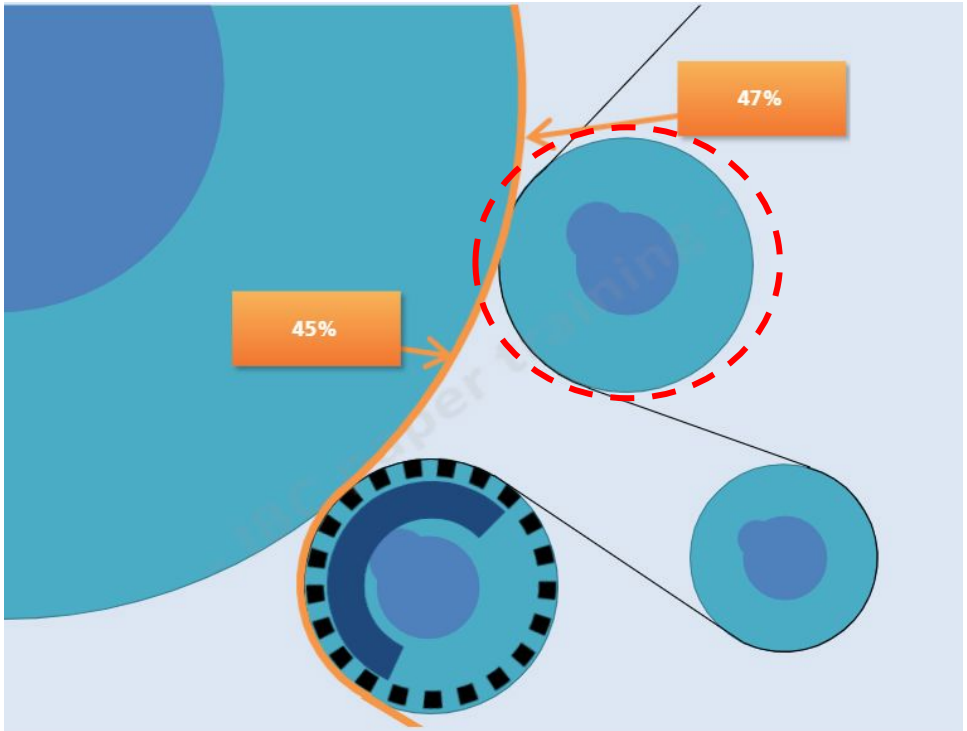
Press configuration - Blind drilled press



