PEERS
September 25-28, 2016
JACKSONVILLE, FLORIDA

Innovative Technologies For Making Improved Paper Out Of The Poorest Fibers

p a p e r m o r p h o s i s®

h i g h l y e n g i n e e r e d p a p e r

by gruppo x di x gruppo, Via delle Industrie 25-8, 30175 Venice-Italy, +39 041 5093431, www.gruppox.it

who we are

we are a company, based in Venice/Italy which

- generates patents on innovations in the paper sector,
- develops them with industrial partners, and
- licenses patents, know how and technology.

where we started from

in the past we found the need of a cost saving and sustainable alternative to plastics in 3D packaging.

we developped a first technology, based on a pure mechanical treatment and using only 100% fibre material with no particular chemical additives for the production of a paper with over 20% strechability in MD and up to 16% stretchability in CD, deriving from pure virgin pulp.

market presence today

the before mentioned technology and its applications has been licensed on an exclusive basis for Europe to Billerudkorsnas AB.

drawbacks of existing technologies

our previous technology was able to reach high stretch in both CD (16%) and MD (over 20%) but those values could not be tuned separately

traditionally available technologies for MD-elongation do work only in MD (about 15%), potential CD elongation derives from pure virgin pulp and costly high refining and does usually not exceed 8%, limiting such technologies to a total symmetric performance of 8% in each direction

our new development

CROSS DIRECTION &
MACHINE DIRECTION
tuning system: 2 units for
customizing elongations
1 CD-unit – 1 MD-unit

for

and

Increased use
of sustainable
raw materials

the system allows to separately adjust stretch in **Cross** Direction and/or **Machine** Direction on demand.

customization of papers

since summer 2015 we have been customizing the most various paper types for the most various customer needs, ranging from bilateral elongations of over 20% in each direction to fine-tuning of adding just some percentage points in the desired direction.

the goal was to end up with more performing and symmetric materials, broadening the application areas of paper, but also to reproduce standard papers with less refining or material costs

and we could see that over elongation also other mechanical properties, as TEA-values, can be influenced/increased/improved.

“ TEA (work) = average load (force) x strain (distance) ”

by this simplified “concept”, inserting the relative values of the paper to be adjusted, ideal/balanced values for elongations and/or TEA can be tuned

either

% **CD** = % **MD**

% of elongation in CD and MD, it can be symmetric if desired

or

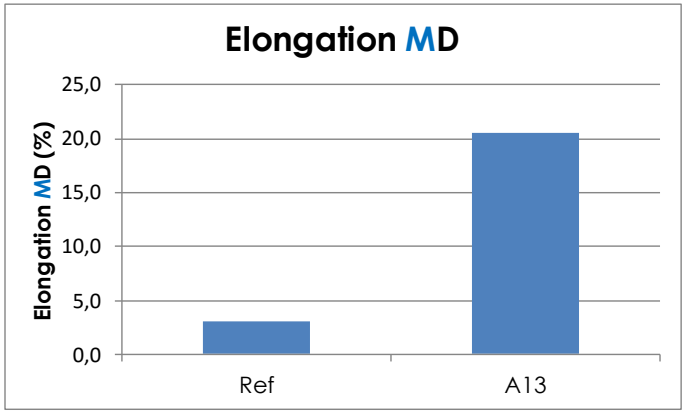
TEA(**CD**) = TEA(**MD**)

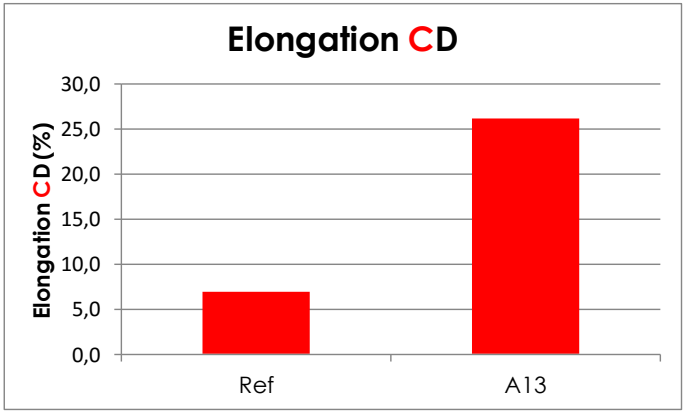
Tensile Energy Absorption in CD and MD, it can’t be symmetric but more balanced

