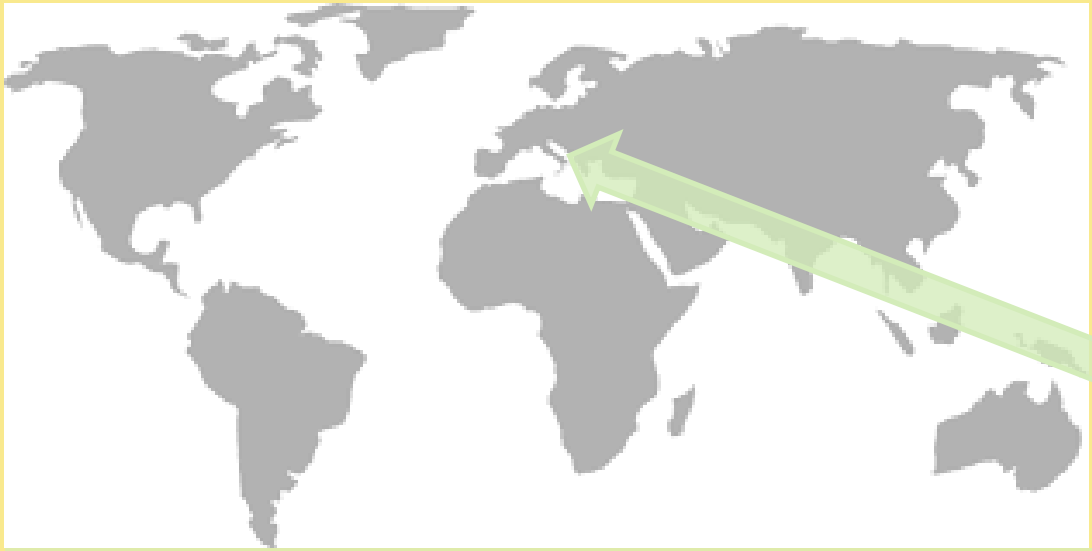
Novel Corrugate In Machine Direction By Novel Paper Technology

papermorphosis®

highly engineered paper

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

corrugate in Italy

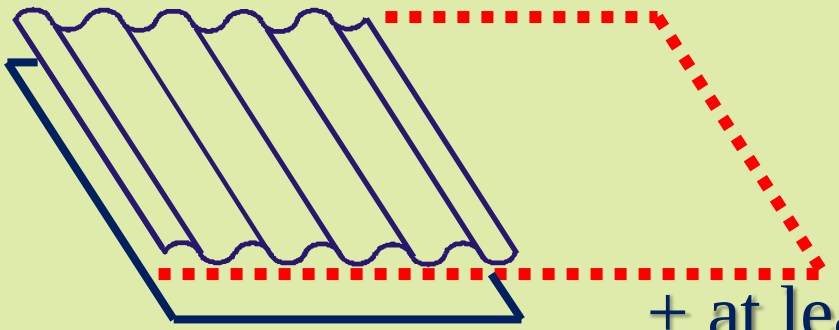


according to GIFCO (Gruppo Italiano Fabbricanti Cartone Ondulato) the Italian Association of corrugate producers, today the only Italian Corrugate Industry covers the equivalent surface of **1 million soccer fields**.
the average weight of corrugated board = 561 gr/m².
since 2000 this weight has decreased of 44 gr/m².
how to decrease this weight furthermore?

in traditional corrugate….

1 m² = 1 m² + take-up factor

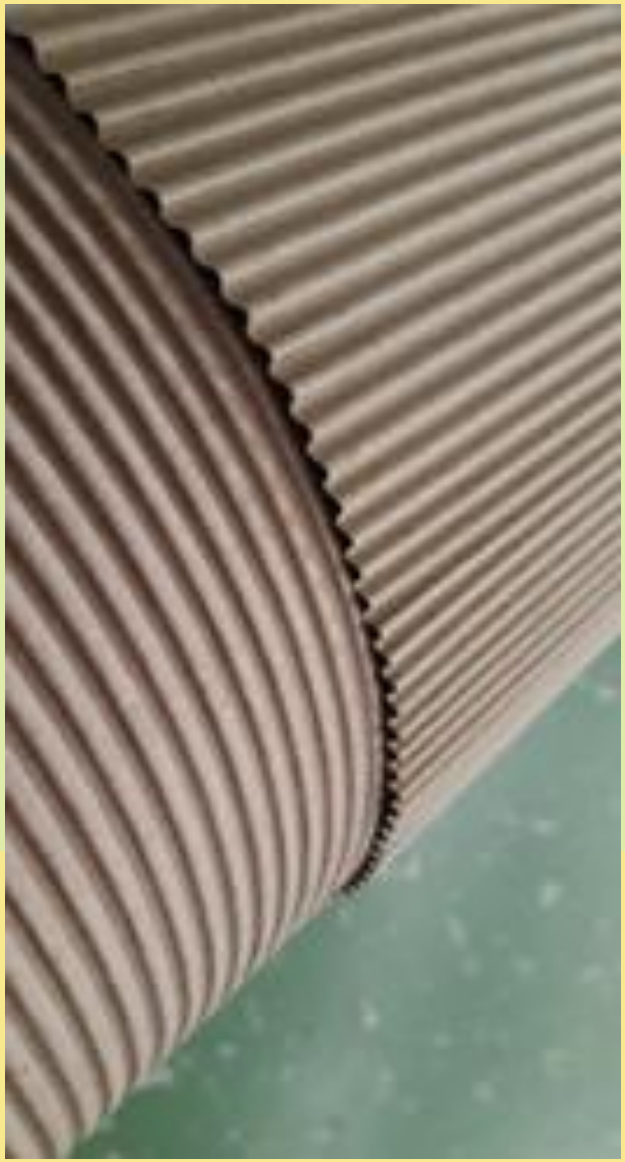
according to wave size



+ at least 1 liner to hold the waves in place

$1m^2 = 1\ m^2$ after corrugation?
stable flutes?

