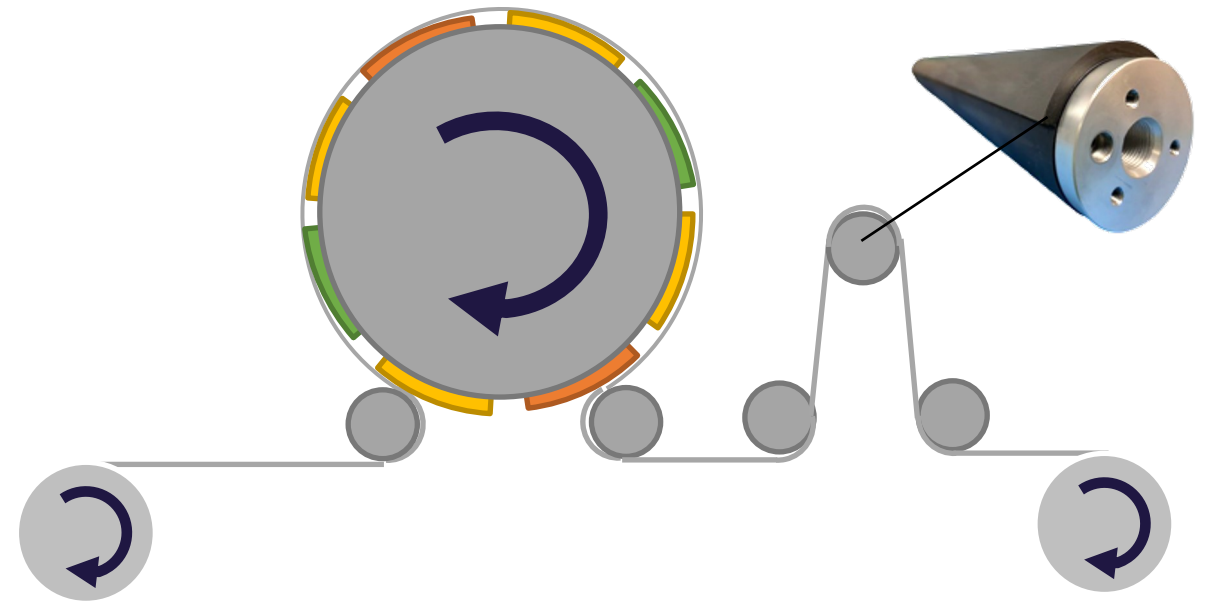
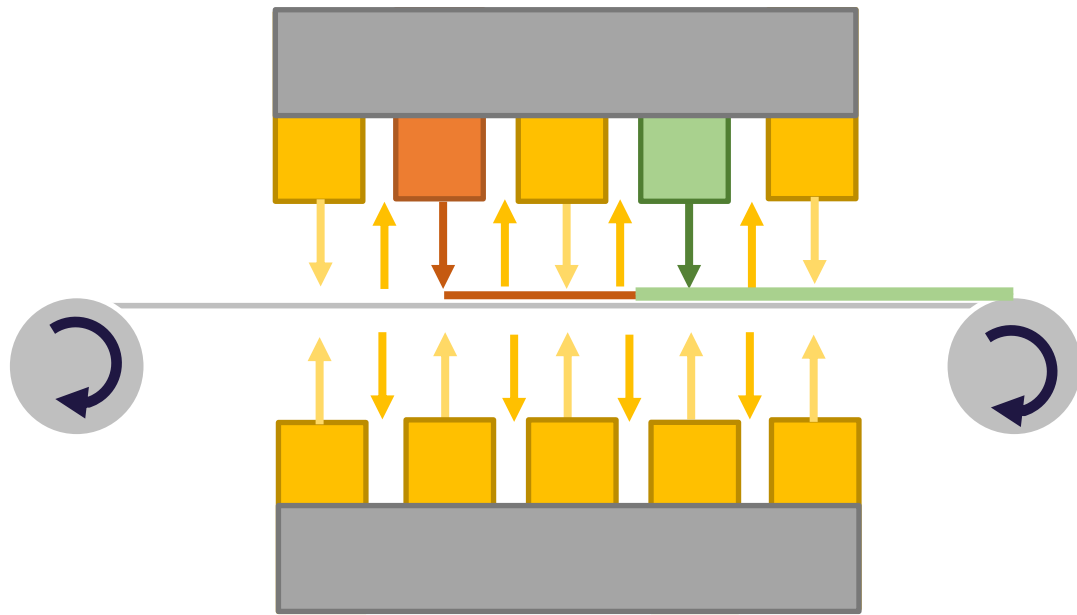