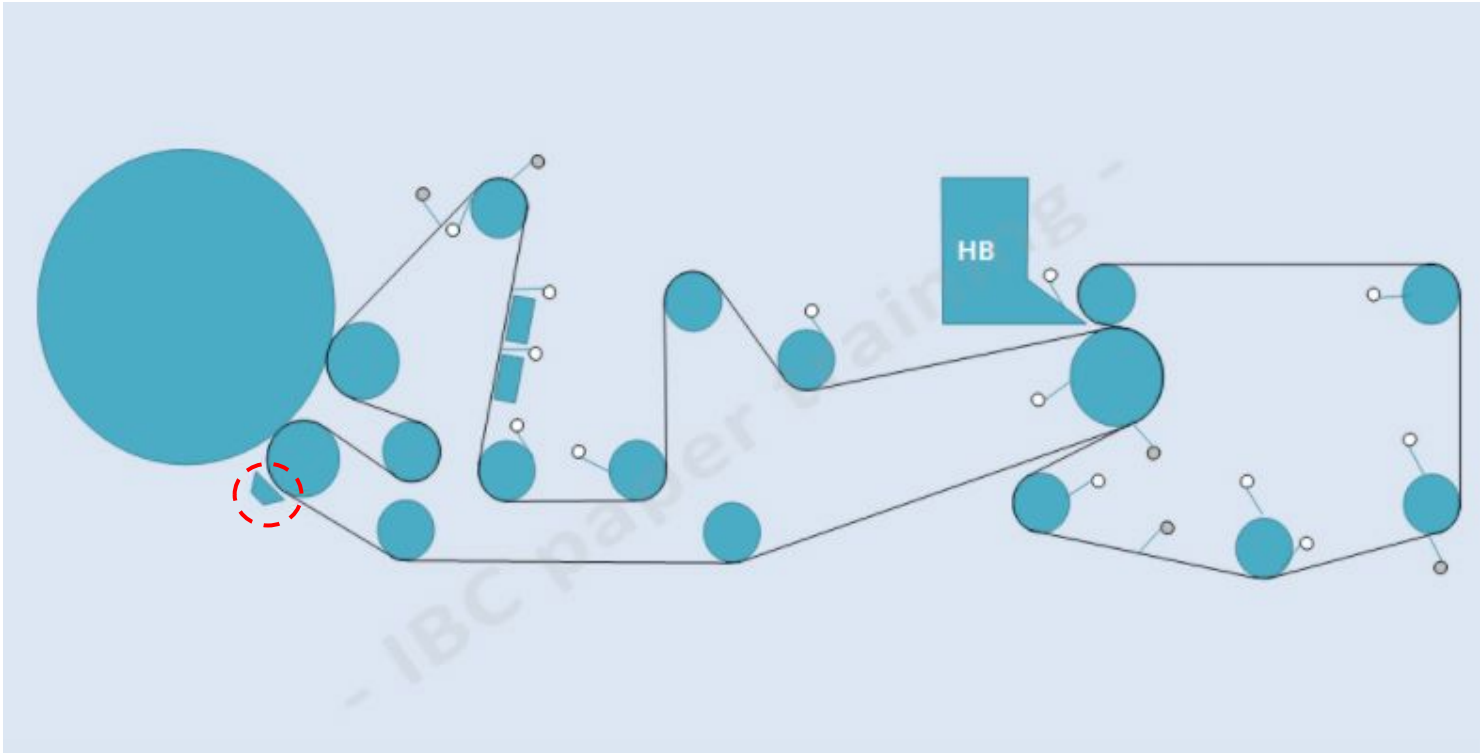
Tissue

Press configuration - Blind drilled press

- to increase the dry solid content and regulate the moisture profile of the web



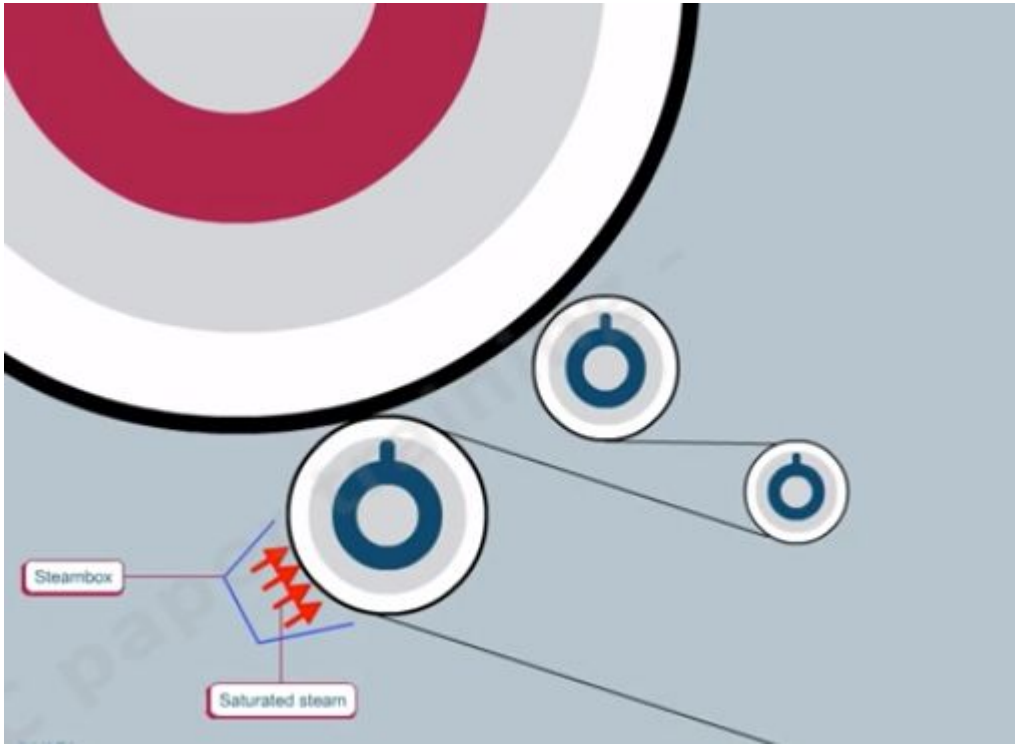
Press configuration - Steam box



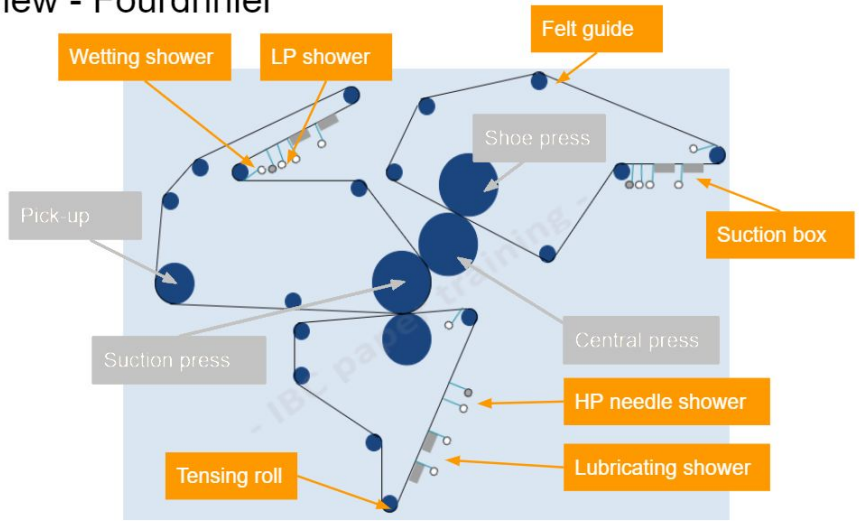
Tissue

Press configuration - Steam box

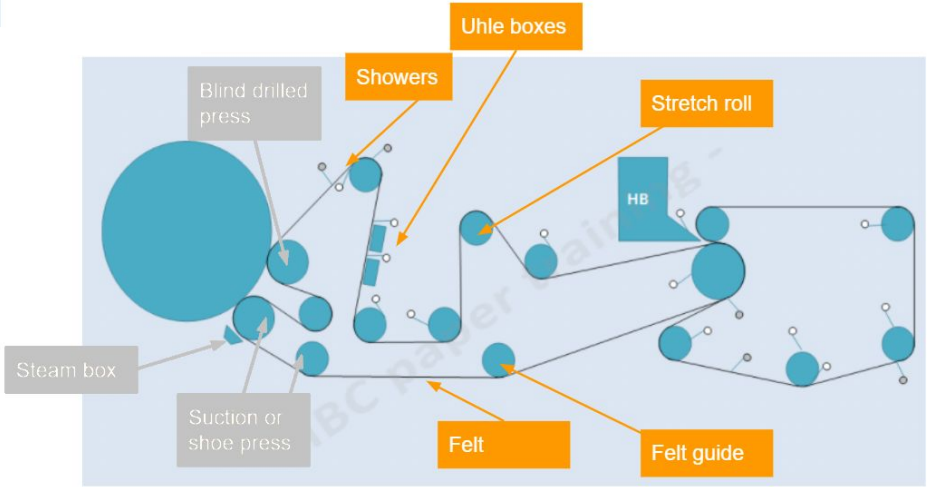
- helps to create even moisture profile for the paper