option 1:
a novel flute in machine direction



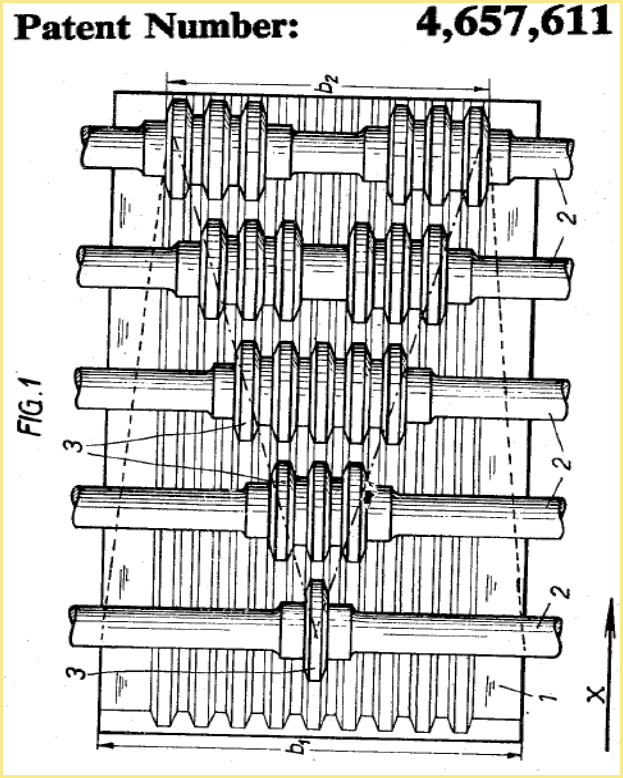
option 2:
stretchable paper for distancing layers by 3D deformation

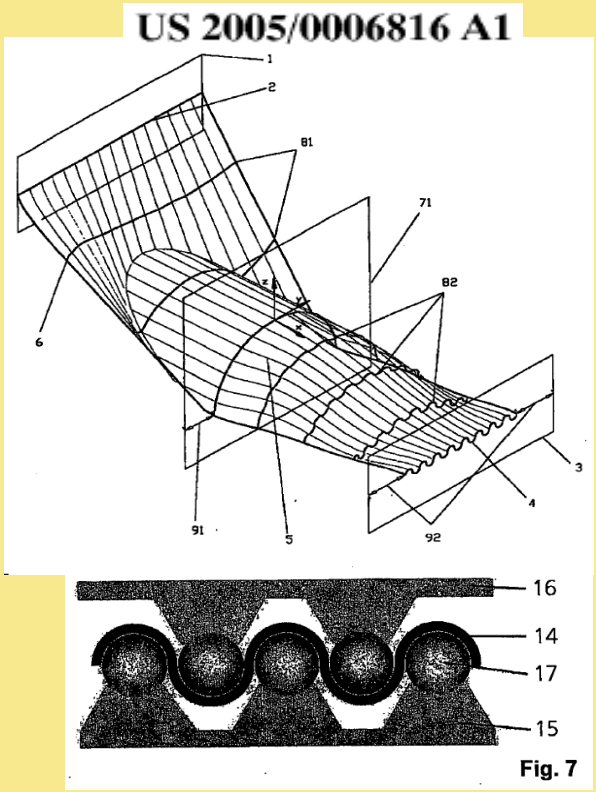
option 1: WELLIXX novel MD-flute

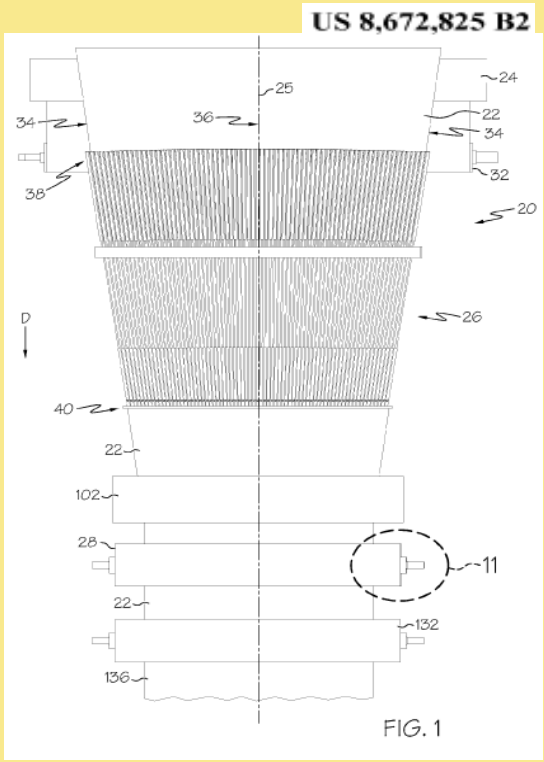
- stable wave without liner
- no web shrinking (ingoing width = outgoing width)
- wave aligned with natural fiber orientation
- continuous process
- can be rolled up
- no need of cross directional strechable paper
- many combination possibilities to other layers
- can be produced in-line the paper machine, or
- off-line at the converter