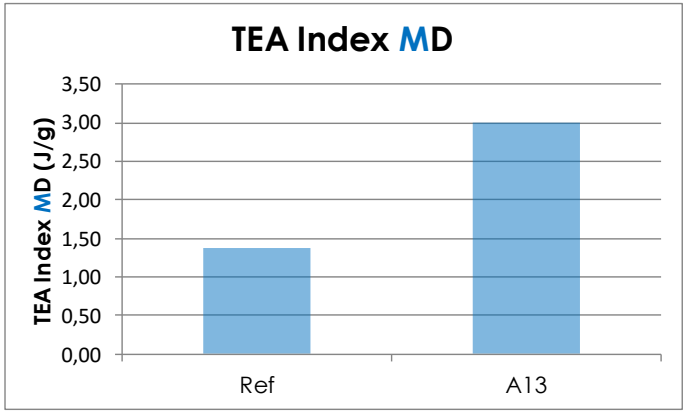
a way for separately adjusting **CD**-stretch was needed. this system for **CD**-elongation could then be combined to traditional but also new systems of **MD**-elongation

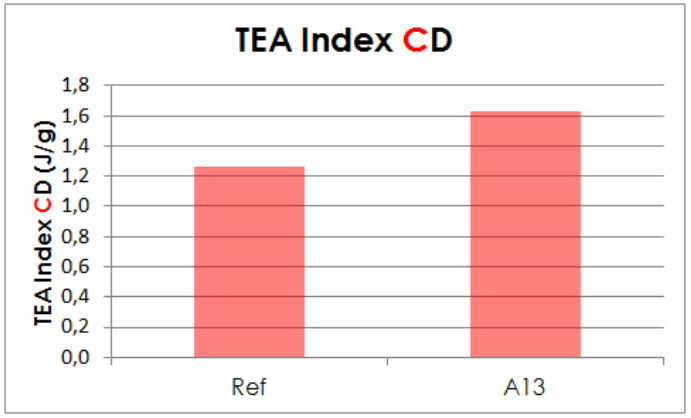
proof of concept for high CD-MD stretch

Used pulp: 100% long virgin fiber, refining 30° SR
Result for treatment with both UNITS: high symmetric stretch over 20% in CD and MD, in both cases improved TEA values



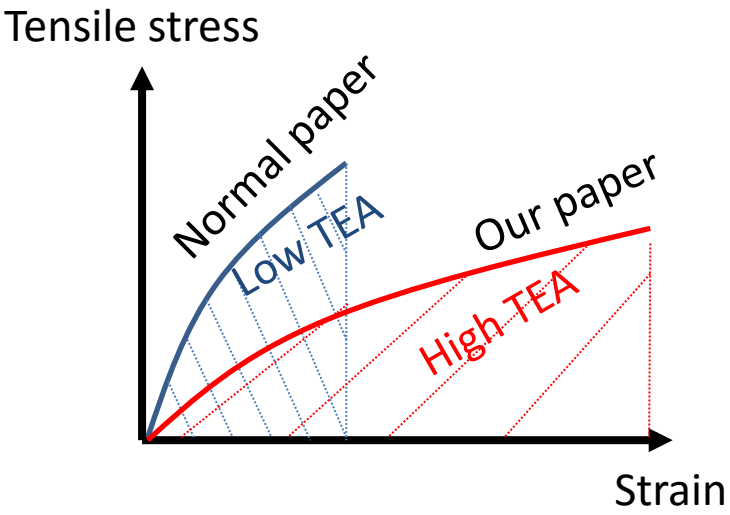






CD and MD treatment can be used separately according to needs, arriving from increases of just a few percentage points up to very high values, combined to the relatively increased TEA in either direction

why not trying with recycling paper?