Overview - Fourdrinier



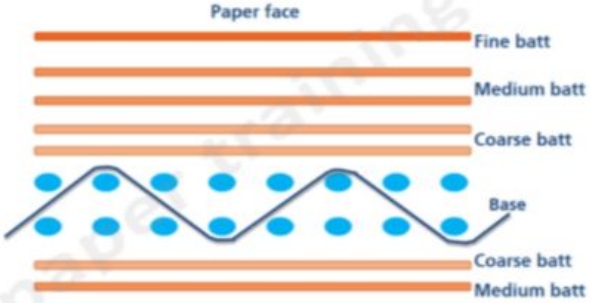
- Tissue press

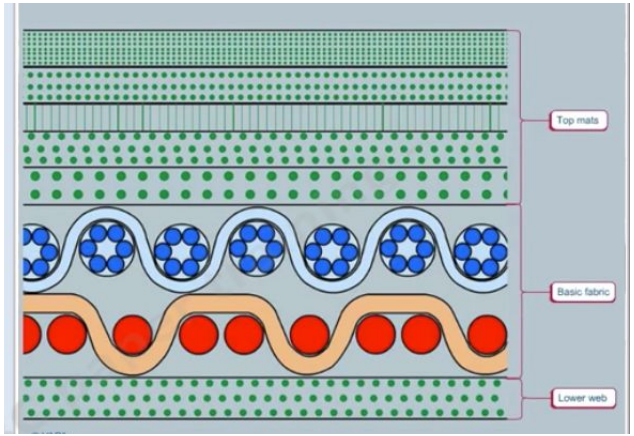


Felt

Structure

1. Top layer
   - Transfers water from paper to felt
   - Supports the sheet
2. Middle layer
   - Determines the running properties & brings wear resistance
3. Back layer
   - Protect middle layer from wear
   - In contact with rolls





