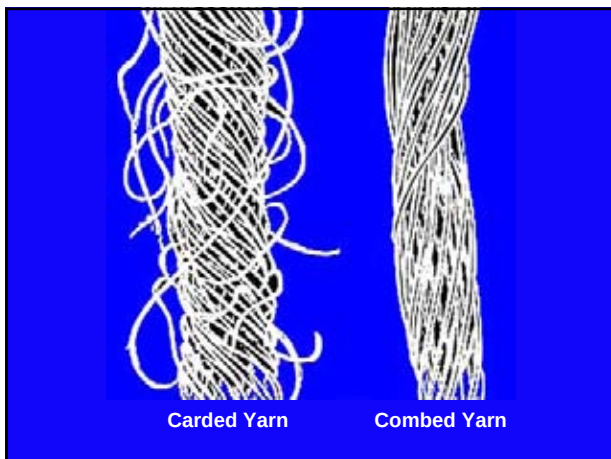


COMBING

- Process to further remove short fibres, neps and impurities in the carded fibre material.
- Combing also straightens fibre hooks and makes the fibres more parallel to each other.

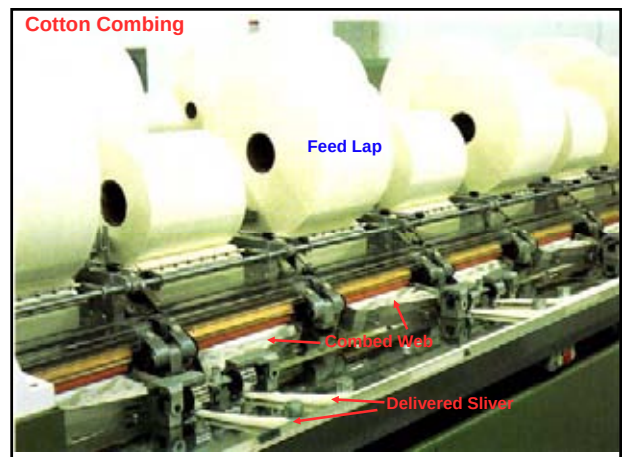
Compared with Carded Yarns
Yarns Spun from Combed Fibre (**Combed Yarn**) Are