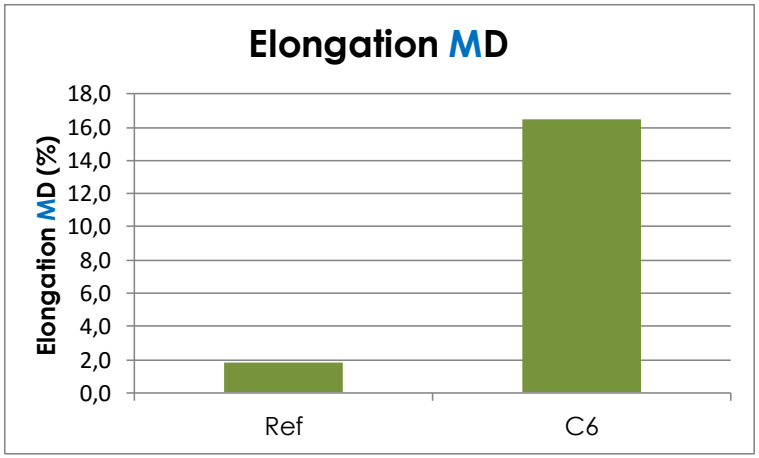
from many focused customer trials we saw that our system is flexible enough to meet or get really close to the targets for the most different needs:

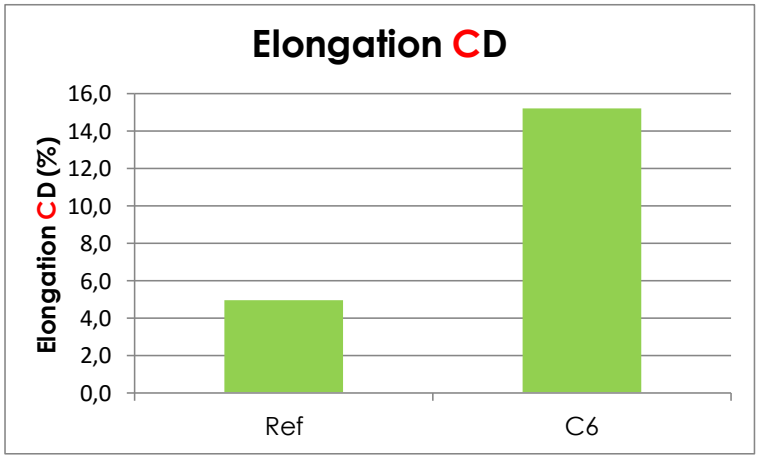
- high symmetric stretch in both CD and MD
- improved TEA-values
- focused joints of stretch/TEA where needed
- reproduction of standard-qualities with less refining or material costs

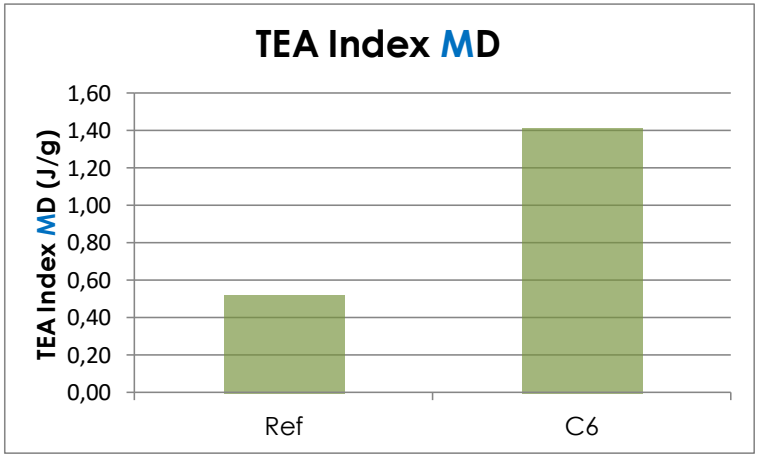
target 1: high symmetric stretch

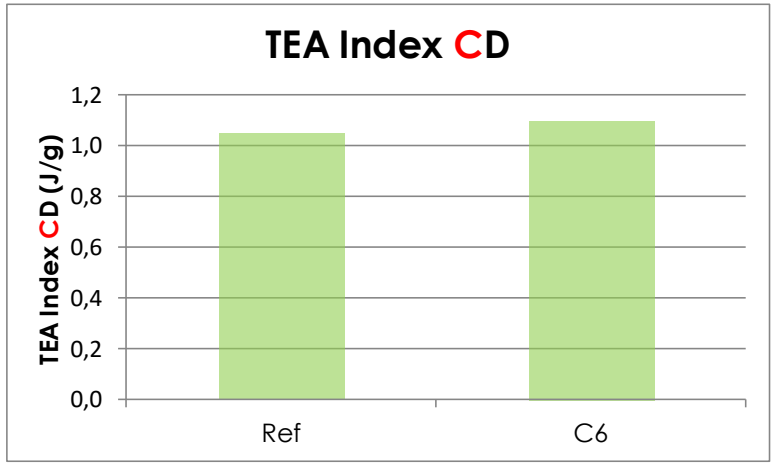
Used pulp: reslushed paper containing 30% unbleached kraft and 70% OCC, final 28° SR