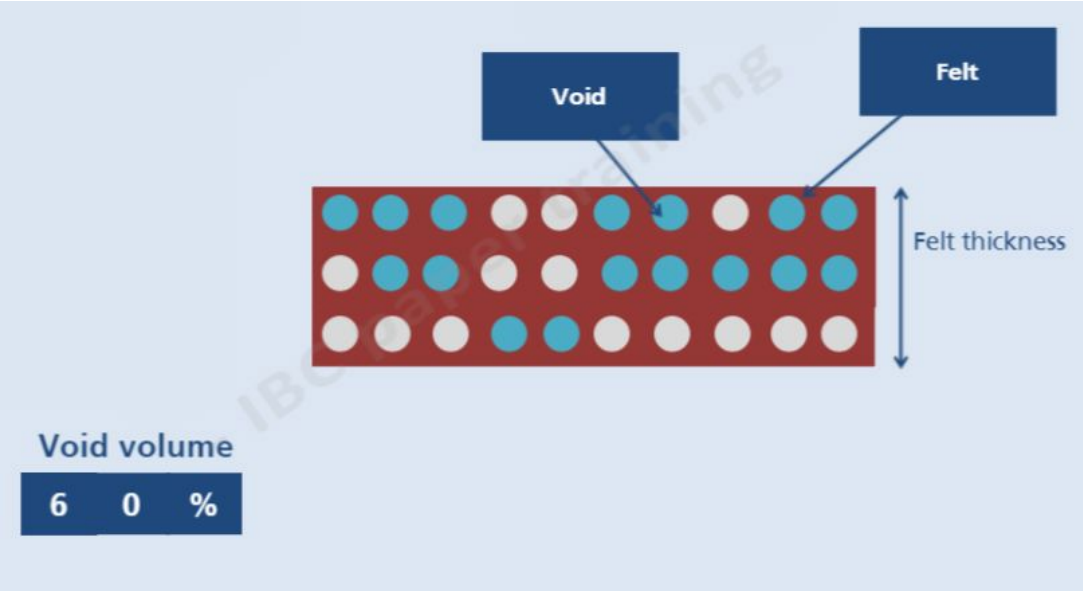
Void Volume And Felt Lifetime

Fourdrinier

lifetime: 1-4 months

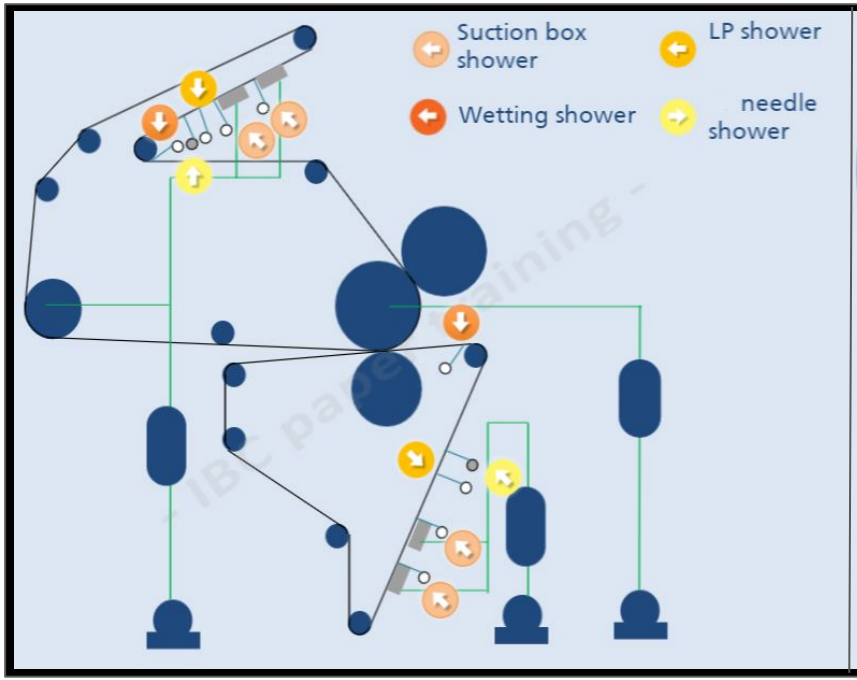
Tissue

lifetime: 1-2 months

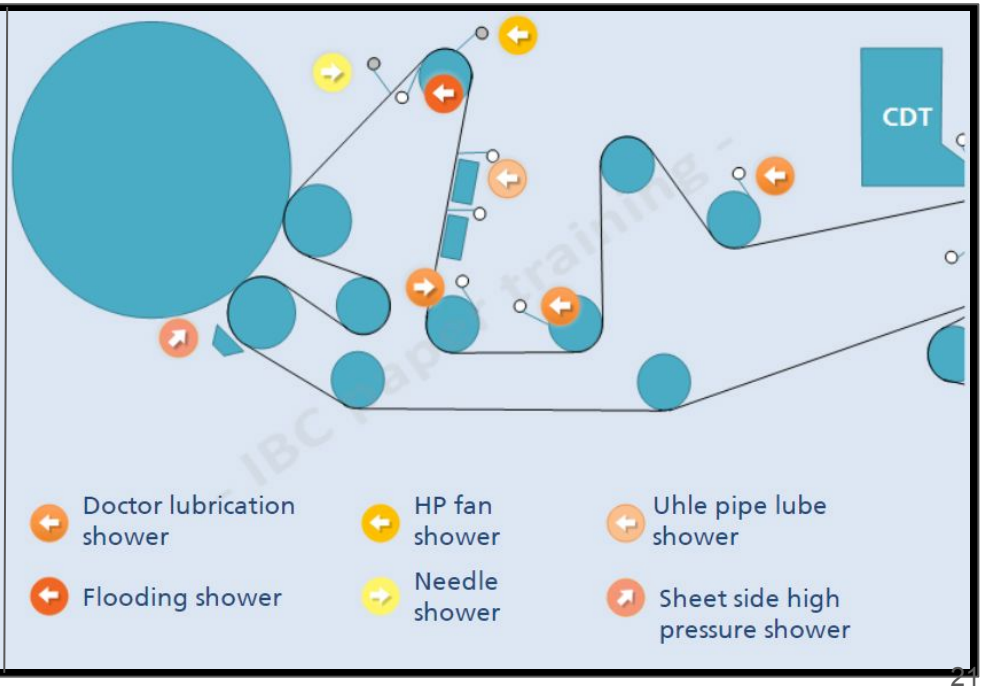


Showers - Needle And Fan Showers

Fourdrinier