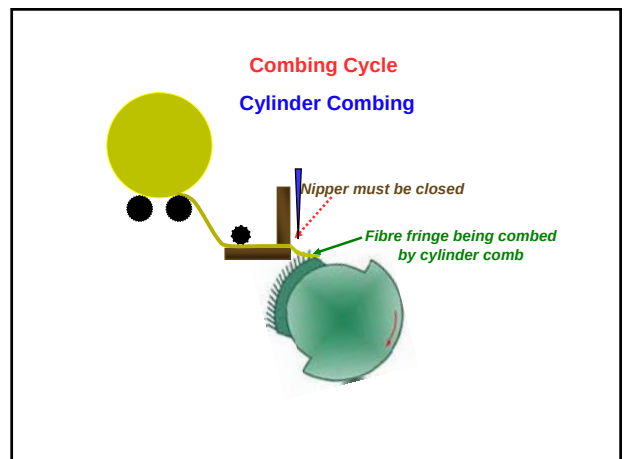
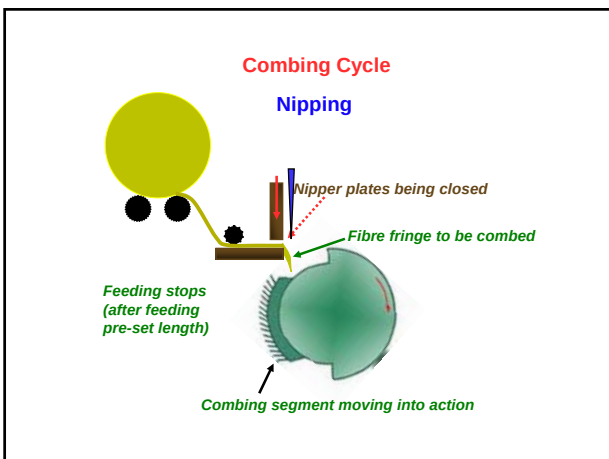
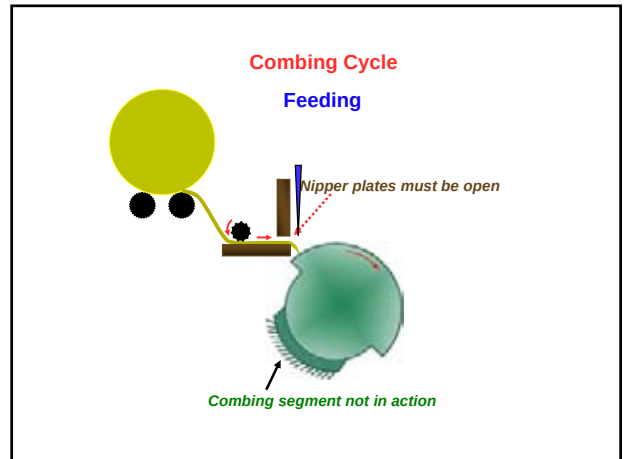
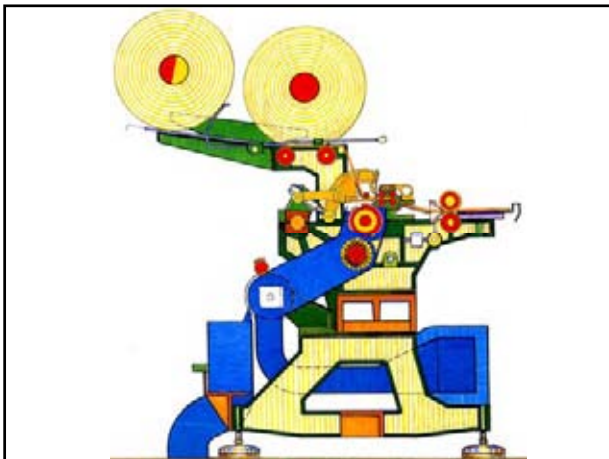
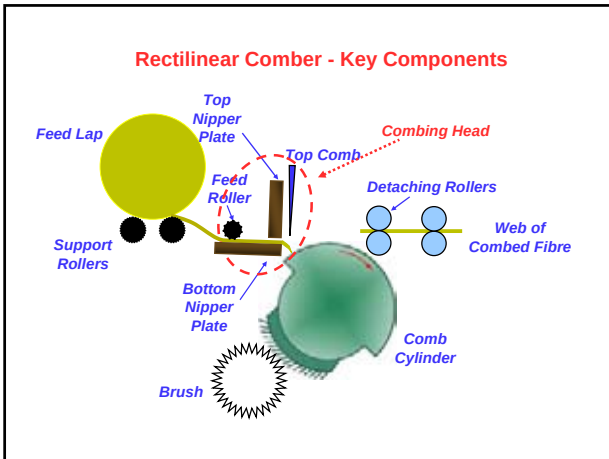
- Cleaner
- More uniform
- More compact
- Stronger
- Smoother / more lustrous