MD flute, attempts in the past

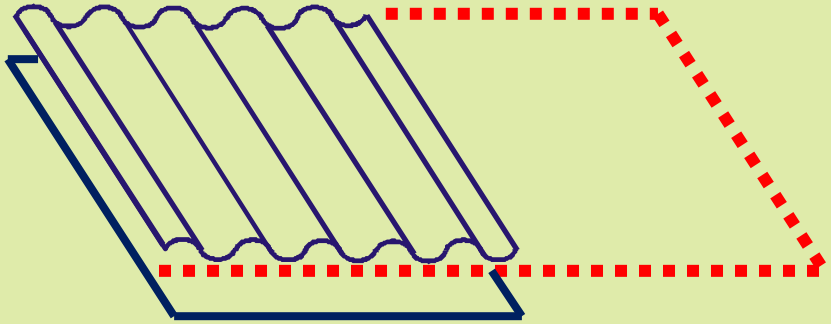
complicated devices for gathering material in cross direction, leading to web shrinkage, differently according to wave size







close-up on less material consumption



in traditional corrugate

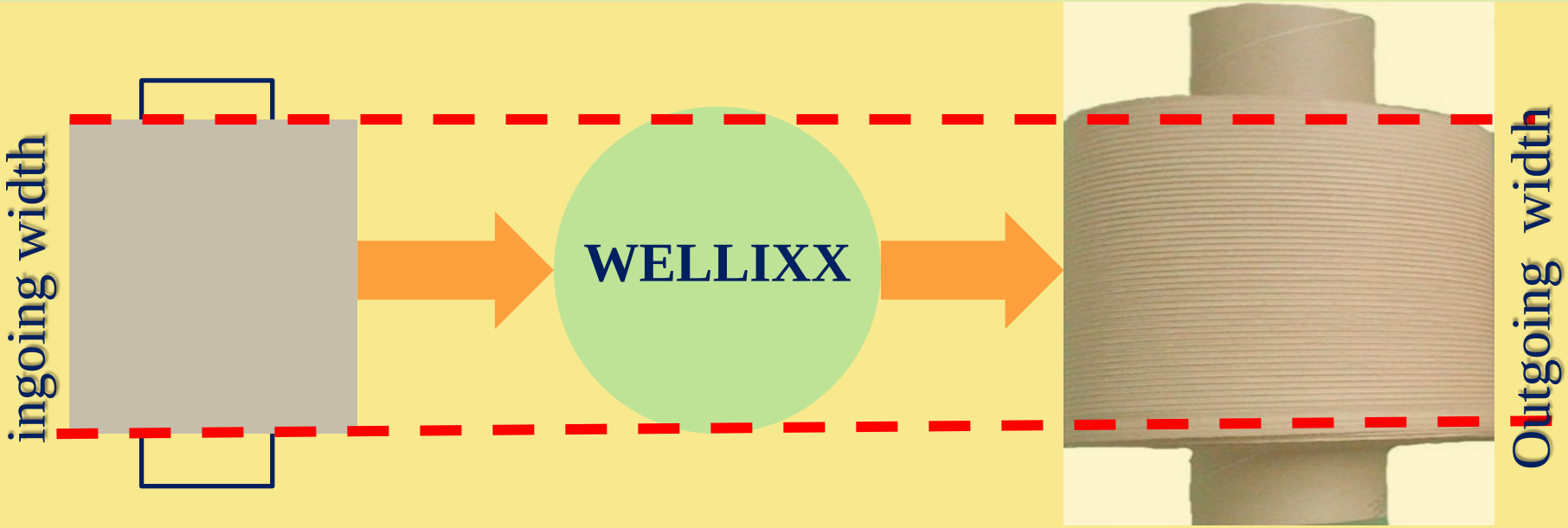
1 m² = 1 m² + take-up factor

according to wave size **+ 1 liner**

in the novel longitudinal corrugate

1 m² = 1 m²

(no liner necessary)



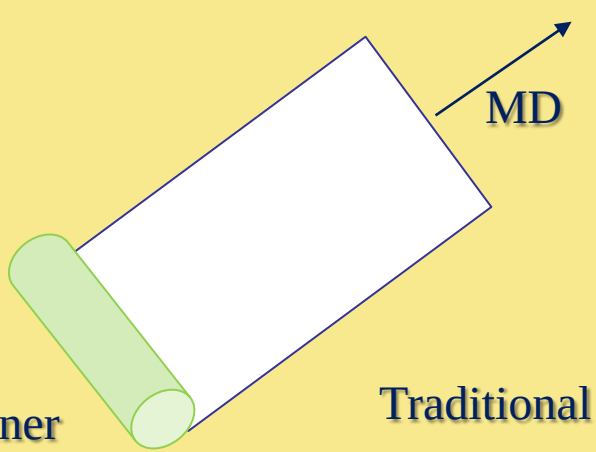
first studies on properties

Today there is no standardized method for testing the novel MD-flute, but probably the normally relevant factors as burst or SCT might not be the only criteria anymore for base papers

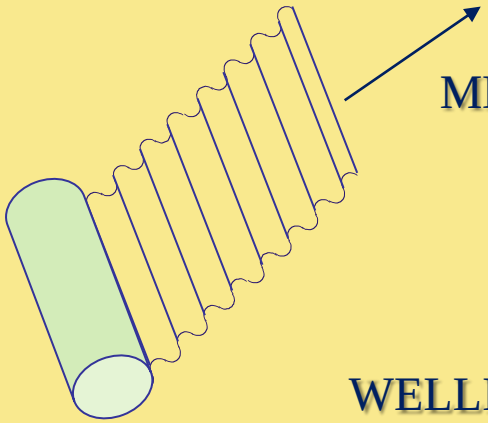
Lab sample of a 90 - combination by RISE

the longitudinal wave corresponds to the natural direction of fibers for improving the behaviour in box compression tests