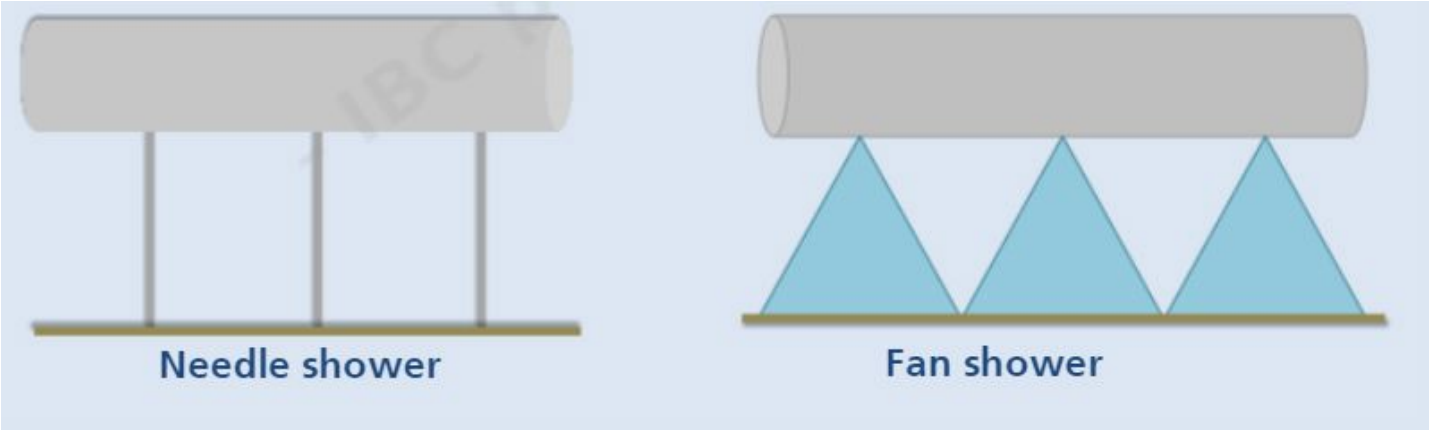


Tissue



Showers

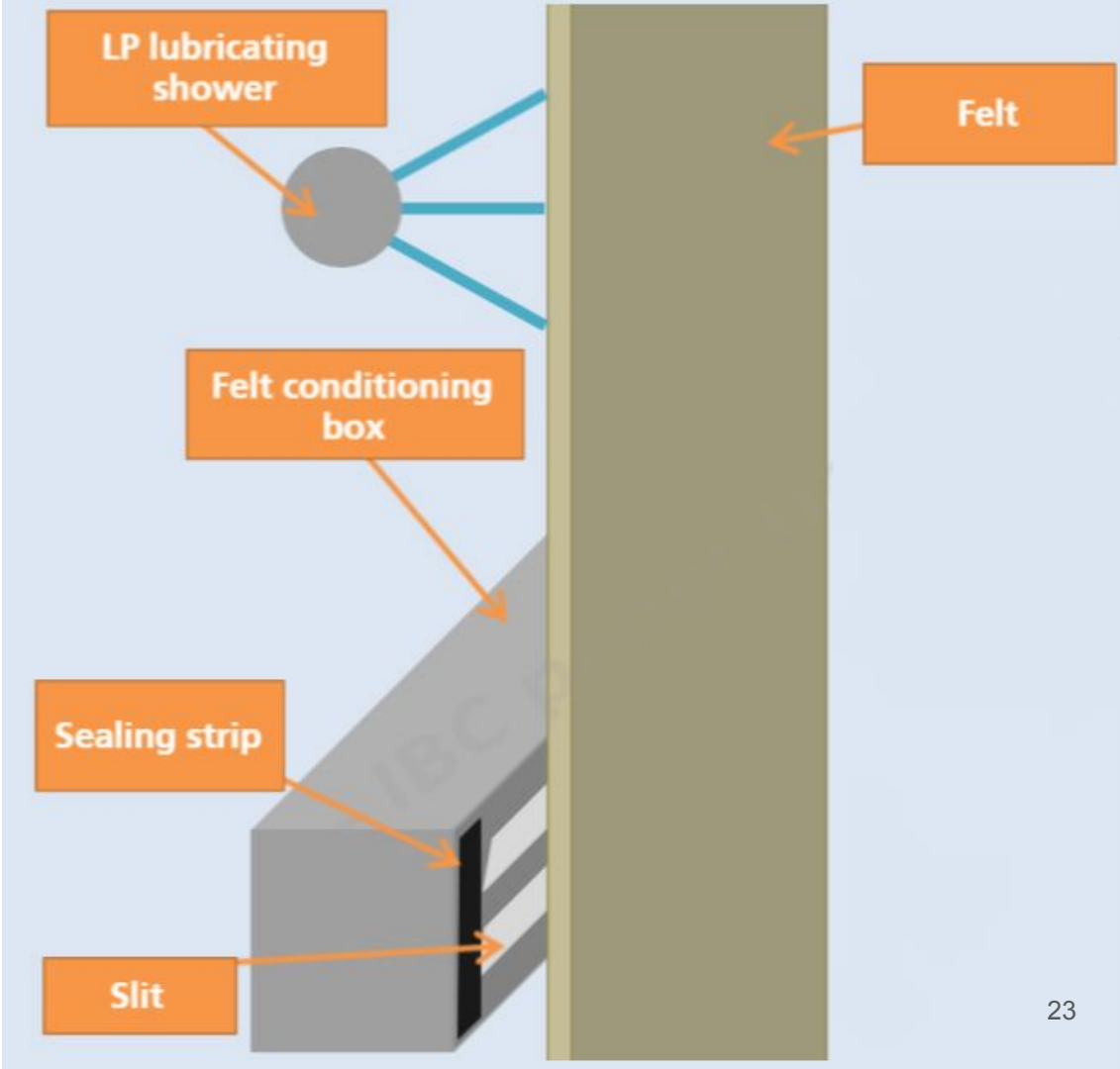
- Fan showers are used to clean and lubricate the rolls and the felt.
- Needle showers are used to remove contaminants off the felt during production.
- Main risks: wet or dry streaks & felt wear.