Result on treatment with both UNITS: symmetric stretch of around 15% in CD and MD, increased TEA values





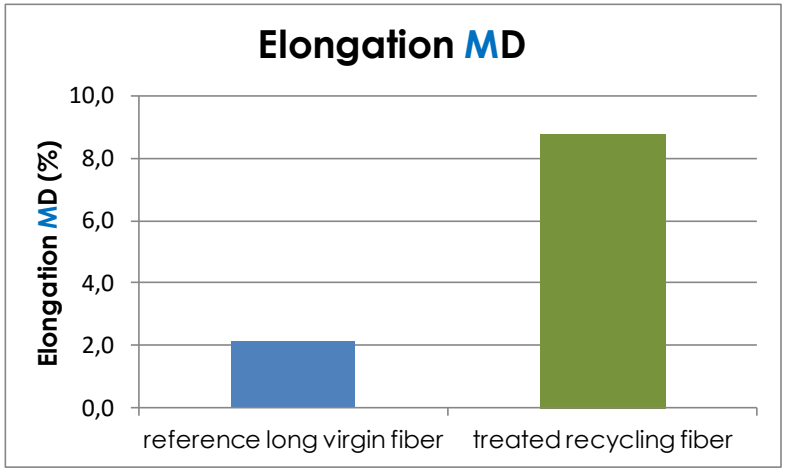


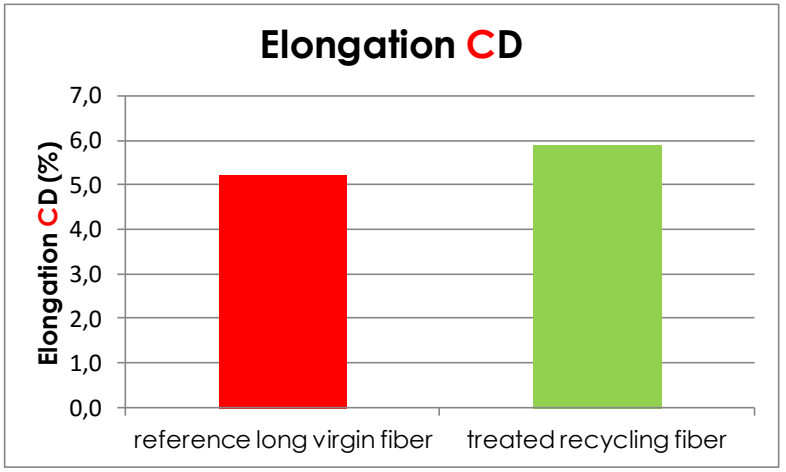


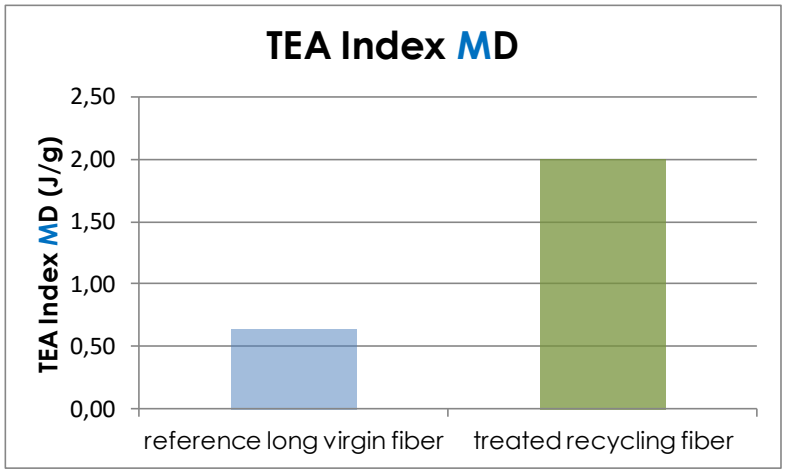
target 2: simulation of vergin fiber

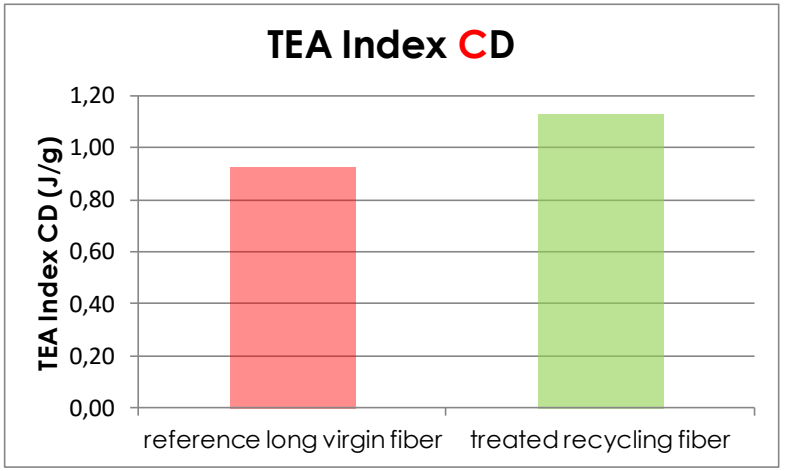
Used pulp: reslushed paper containing 30% unbleached kraft and 70% OCC, final 28° SR