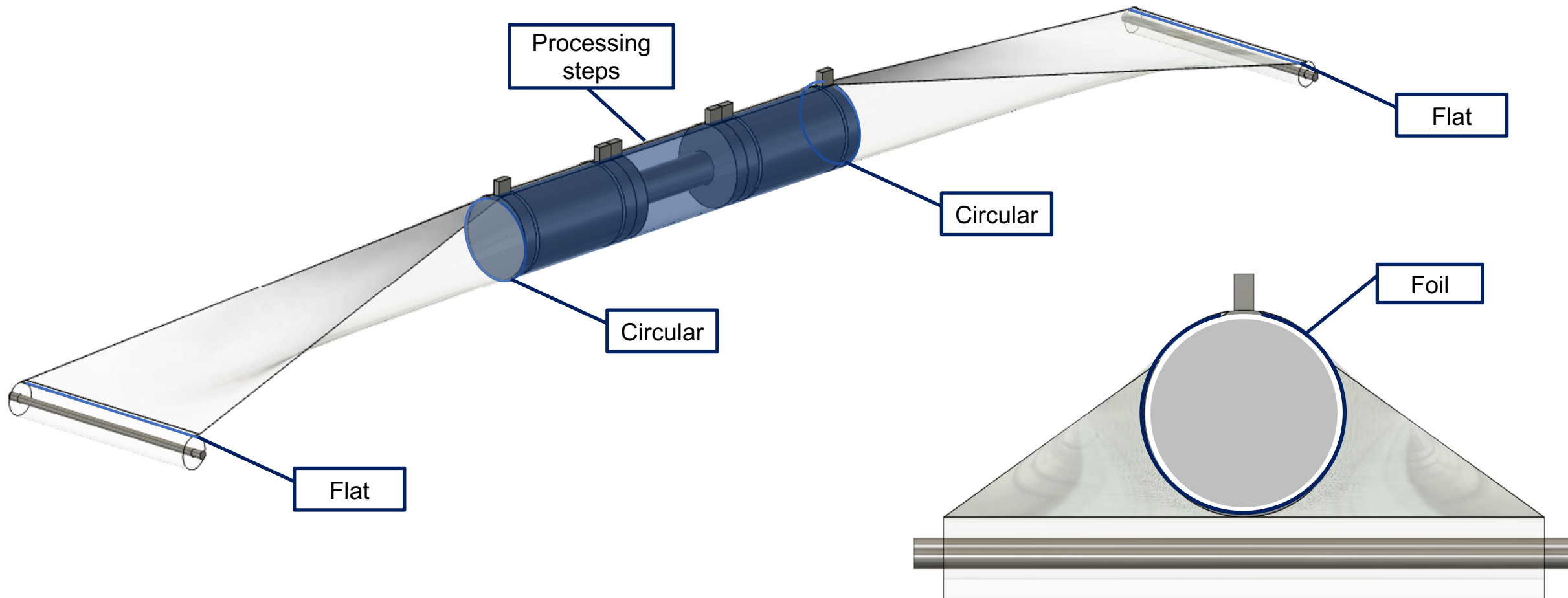


InnoFlex rolls in a different way

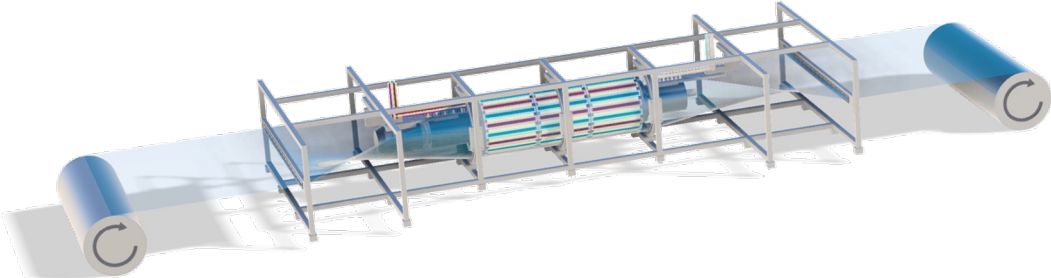
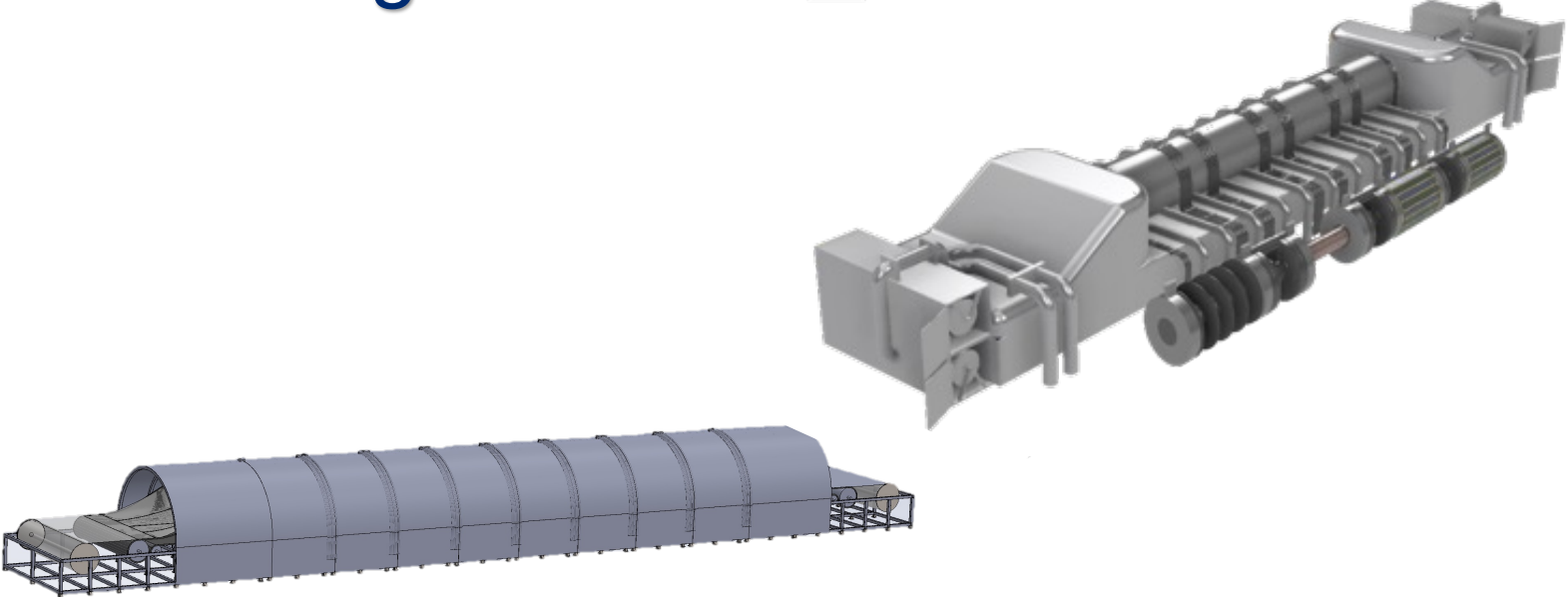
Conventional Roll-to-Roll



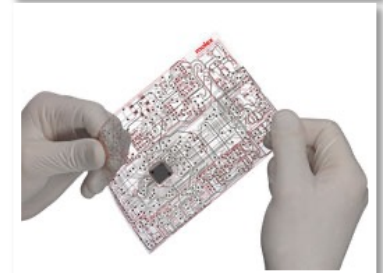
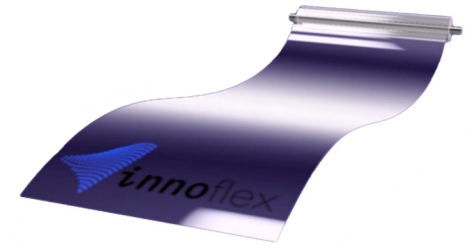
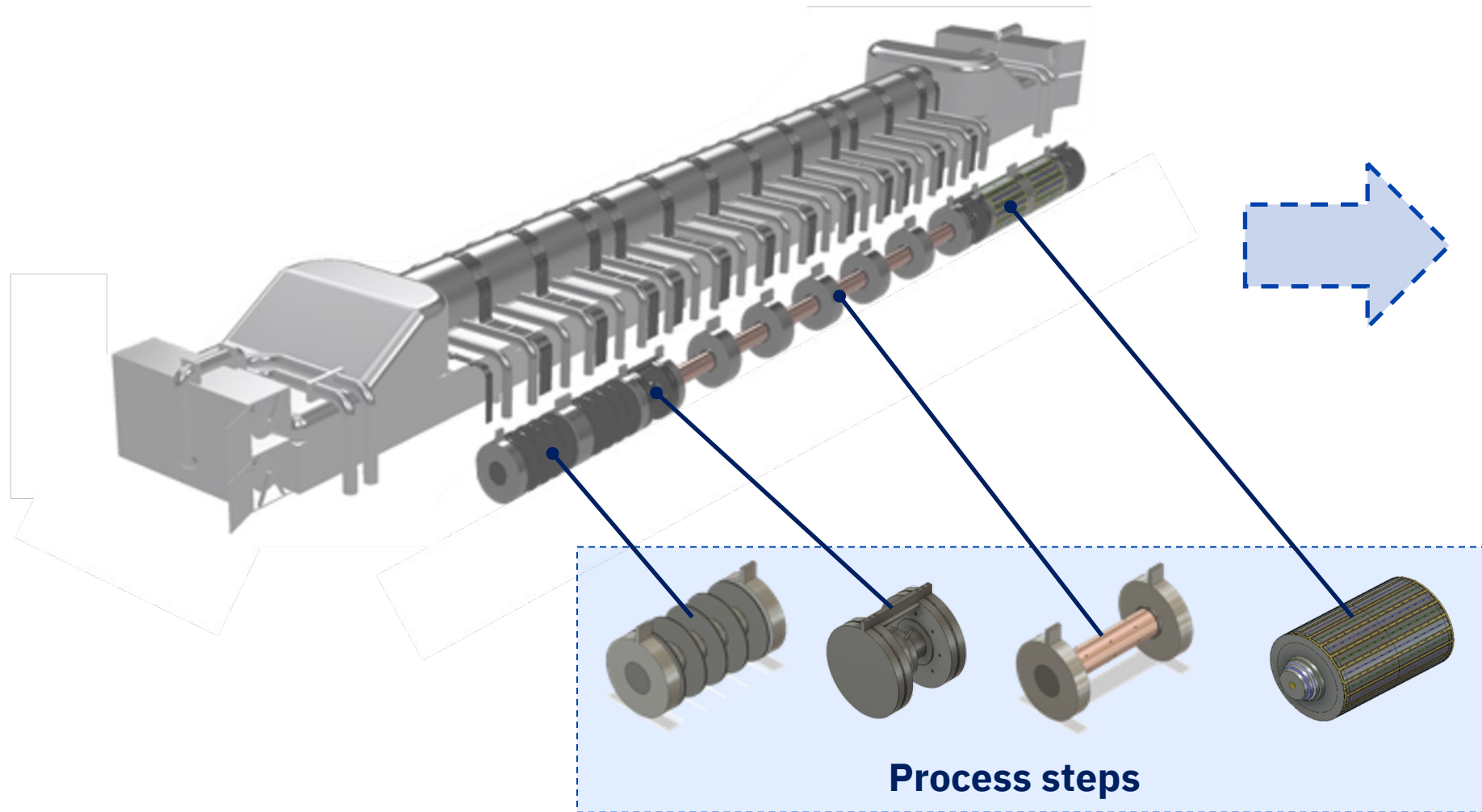
InnoFlex Roll-To-Roll concept



Design iterations



InnoFlex integration platform

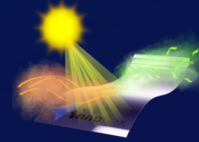




*Creating a healthy world
through nanotechnology*

PolluFix Aero

A foil that degrades air pollution



Each square meter cleans
7.000.000 m³/year*



Self cleaning



Heat reflective layer**

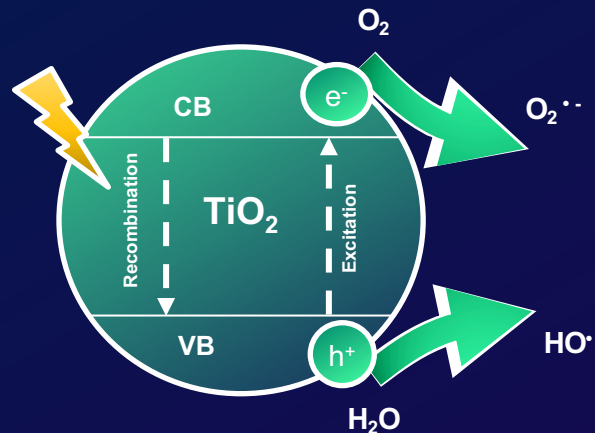


* The foil has an ultra-thin TiO₂ layer, which acts as a photocatalyst and neutralizes pollutants from the air. TiO₂ effectivity has been proven through an ISO test with great results.