Suction/Conditioning Boxes

- Fourdrinier
- Conditions the felt & remove water
- Vacuum over 0,5 bar

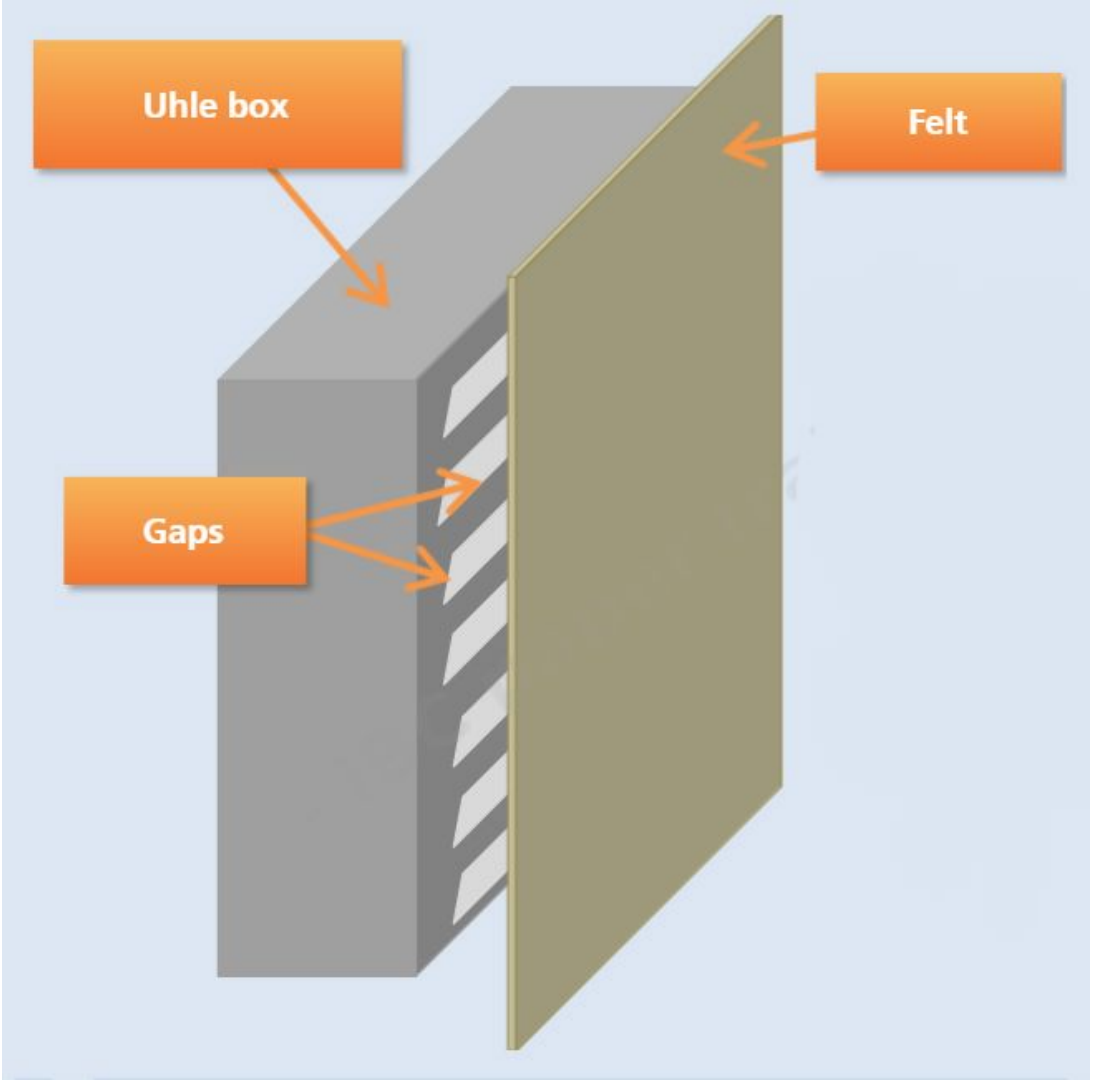
  → change the felt