Result: recycling fiber, even slightly treated, apart from increased elongation, also increase of TEA in **CD** and **MD**, better than the untreated reference in pure long virgin fiber, refined to 30°SR







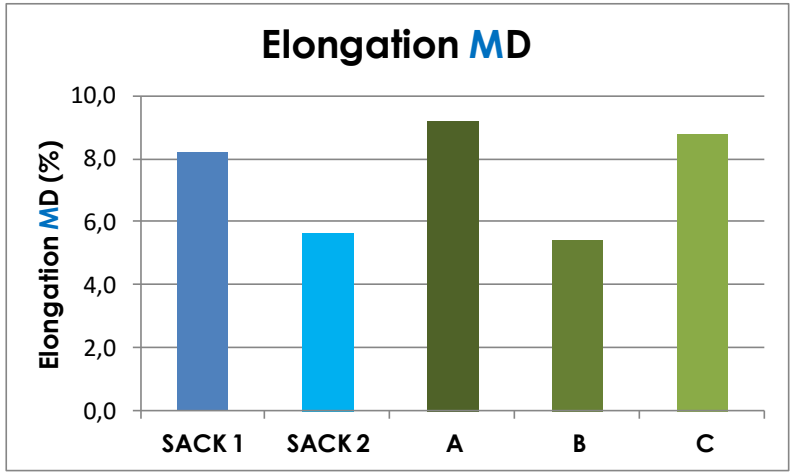


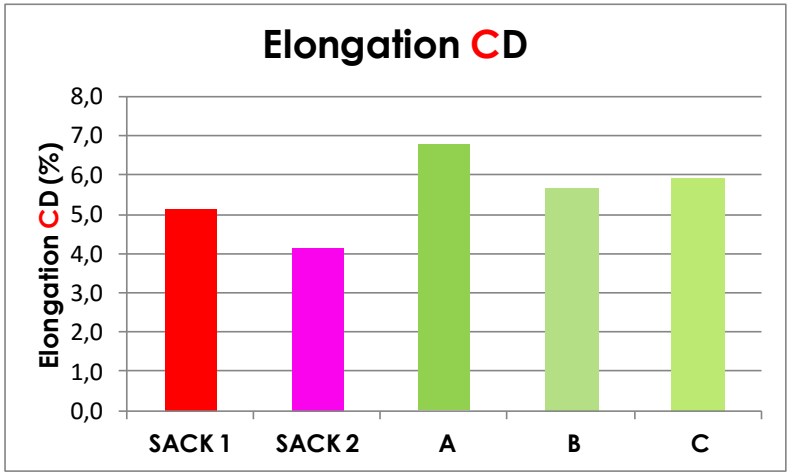
target3: simulation of standard sack kraft