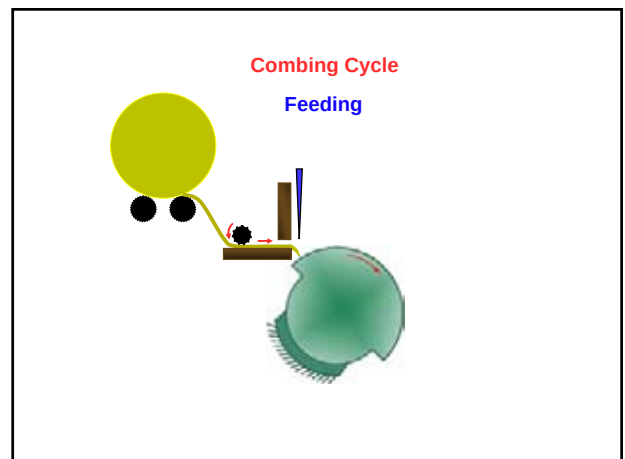
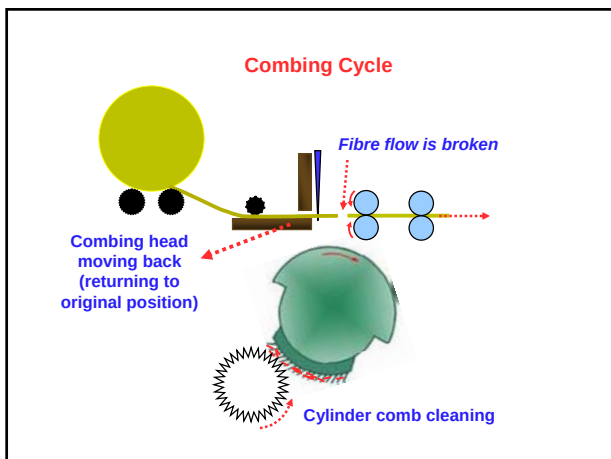
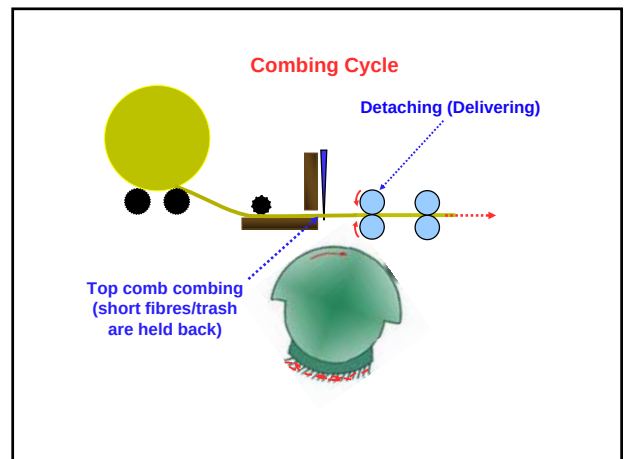
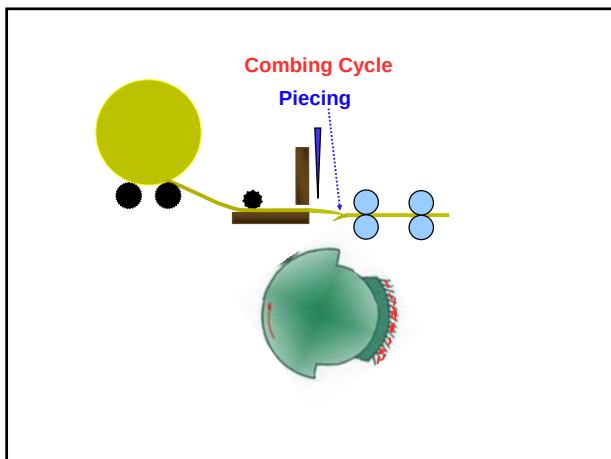
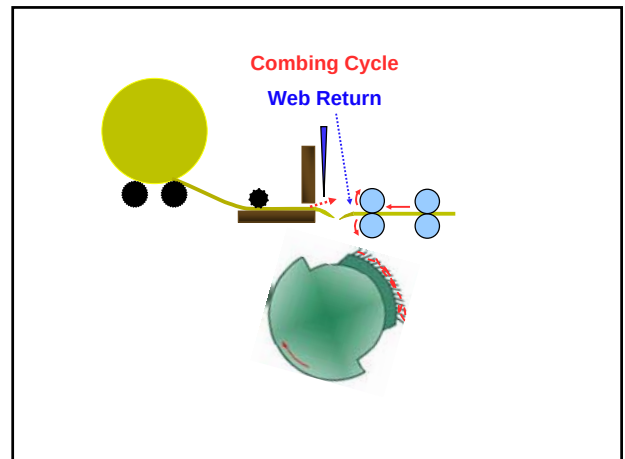
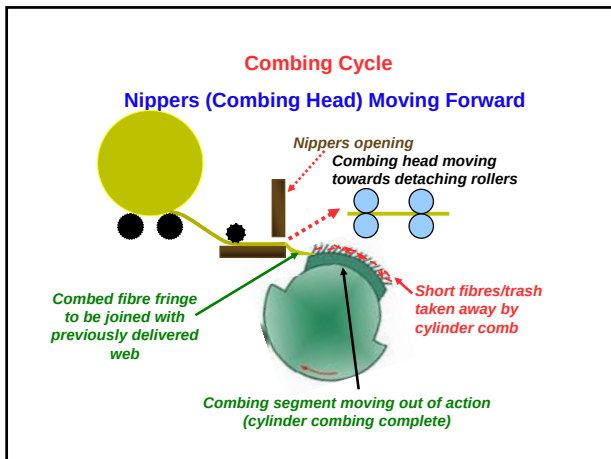