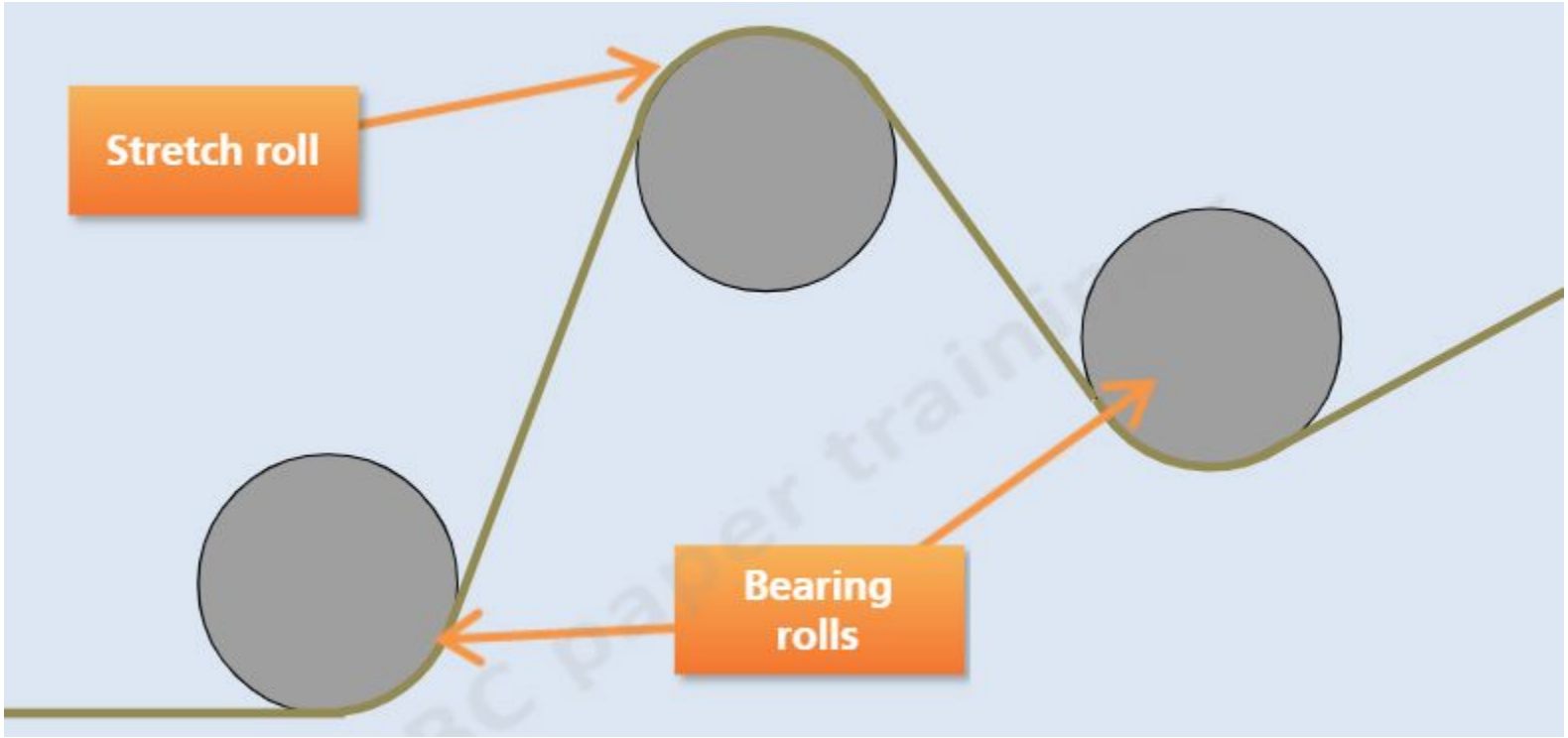
Uhle Boxes

- Help conditioning the felt
- Flushes contaminants to the felt surface
- Vacuum over 2,4 kPa