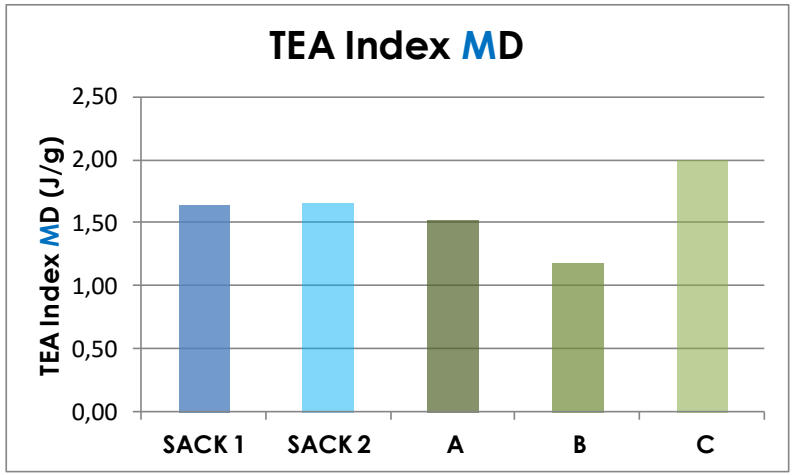
Used pulp: reslushed paper containing 30% unbleached kraft and 70% OCC, final 28° SR

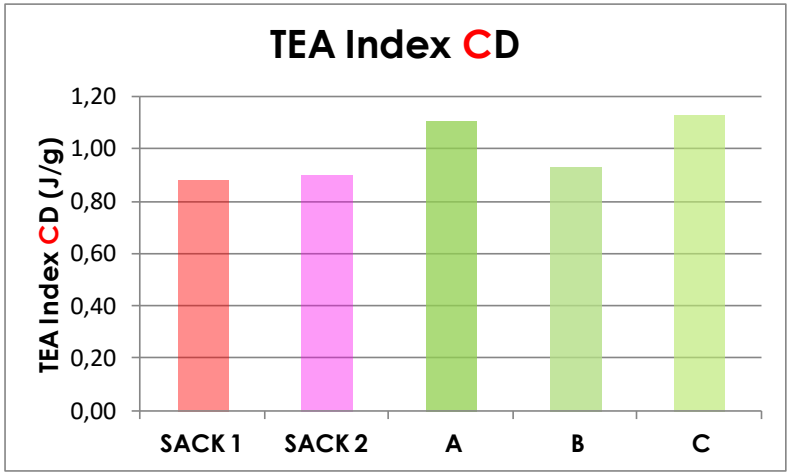
Result: elongations could be reproduced or increased. In almost all cases also TEA was improved.

Being our system flexible there is still space for further fine-tuning









more stretch/TEA for recycling paper?