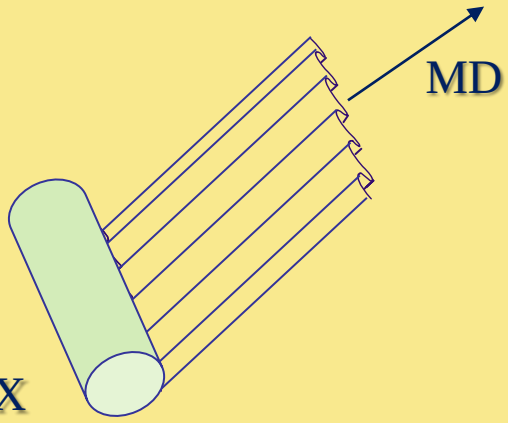
3 point bending at RISE/Stockholm



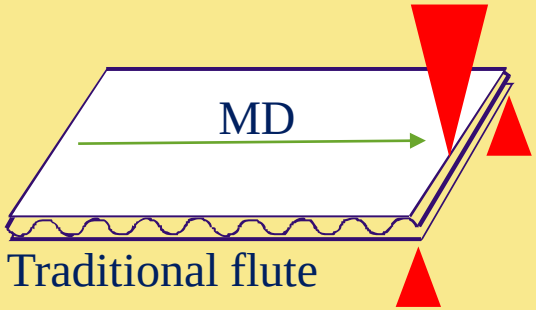
Liner



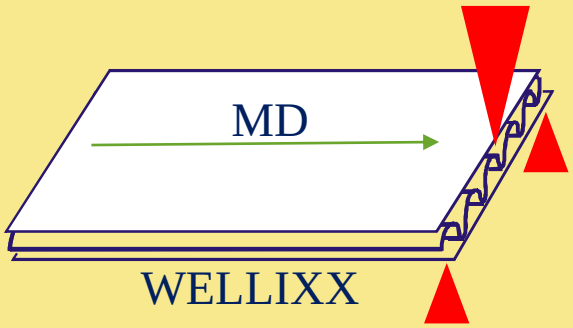
Traditional flute



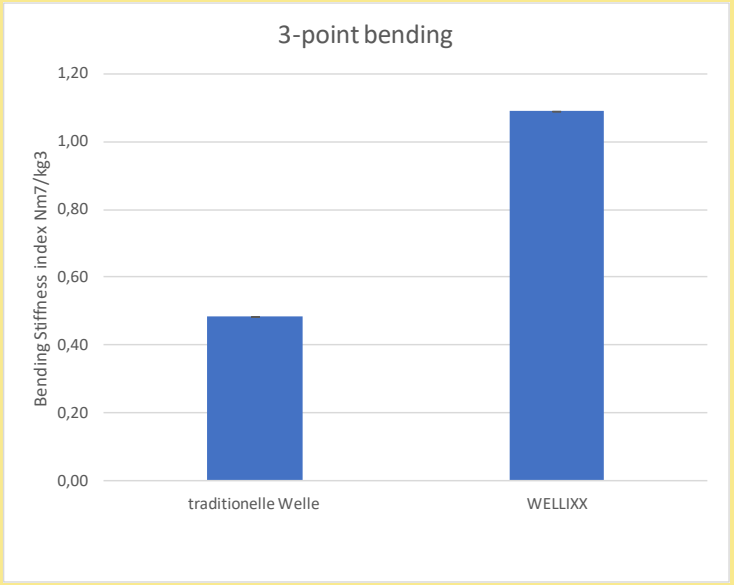
WELLIXX



Traditional flute



WELLIXX



Sample size 60x25 mm

performed on standard papers

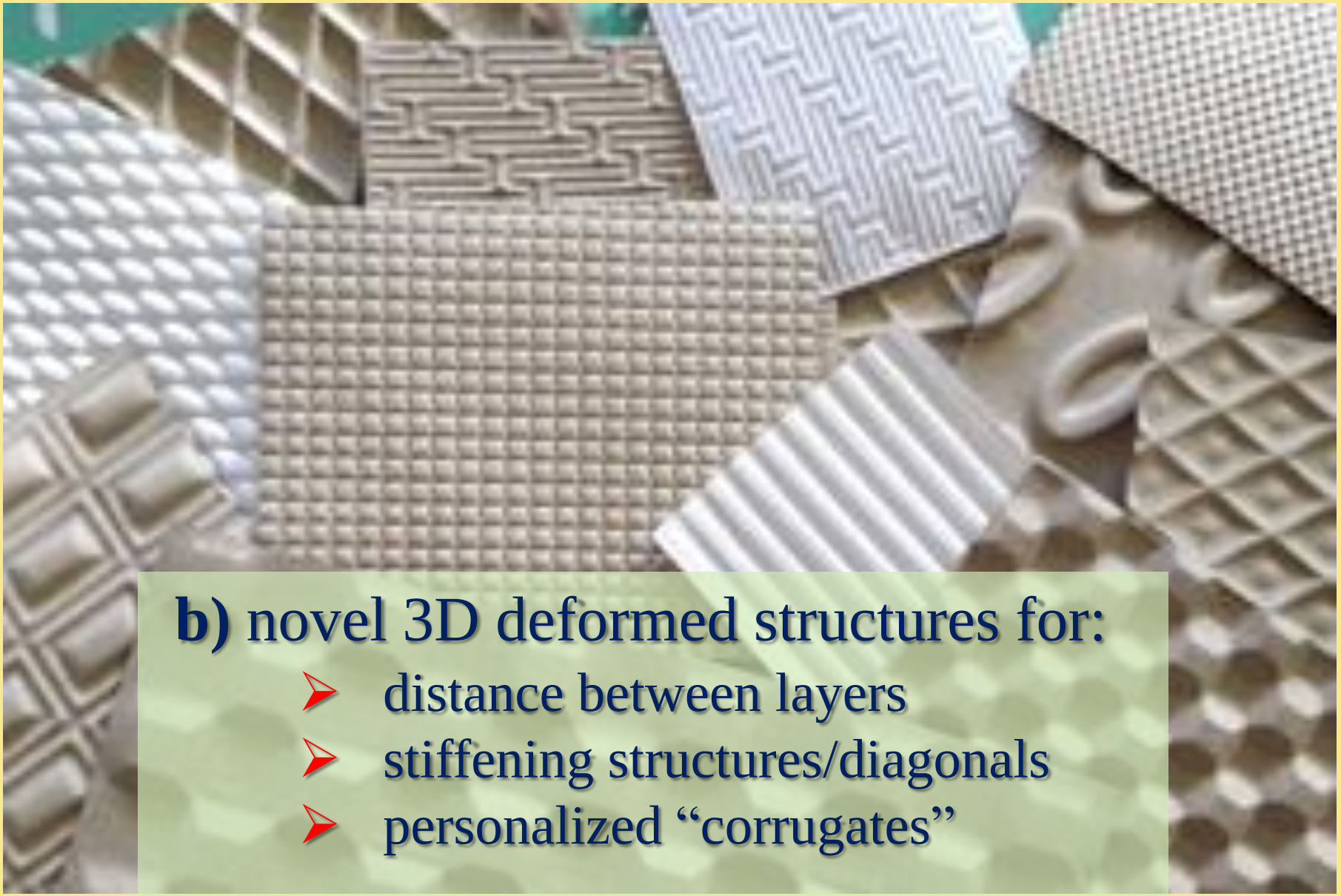
The novel longitudinal flute **WELLIXX** is made out of standard papers