** Additional layers like a heat reflective layer, optical layer or scratch resistant layer can be added.

Photocatalytic process

A process that degrades pollution by light energy

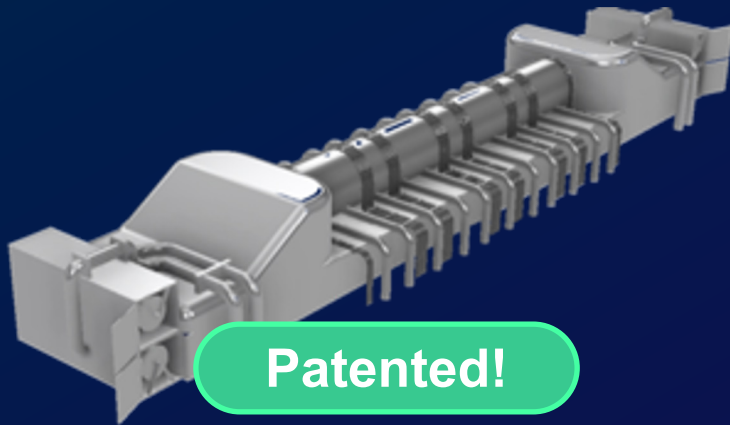


Process that uses semiconductor materials which are similar to materials found in solar cells.

Advanced production processes are required to make efficient photocatalytic products

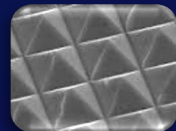
The trick...

For the first time semiconductor technology can be leveraged for very large scale surfaces



Patented!

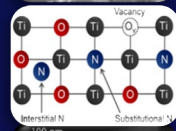
Mass produce and engineer a superior low-cost product