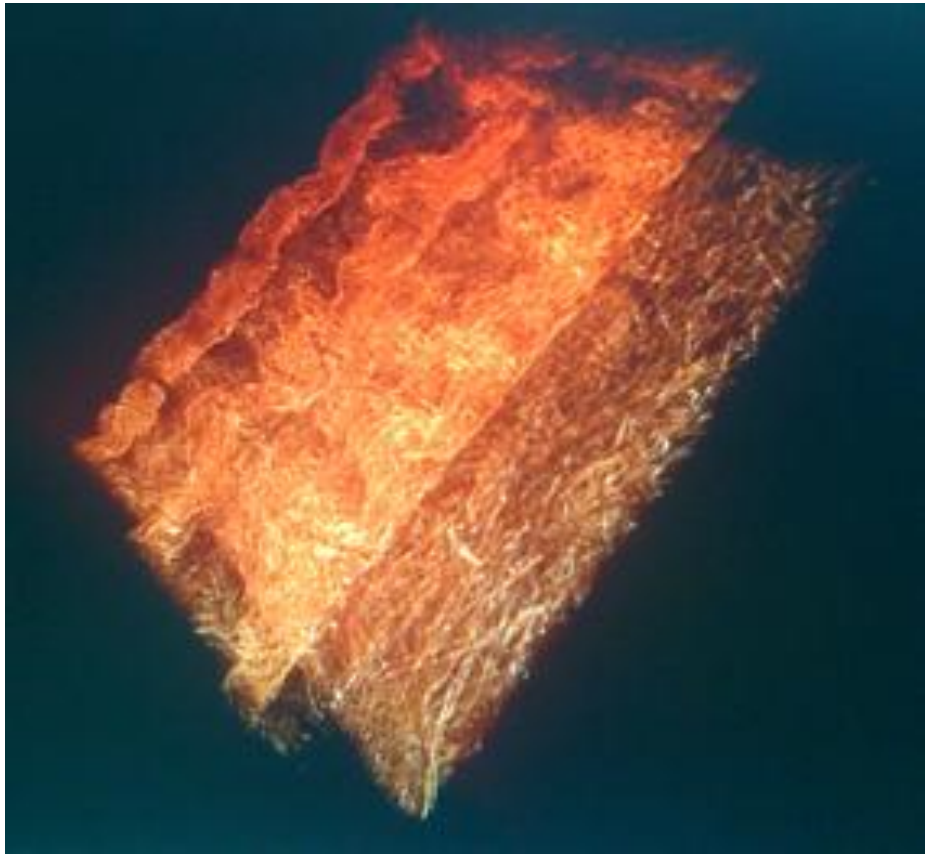
Increased stretch for folding

Increased TEA for drop test, no negative impact on Gurley

3D-packaging

increasing bulkiness and absorbency?

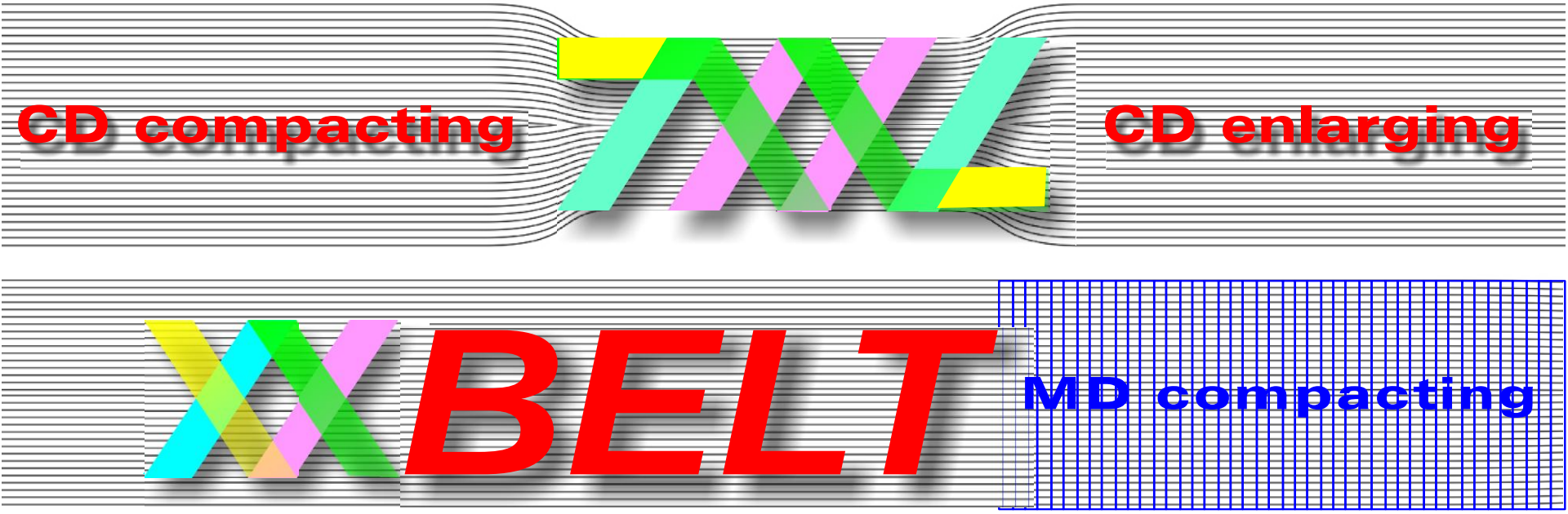
Our processes do also contributes to an increase of fluffiness for certain paper grades and even non wovens with the appropriate degree of treatment.



µXRay Computer Tomography on treated and reference material

our new technology

consists in two separate units:



Forming a system:

- to be installed, or one or both, in existing production lines
- to be excluded if not needed for other productions
- easy to set for required **CD** or **MD** elongation value