NO stretchable paper is needed

option 2: stretchable paper for 3D deformations

a) reproduction of traditional flutings/waves

Option 2: 3D deformations of central layers



b) novel 3D deformed structures for:

- distance between layers
- stiffening structures/diagonals
- personalized “corrugates”

both options are part of our novel paper technology for:

- CD-stretch on demand up to 20%
- MD-stretch on demand up to over 50%
- increased trim width(2,3,4%) and stiffness in CD by pre-enlarging the web
- novel papers for 3D-deformed flute
- WELLIXX novel longitudinal corrugate

… for all papers (long and short fiber, bagasse, recycling grades etc)

CD compacting

CD unit

CD enlarging

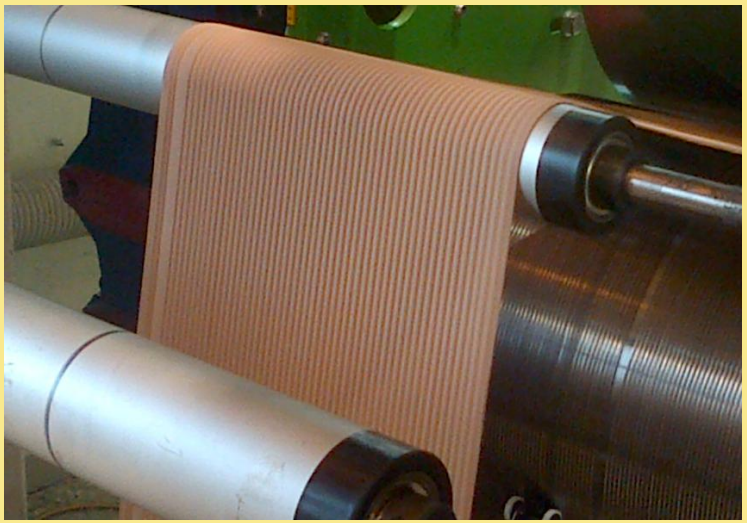
- **XXL mode:**
- generation of up to 20% stretchability on top of the base paper properties

- **FIXX mode:**
- prestretching of a paper web of 2,3 4% for recuperating trim width lost to drying
- gain in stiffness in CD-direction