3D surface



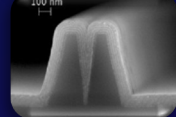
Higher contact per m²



A doped surface



Effective in shadow and indoors

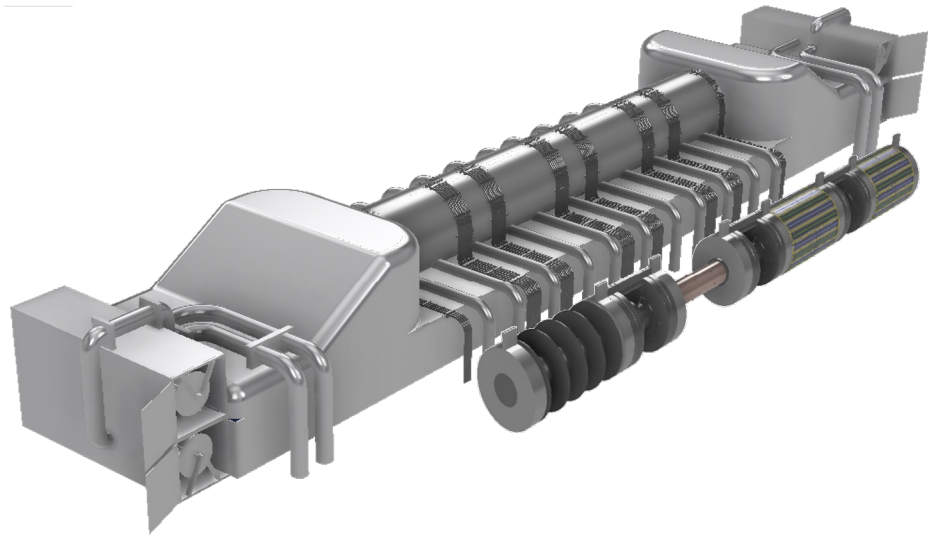


High quality layer

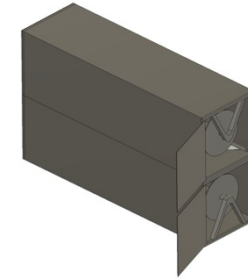


100% use of effective surface

The integration platform overview



Feeding unit



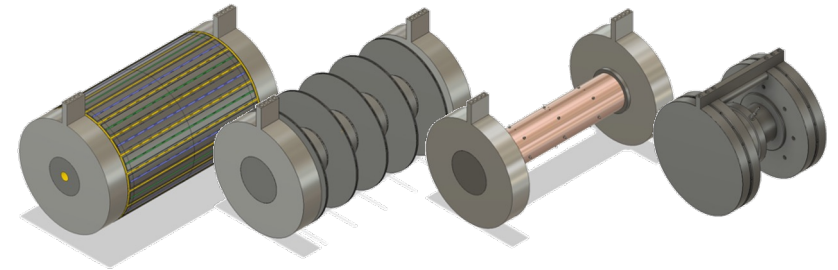
Vacuum chamber



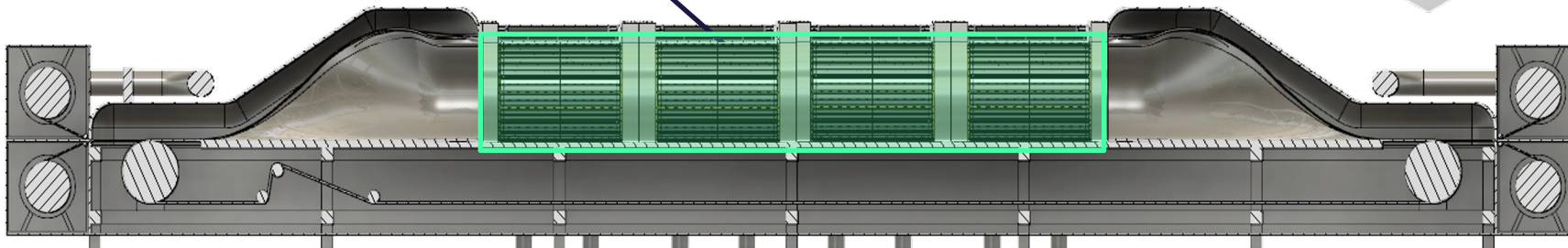
S-ALD Module

Sputtering Module

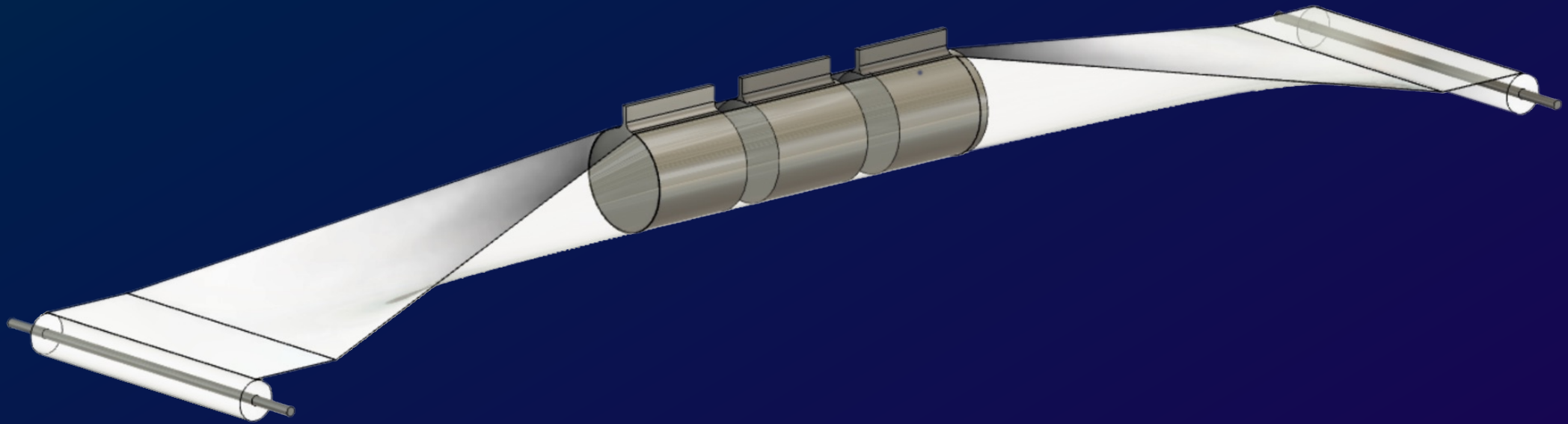
Evaporation Module