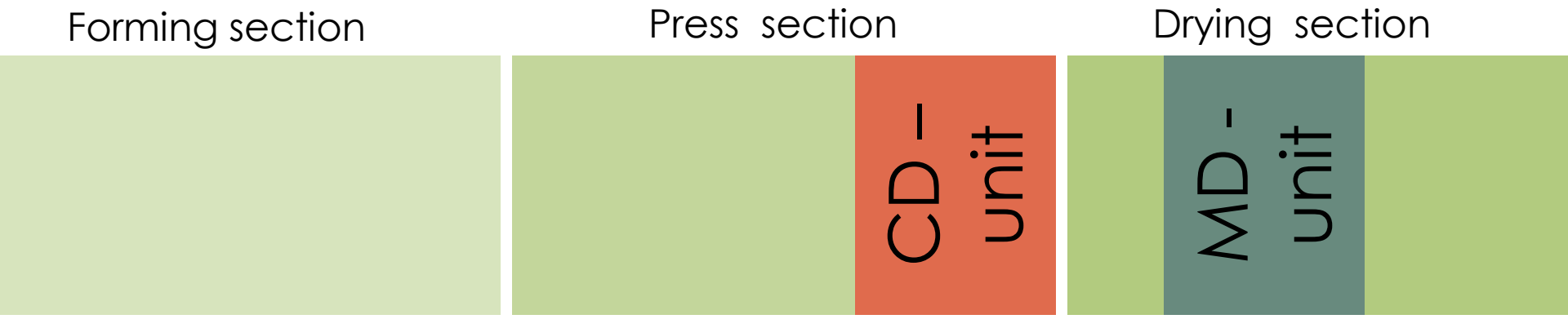
a look at the units

CD-treatment: on the only **CD**-UNIT we can today treat a fibrous web from standard values up to around 15% on top of what base paper has

MD-treatment: MD-units are today available and might potentially be combined to our **CD**-unit. Anyhow, we have developed a new **MD**- UNIT ourselves, improving traditional devices with:

- adjustable nip size and paper contact area
- flexibility for intensity of treatment
- uniformity of treatment over whole width
- no need of lubrication

The units within a paper machine

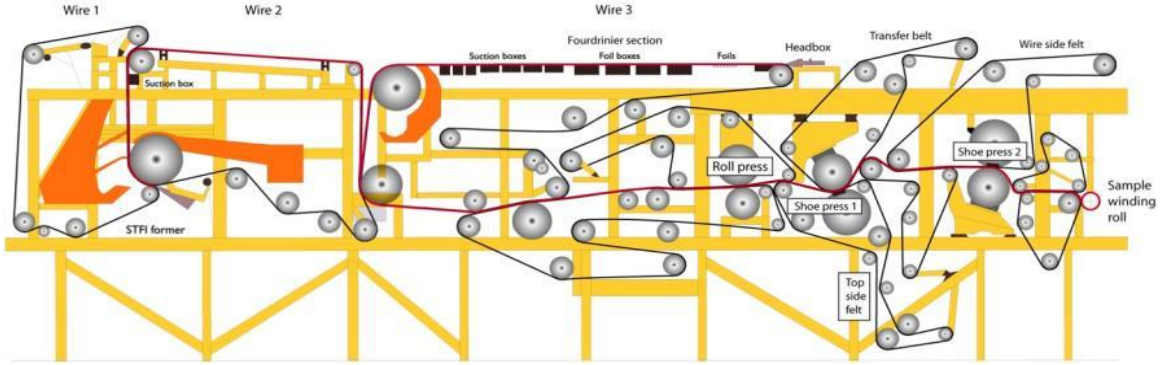


Dry content 50% or less for CD-treatment

Dry content about 65% for MD-treatment

where are the units today located?

Whereas for our past development of extensible paper we worked at full industrial scale on a 2,50m wide papermachine at a mill in Italy, today we have installed our UNITS at the "FEX"-pilot paper line at the paper science and research institute Innventia AB in Stockholm.



installation of the UNITS

The pilot line is split between press section and a separate dryer allowing the simulation of processes implemented at different positions in a paper machine. The pilot facility in Stockholm can also start for very small pulp batches (as low as one ton dry pulp) as it is built in a full scale but narrow At this pilot line we are processing the standard available machine width (240 mm). All sorts of furnishes can be produced to be then processed on our UNITS, the scientific evaluations are carried out according international standards

outlook

the field of recycling pulp and its mixtures within a furnish is huge, ranging from pre-consumer to post-consumer, being mixed from the highest to the lowest level with other fibers.

we saw that our technologies can assist recycling fiber the same way as they do for specialty and high performance papers in terms of:

- Adding performance
- broadening applications
- invading new fields and markets

Many thanks for your attention!

Marion Sterner (gruppox)
Mikael Magnusson (co-author, Innventia)