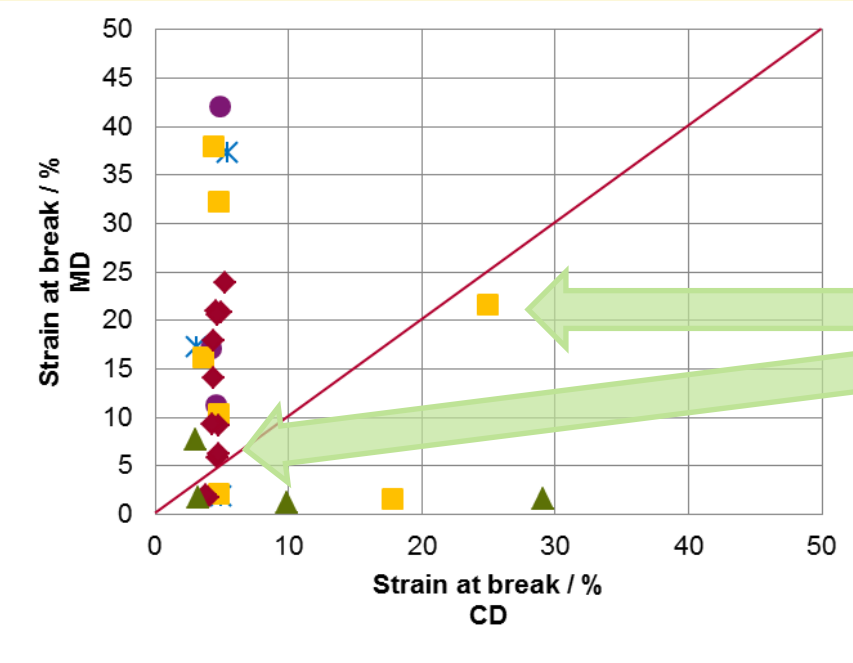
MD and some CD stretch

MD unit

WELLIXX novel flute in MD

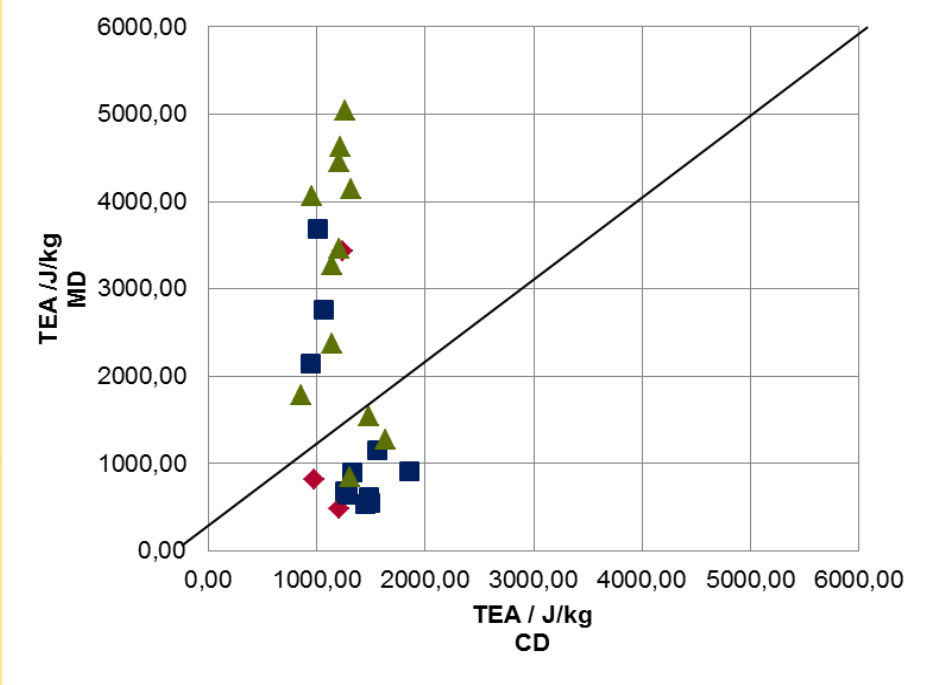


getting technical

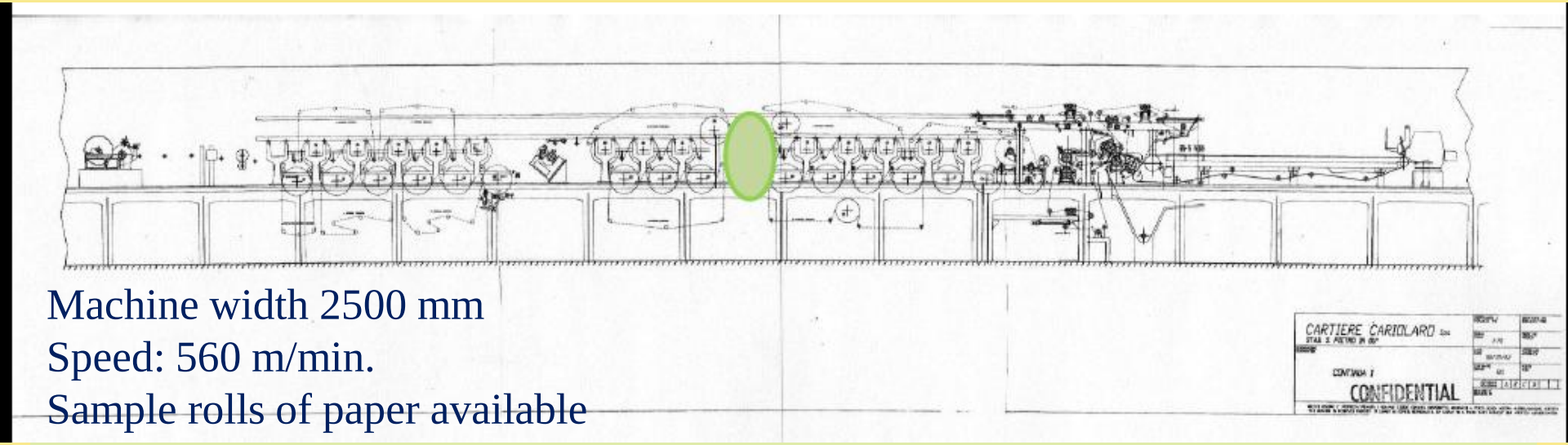


high stretch in either direction but also isotropy… on high or low levels

the higher stretch the higher the increase of tensile energy adsorption (TEA)



XXBELT –INSTALLATION AT CARIOLARO MILL/ITALY



Machine width 2500 mm
Speed: 560 m/min.
Sample rolls of paper available

the Cariolaro company changed ownership in 2013 and we needed a place to invite customers to show the performance. mid 2015 pilot units were installed at the paper research institute INNVENTIA, now RISE in Stockholm Sweden.

2 pilot units installed at RISE/Stockholm

use of the standard available width (240 mm).