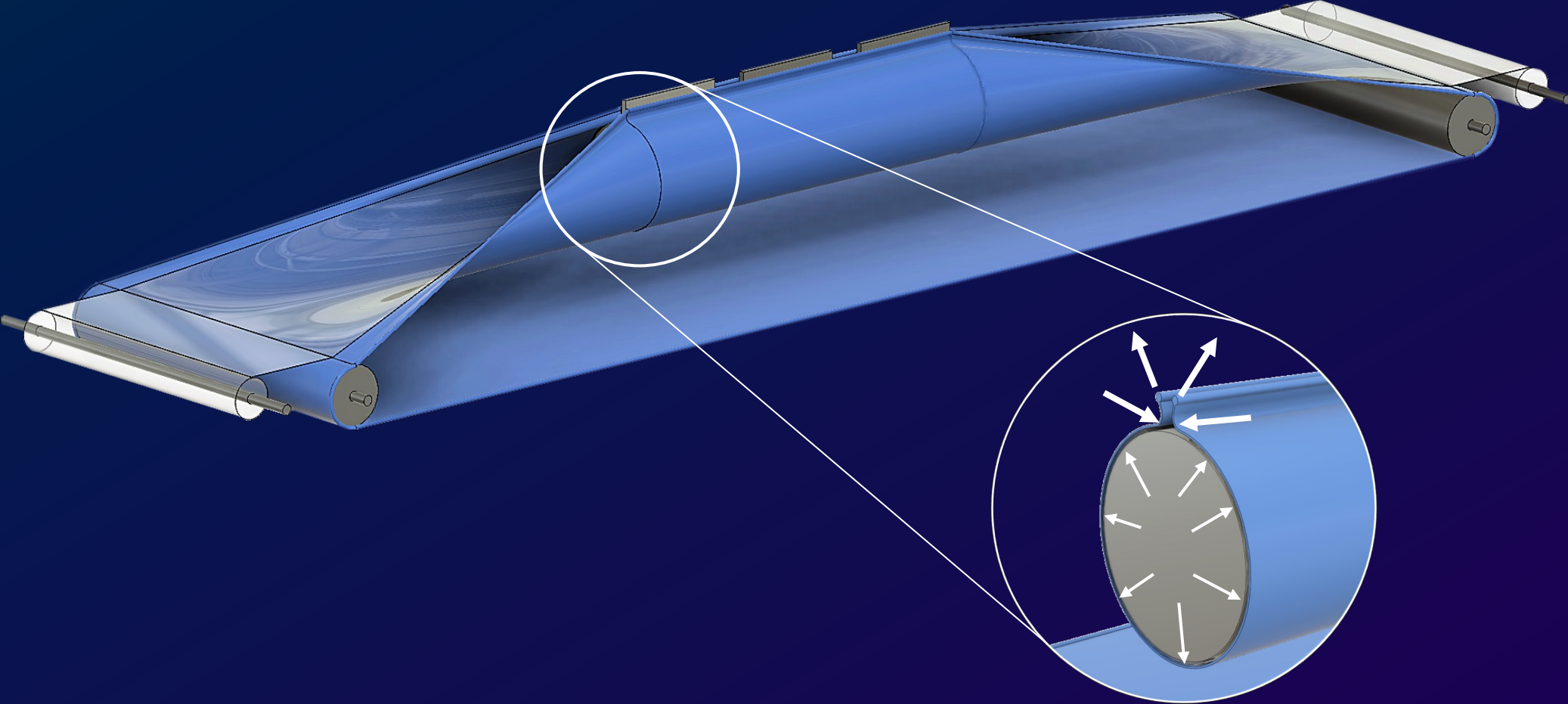
Process environment



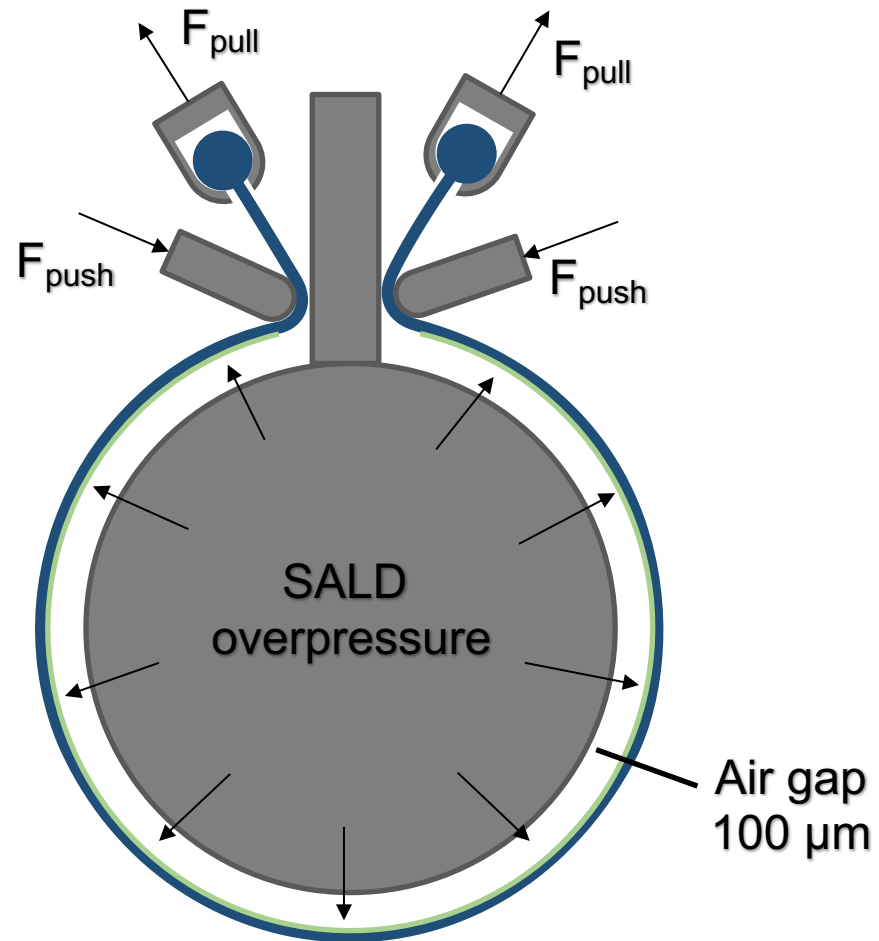
Concept



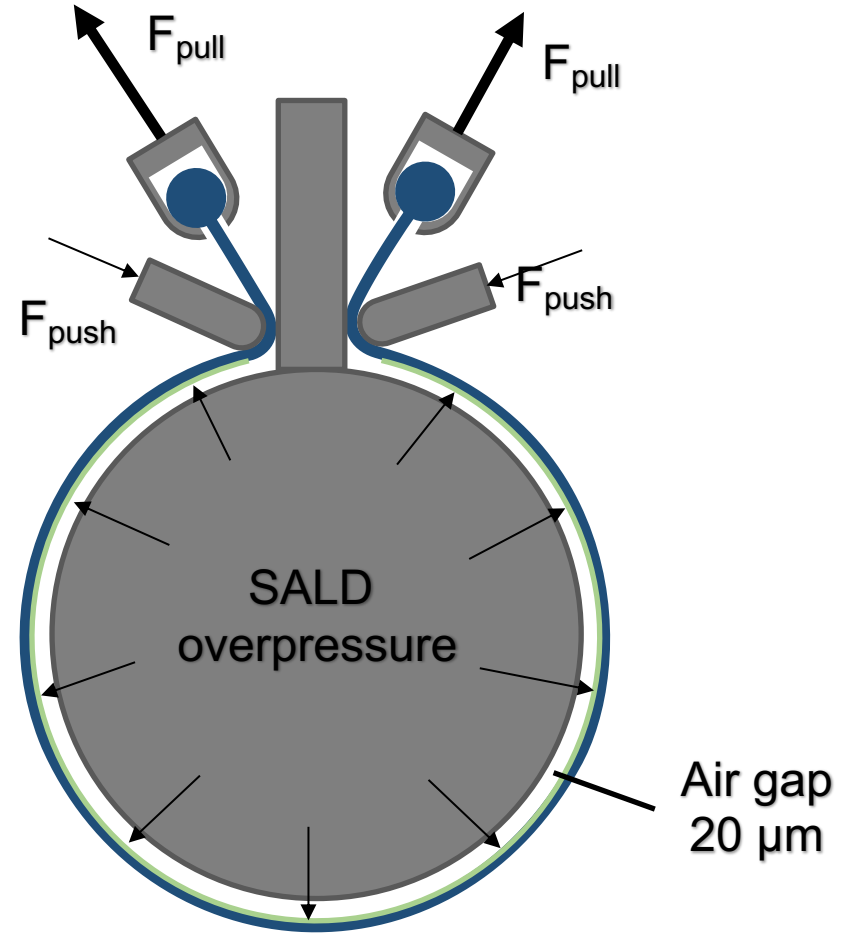
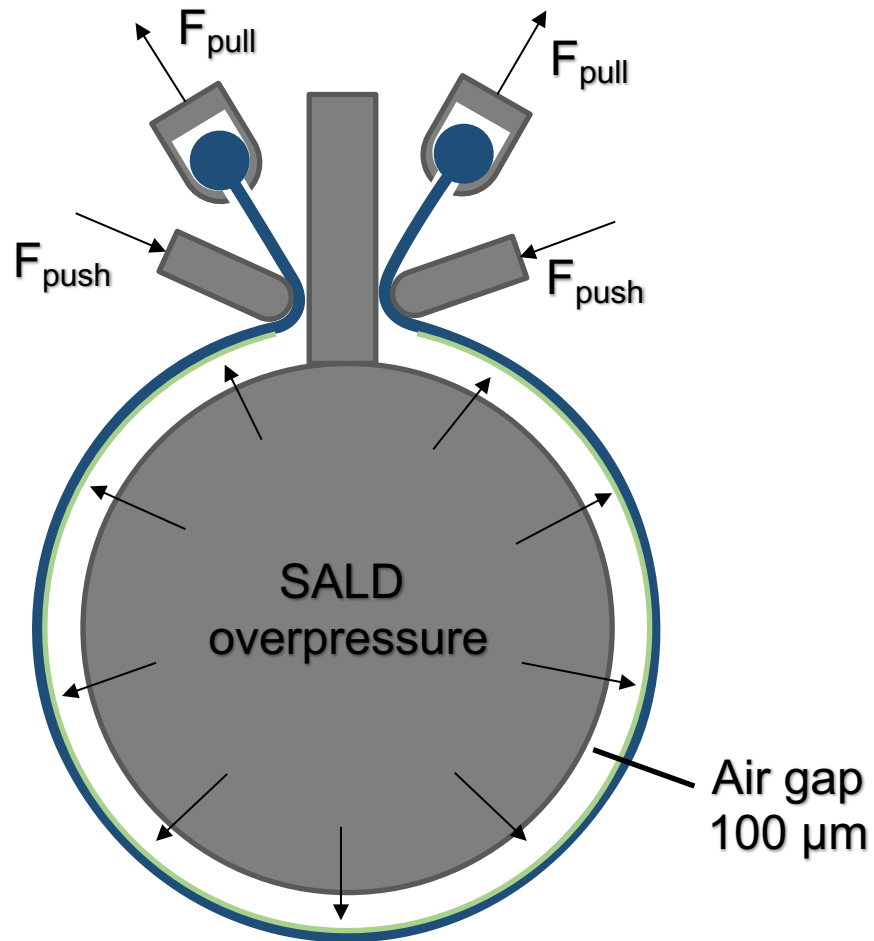
Concept



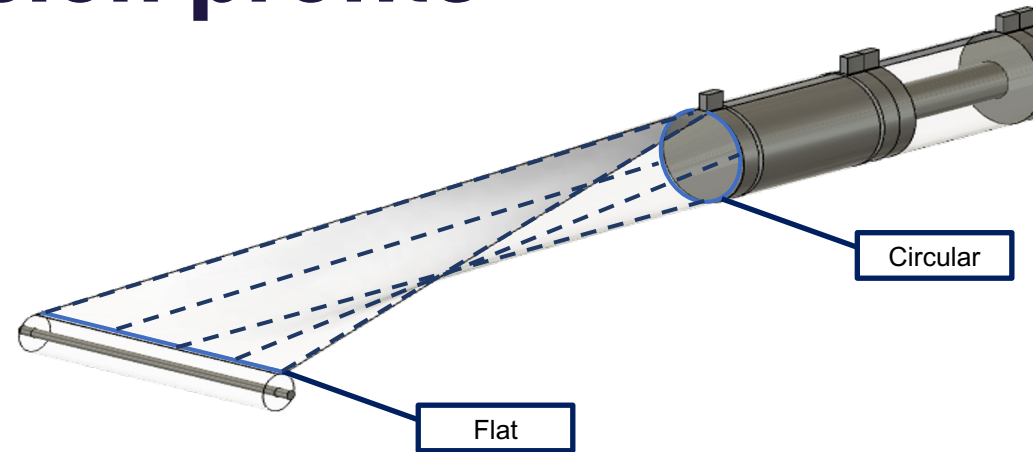
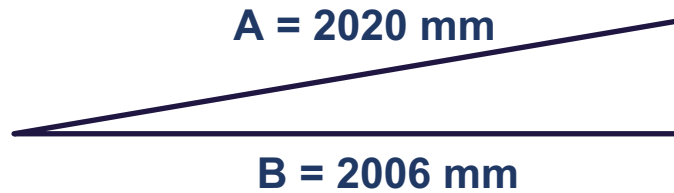
Cross sectional equilibrium



Cross sectional equilibrium



Web tension profile



Max elongation:

$$\varepsilon = \frac{\Delta L}{L} = \frac{14}{2006} = 0,0071$$

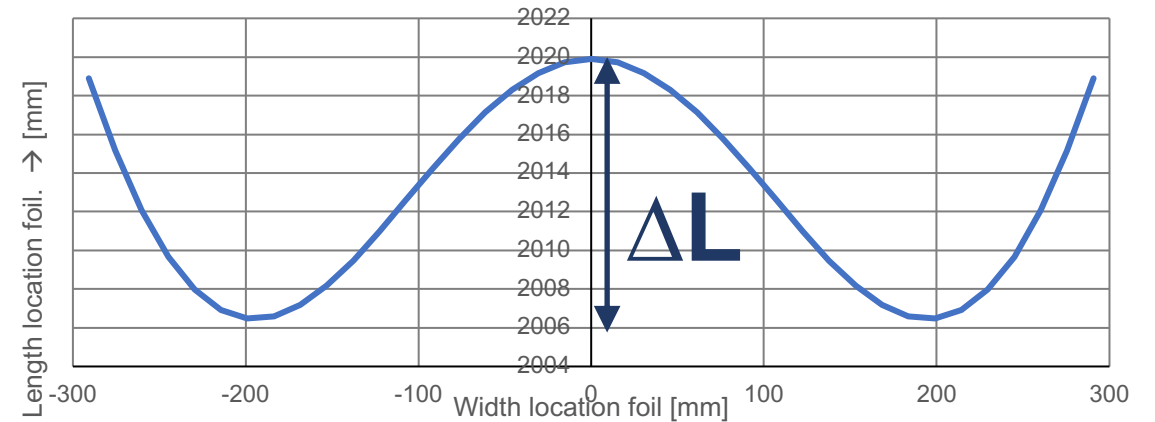
Belt & Substrate requirement:

at 0,085% elongation $\sigma < \sigma_v$

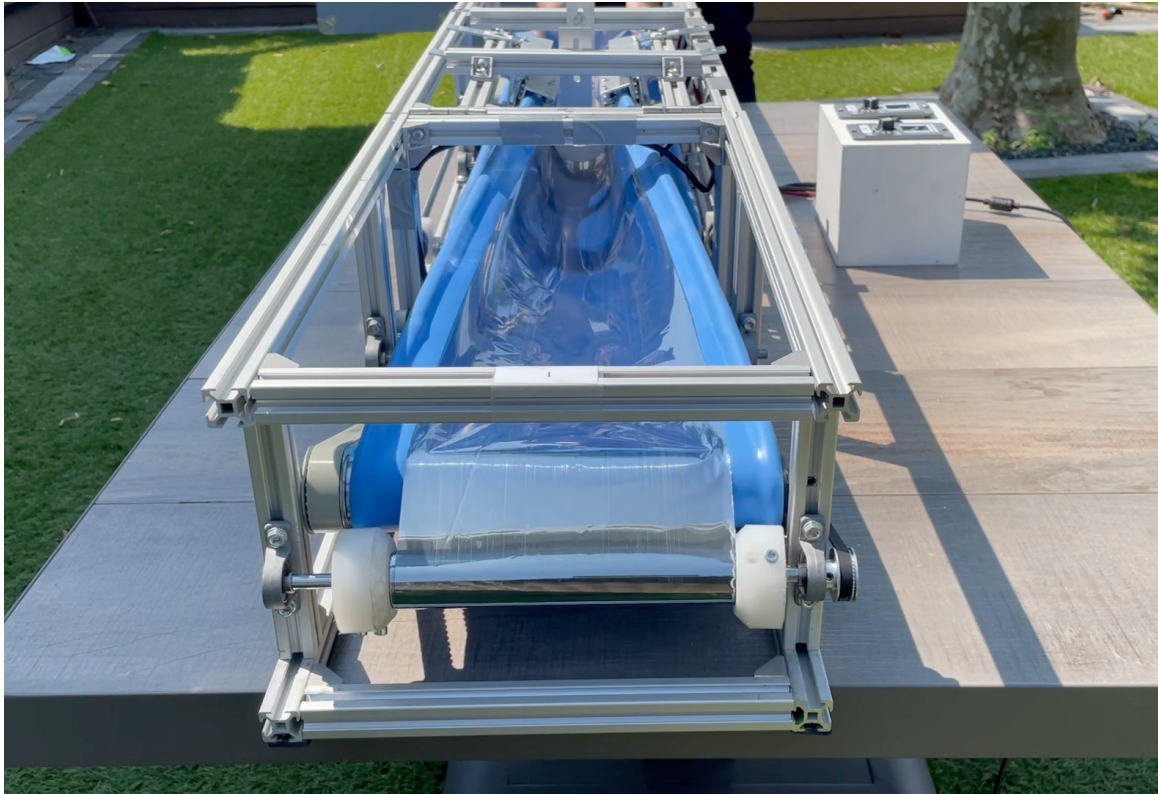
Using $\sigma = E * \varepsilon$ gives:

PTFE:	$\sigma_{PTFE} = 0,4 * 10^3 * 0,0071 = 2,8 \text{ MPa}$
Polyethylene	$\sigma_{PE} = 0,8 * 10^3 * 0,0071 = 5,6 \text{ MPa}$
PET	$\sigma_{PET} = 2,3 * 10^3 * 0,0071 = 16,3 \text{ MPa}$
Glass:	$\sigma_{Glass} = 80 * 10^3 * 0,0071 = 568 \text{ MPa}$
Aluminum	$\sigma_{AL} = 70 * 10^3 * 0,0071 = 497 \text{ MPa}$
SST	$\sigma_{SST} = 200 * 10^3 * 0,0071 = 1420 \text{ MPa}$