Further Reading Material

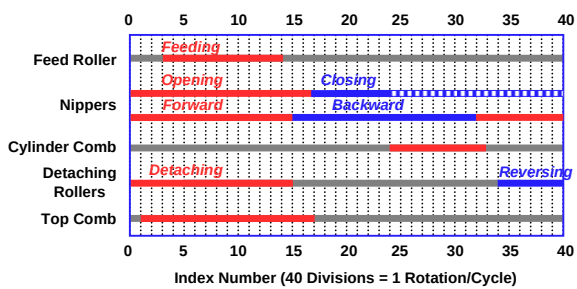
The Textile Institute, "The Technology of Short Staple Spinning", Vol.3 Part 1, The Rectilinear Comber







The Combing Cycle

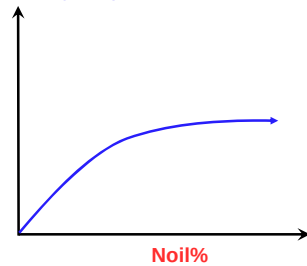


The Degree of Combing

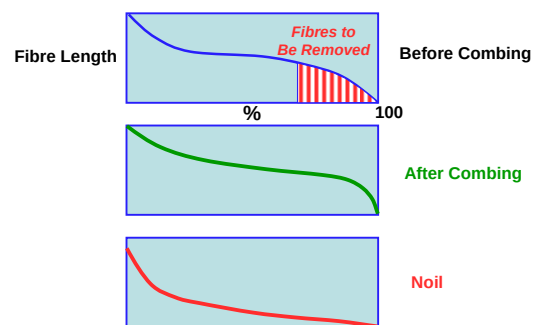
Waste (Noil) % Extraction

- Semi-(half-)combing/Upgrading: 5-12%
- Normal Combing: 10-20%
- Super-combing: >20%

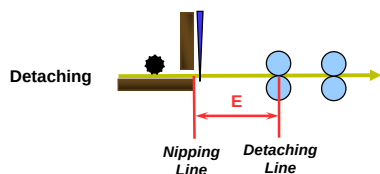
Yarn Quality



Staple Diagram



Theoretical Analysis of Noil Extraction

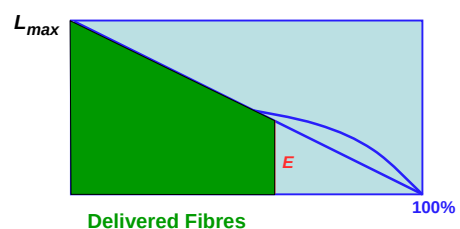


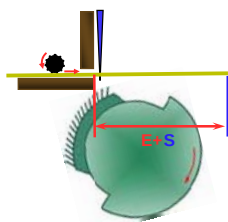
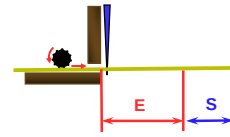
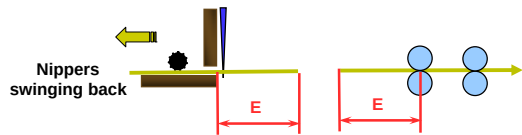
When nippers in most forward position (closest to detaching rollers)

The distance between nipping line and detaching line = Detachment Setting (E)

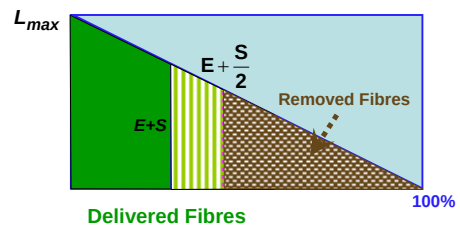
If there is no feeding during detaching, fibres must be longer than E to reach detaching line to be delivered