  → change the felt

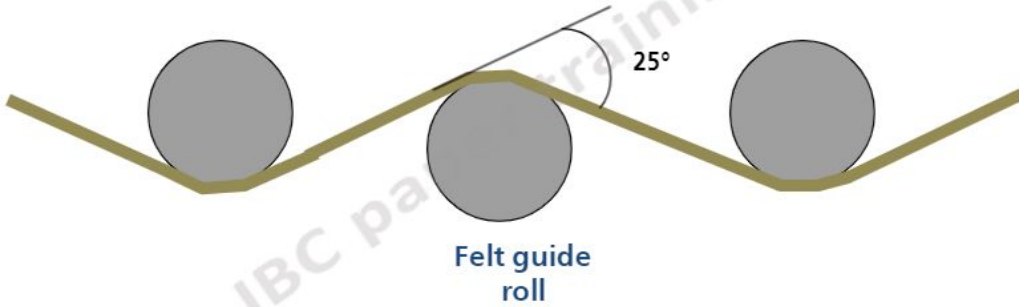


Stretch Roll

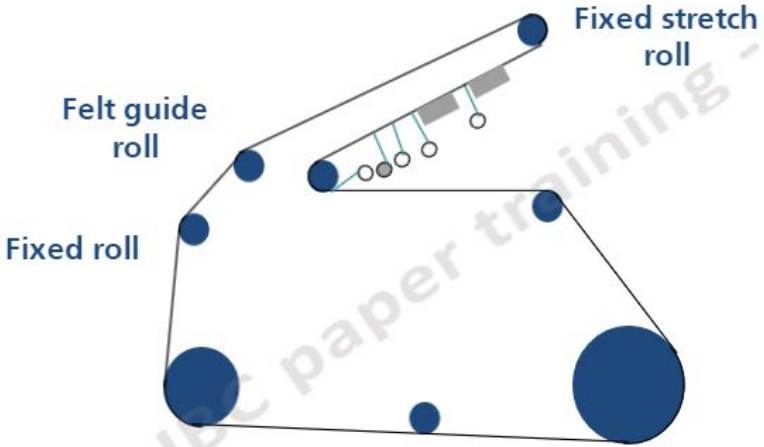


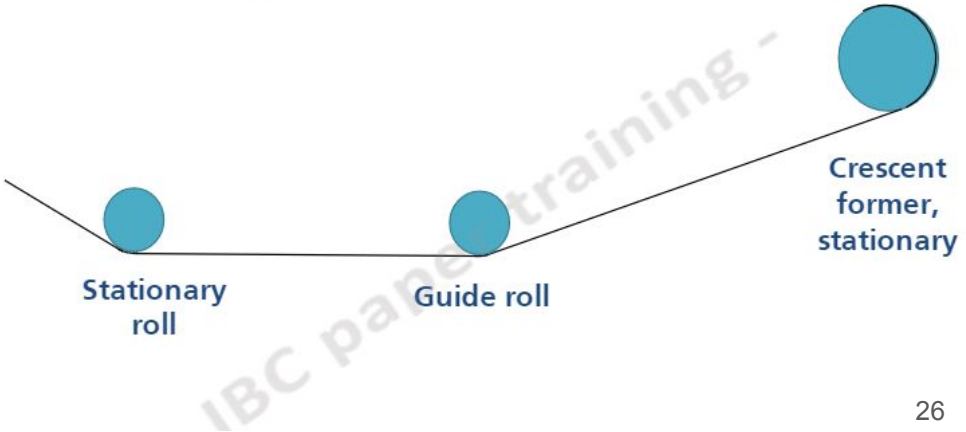
Felt Guiding

Minimum angle: 25°



Between two fixed rolls, to have a constant covering angle





Press management

Pressure depends on the paper grade and the machine.

- Conventional press: 50 kN/m -150 kN/m
- Shoe press over 1000 kN/m
- Tissue
  - Bulk paper 70 kN/m
  - Sheet with a lot of water 100 kN/m

Increasing pressure

- Increase:
  - MD and CD strength
  - Smoothness
- Decrease:
  - Thickness
  - Opacity/brightness
  - Rigidity

Increasing wet draw

- Wet draw = speed difference between press and drying section
- S_drying > S_press
- Increase:
  - Opacity/brightness
  - MD tensile strength
  - CD tear strength
- Decrease:
  - Burst resistance
  - MD tensile stretch

Conclusions

- **Goal:** we should remove as much water as we can before drying.
  - DSC from 15% to 50%
- Press sections includes press, steam box, felt, showers, stretch & guiding rolls, and suction/uhle boxes.
- Too **weak** pressure → too much water in the paper.
- Too **high** pressure → paper is too pressed, which may result in crushing.
- For efficient water removal, the felt has to be saturated with water & not too clogged.
  - The end of felt lifetime can be determined from the thickness of the felt and the vacuum level in the suction/uhle boxes.

Thank you!