Flat to circular ΔL

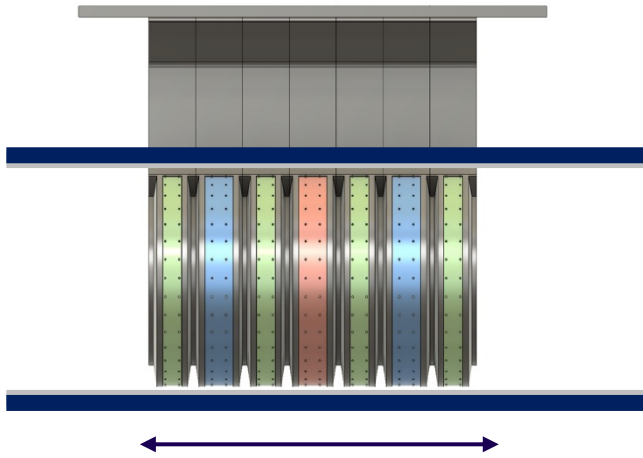


Mechanical mockup

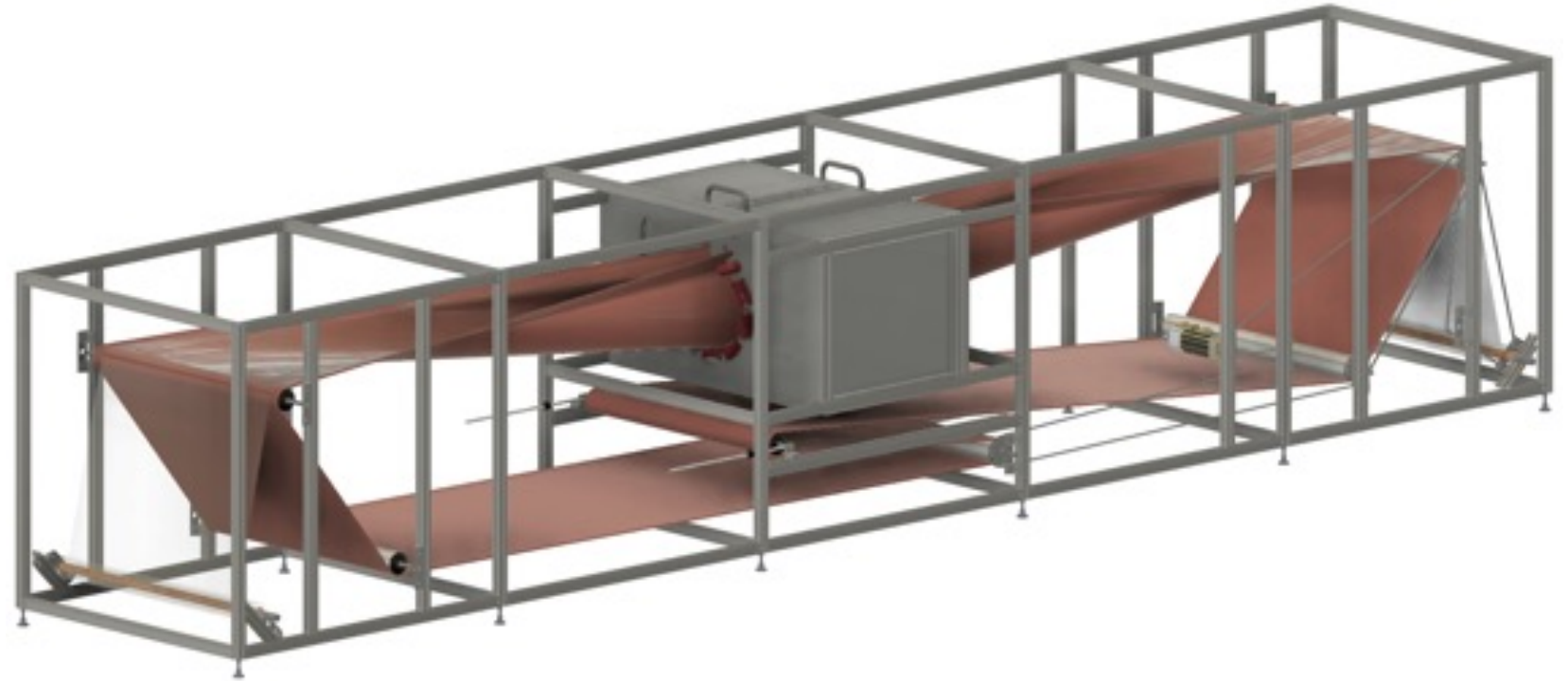


End 2022 - Demonstrator

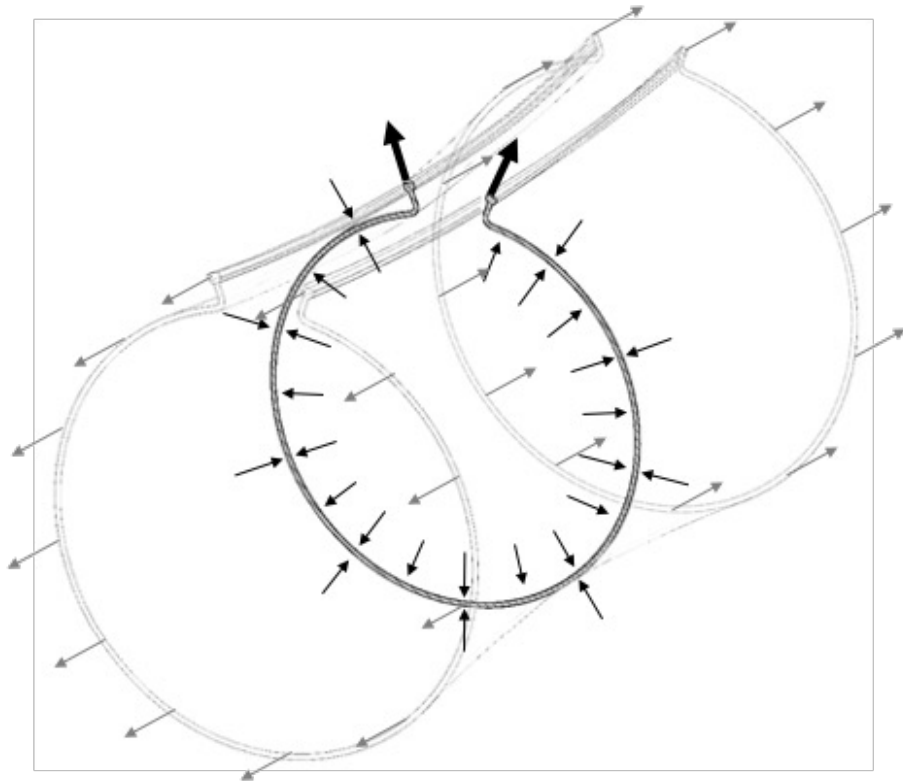
Stationary S-ALD head



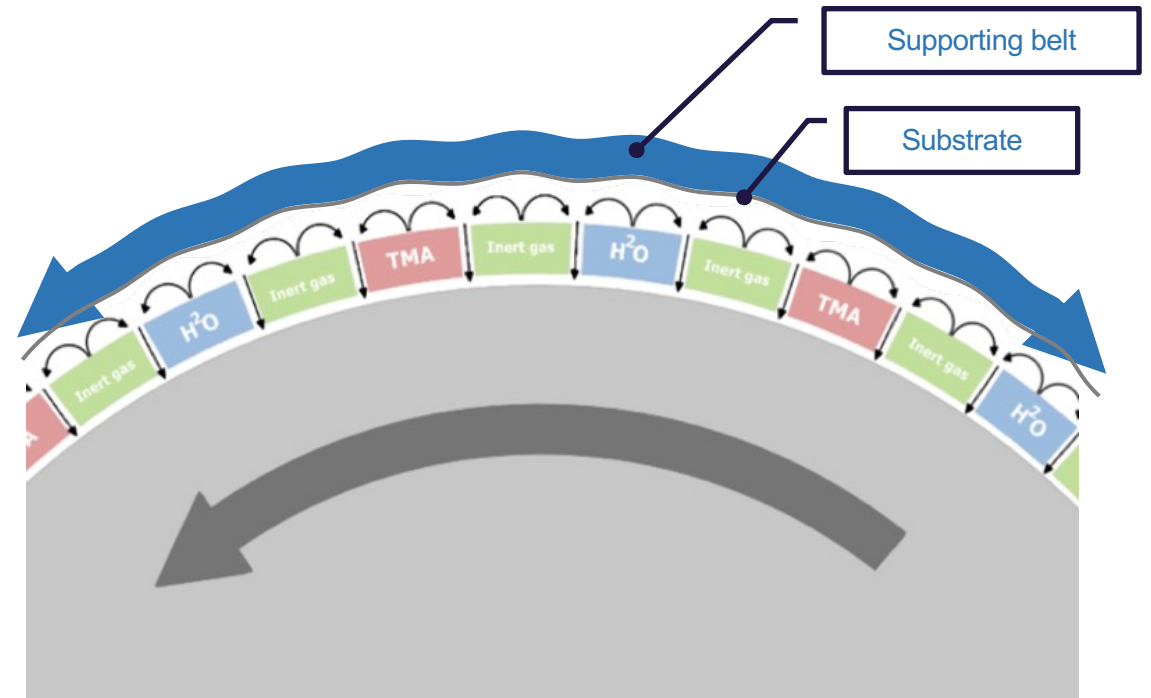
60 cm wide foils



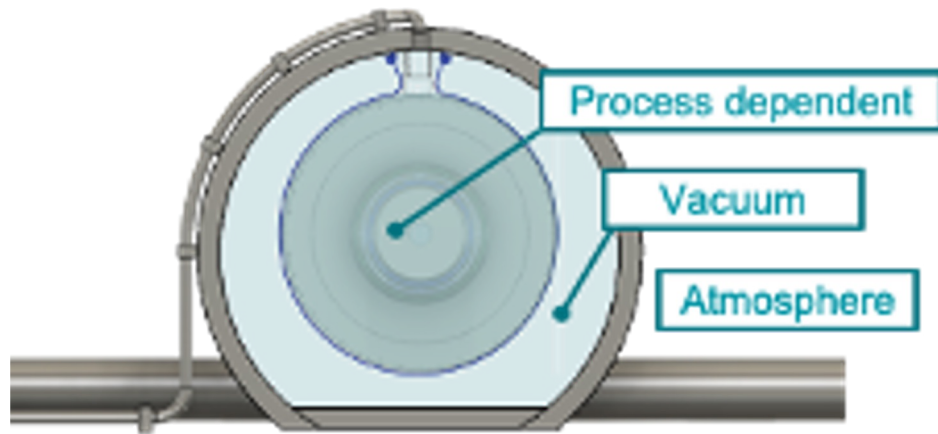
Apply tension
both directions



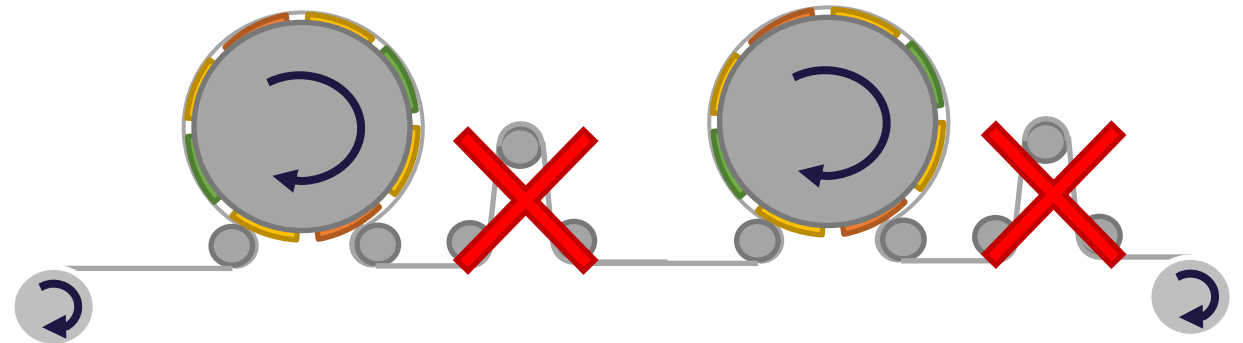
Smaller air gap
deviation



Separation of process environment

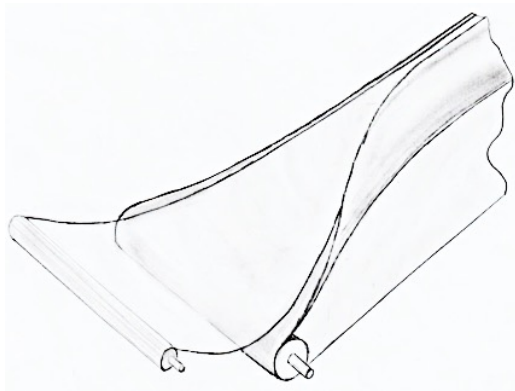


No handling

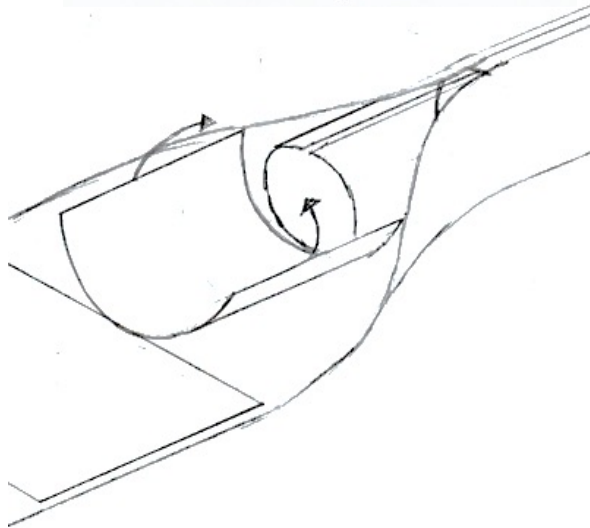


Other substrates

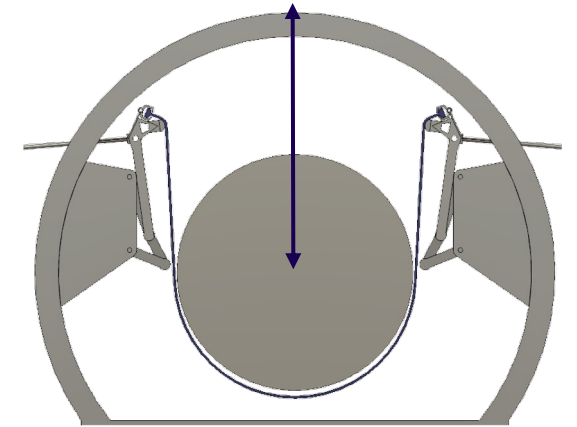
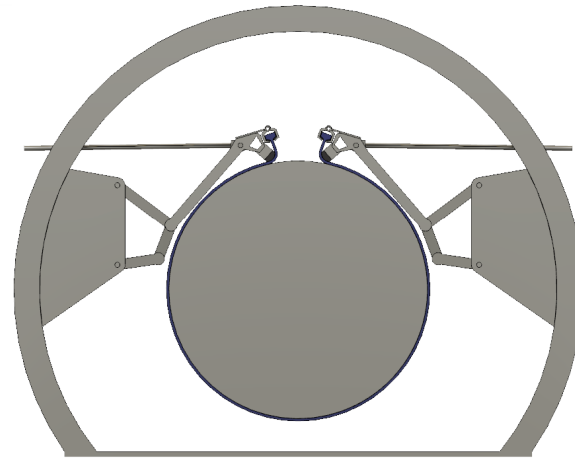
Roll-to-Roll



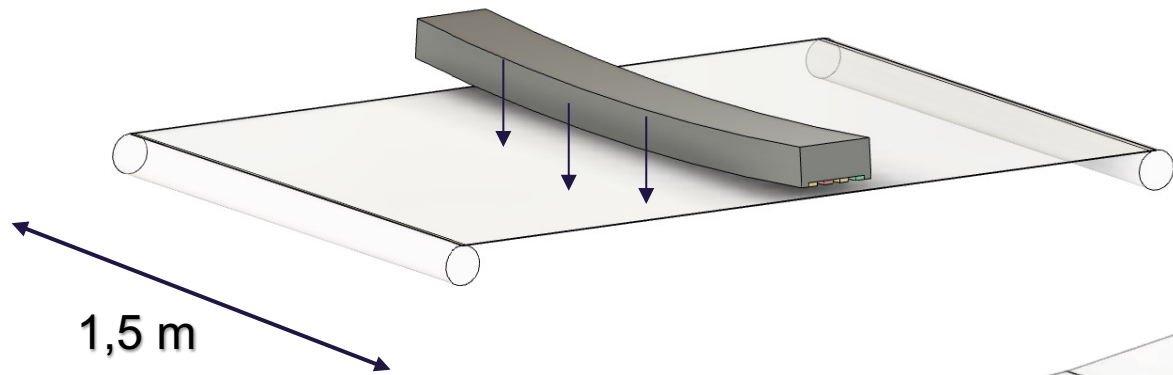
Sheet-to-sheet



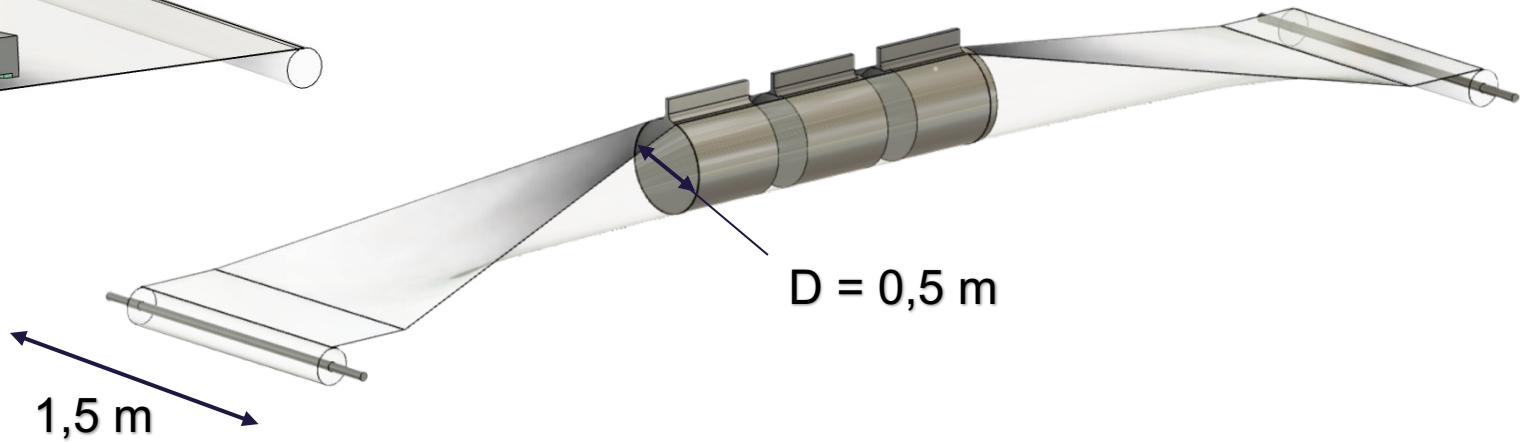