Theoretical Analysis of Noil Extraction

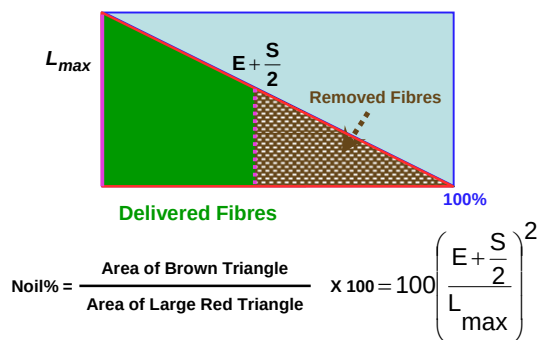




Theoretical Analysis of Noil Extraction



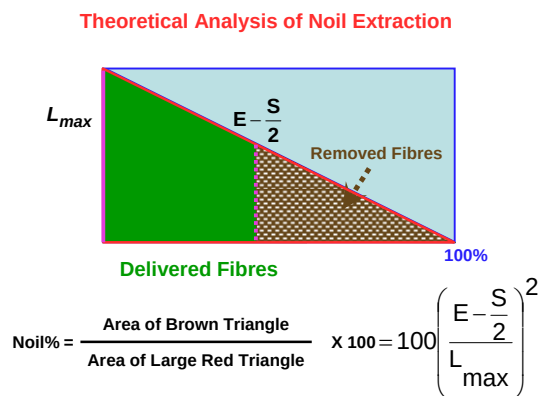
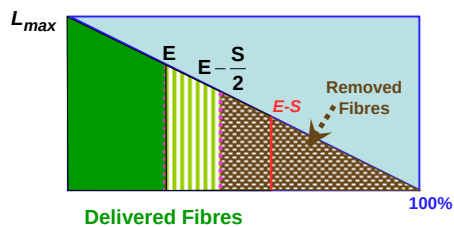
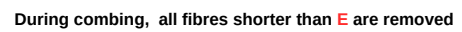
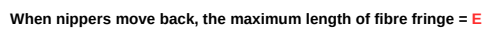
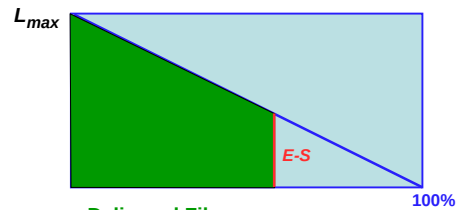
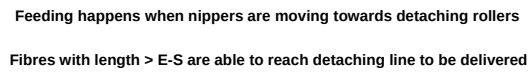
Theoretical Analysis of Noil Extraction



For Counter-Feed

$$\text{Noil\%} = 100 \left(\frac{E + \frac{S}{2}}{L_{\max}} \right)^2$$

- Longer Detachment Setting E: Greater Noil%
- Longer Feed Distance: Greater Noil%
- Longer fibre: Less Noil%



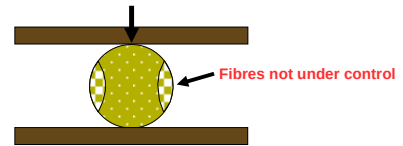
For Con-Current-Feed

$$\text{Noil\%} = 100 \left(\frac{E - \frac{S}{2}}{L_{\text{max}}} \right)^2$$

- Longer Detachment Setting E: Greater Noil%
- Longer Feed Distance: Less Noil%
- Longer fibre: Less Noil%

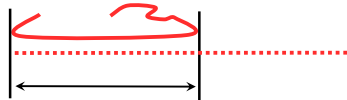
Preparations for Combing

- Round sliver is not suitable for feeding to comb



Preparations for Combing

Fibres should be as straight as possible before combing

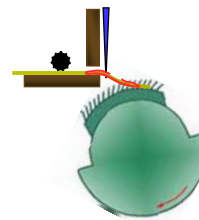


Hooked fibres are treated as short fibres and increase fibre wastage

Drafting straightens fibres

Preparations for Combing

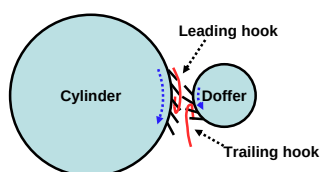
- Leading fibre hooks preferred



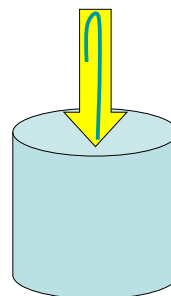
Fibre Configuration in Card Sliver

- Most fibres have hooked ends:

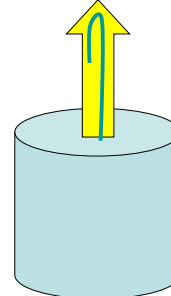
- 50% (majority) trailing hooks
- 25% leading hooks
- 15% double hooks
- 10% straight



Trailing hook in



Leading hook out



Each process reverses hook direction

Preparations for Combing

- Fibre straightening (drafting) required
- Leading fibre hooks preferred
- 2 reversals of fibre flow between carding and combing
- Flat, instead of round, feeding material is required
- Traditionally: sliver lap machine + ribbon lap machine



Preparations for Combing

- Fibre straightening (drafting) required
- Leading fibre hooks preferred
- 2 reversals of fibre flow between carding and combing
- Flat, instead of round, feeding material is required
- Traditionally: sliver lap machine + ribbon lap machine
- Now: drawframe + sliver lap machine

After combing, doubling is required to minimise the unevenness of joints

Drawing after combing



Important Combing Parameters

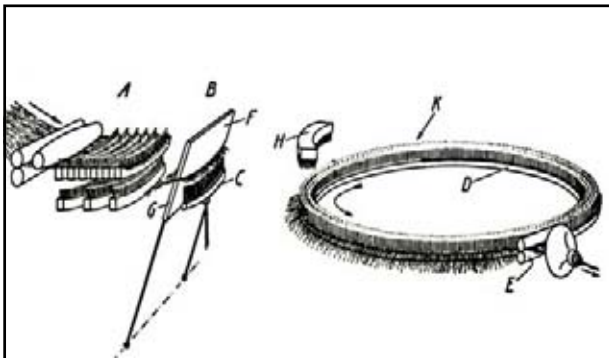
- Degree of combing (noil%)
 - Detachment setting
 - Feed distance (typically 5-6 mm)
 - Top comb/cylinder comb segment
 - Raw material and preparation
- Production rate (up to 60 kg/h)
 - Cycles (nips) / minute (up to 450)
 - Lap weight (50-70 ktex) / feed distance
 - Noil%
 - Efficiency (90-94%)
 - Number of combing heads (typically 8)

Additional Costs of Combing

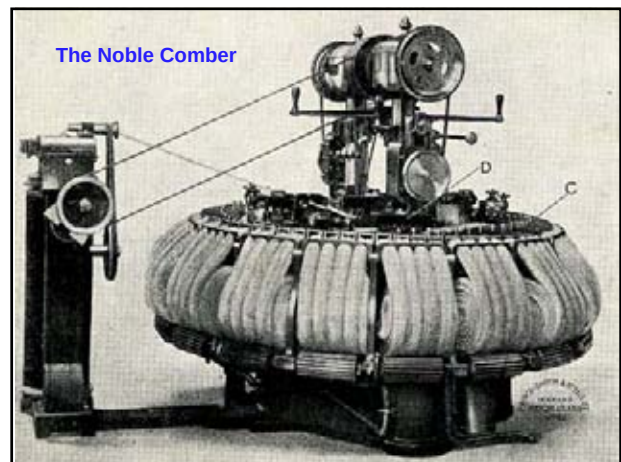
- Additional processes
- Extra material costs

Possible Cost Savings

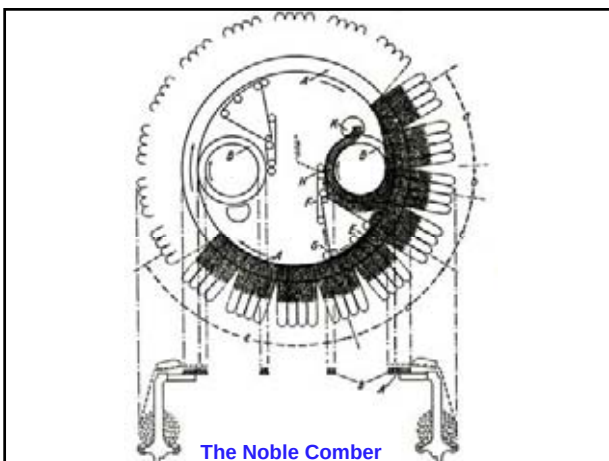
- More efficient down stream processes



The Lister Comber



The Noble Comber



The Noble Comber