Different paper grades can be produced and then treated on the units

Stretch on demand can be tuned according to product needs

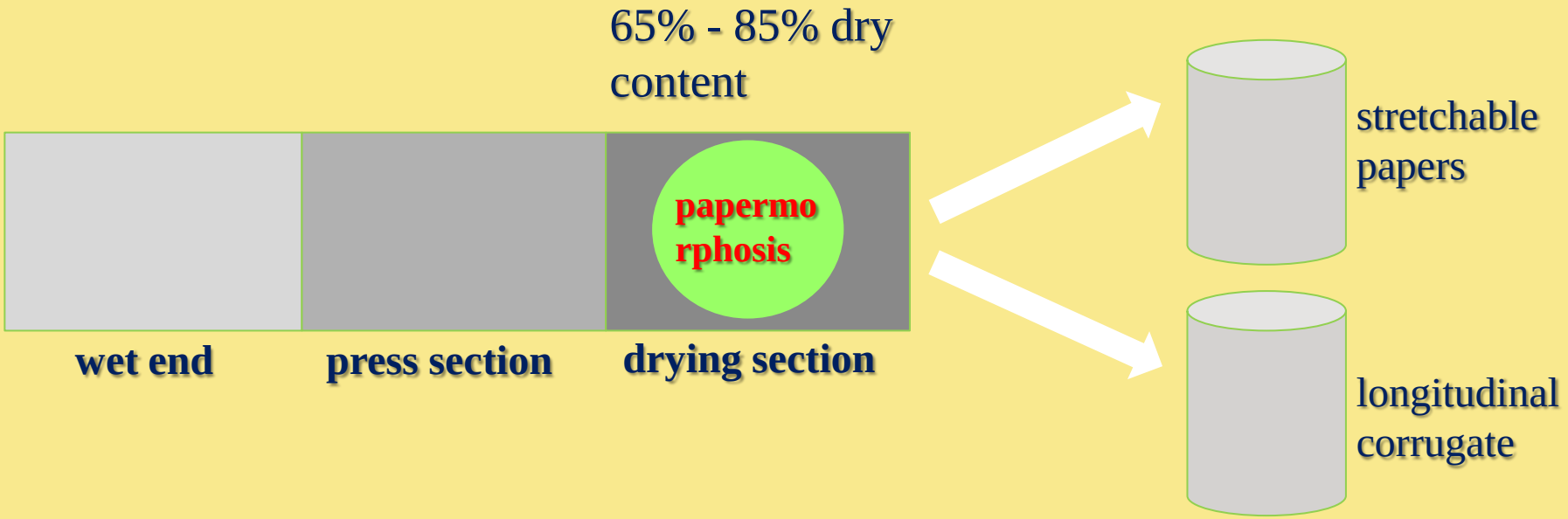
CD – unit

Operated at about 40% dry content

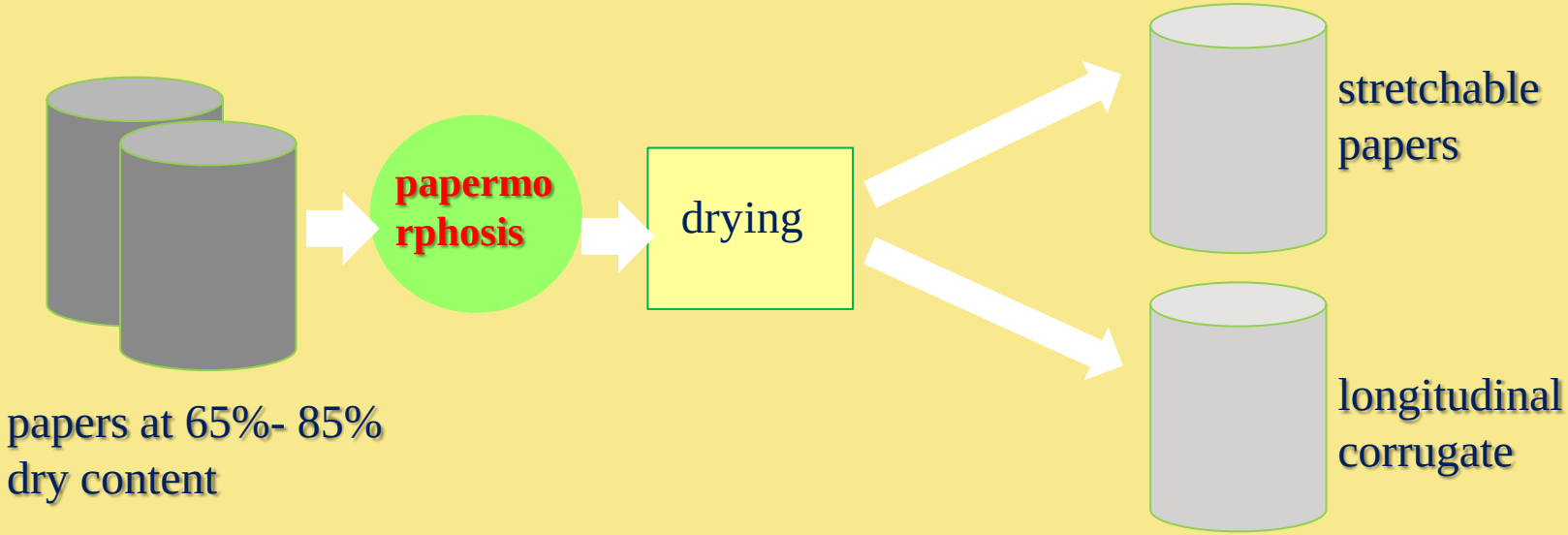
MD – unit

Operated at 65-85% dry content

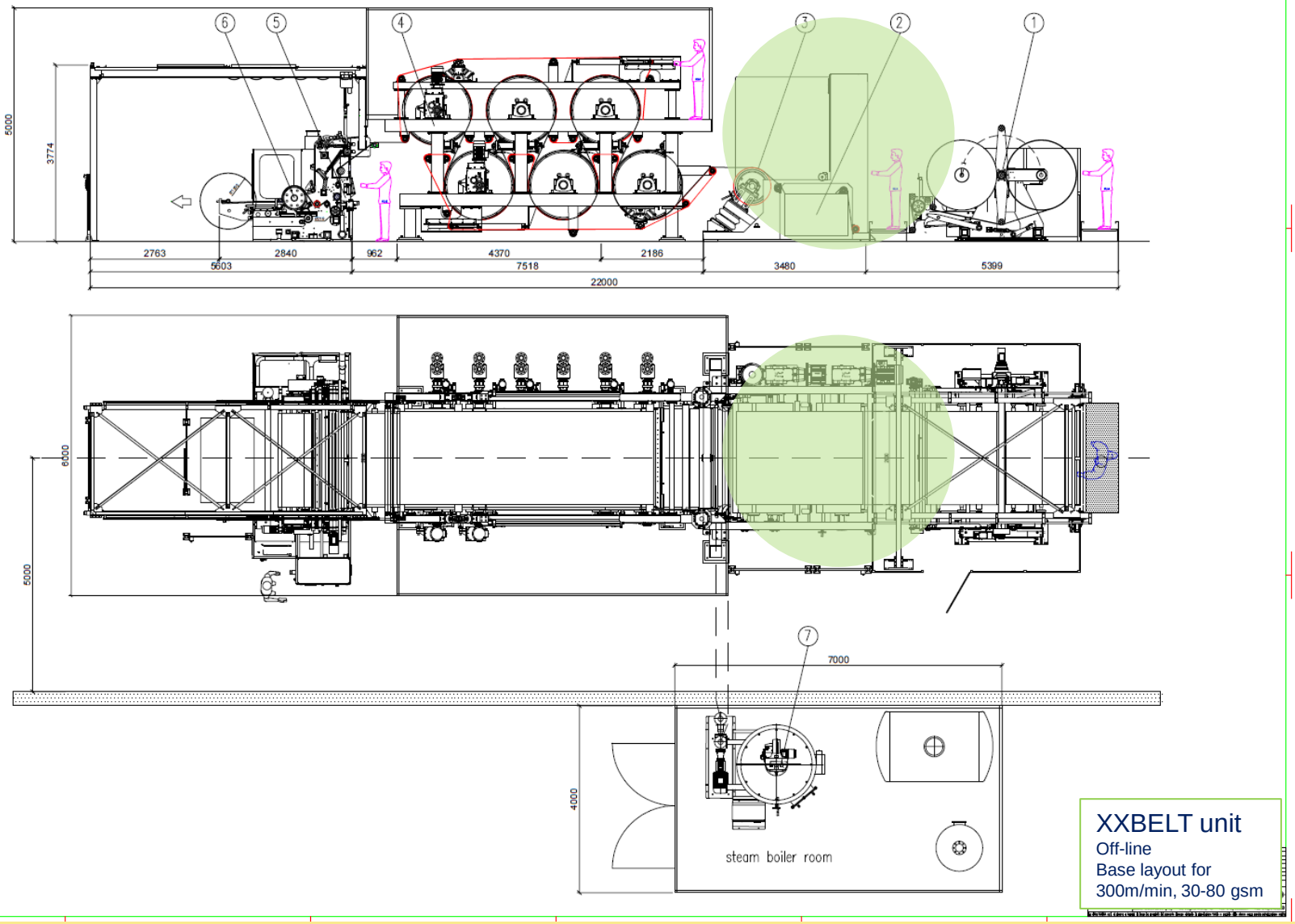
retro fitted in-line a paper machine….



or off-line a paper machine

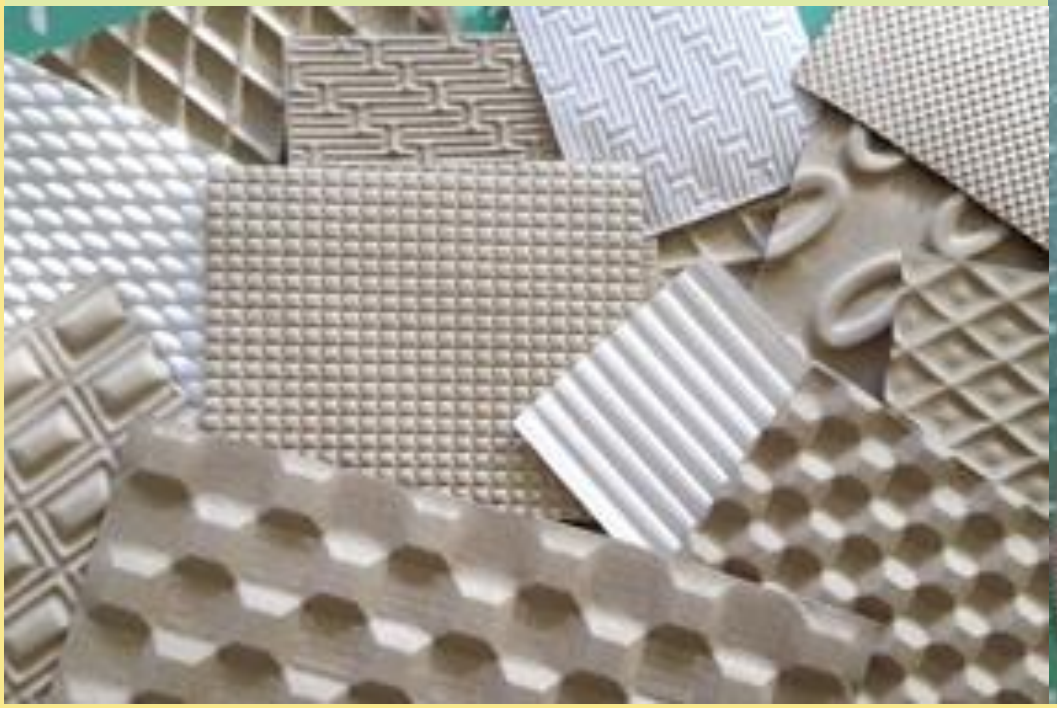


footprint of an off-line unit



stretchable paper and/or WELLIXX

a new way of distancing liners
for stiffness



about ourselves

gruppo x di x gruppo is specialized in stretch in papers,

- patents its proper innovations
- develops them
- licenses patents, know how, technology

thanks for your attention!