Fast replacing of deposition units



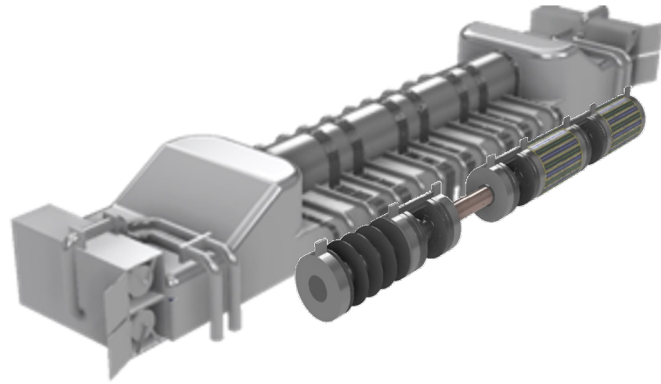
**No displacement
due to gravity**



**Smaller deposition
unit for foil size**

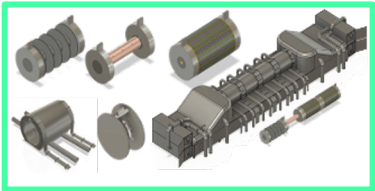


InnoFlex System overview

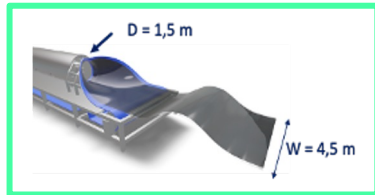


More features

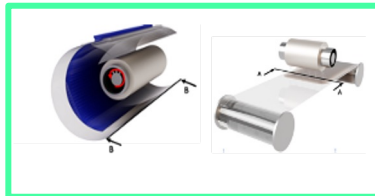
Modular



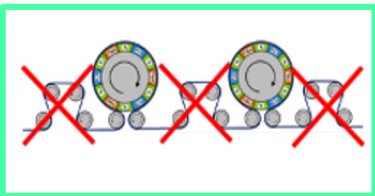
Large substrate sizes



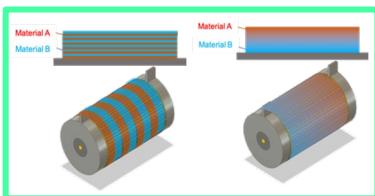
Better Layer uniformity



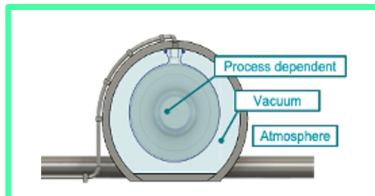
No handling



Transition layers, nanolaminates



No cleanroom



Lower cost

~ 40% Lower equipment cost

- No cleanroom
- Fewer high precision parts
- No handling equipment

~ 25 % Lower processing cost

- Less nitrogen use
- Higher yield

Etc.



InnoFlex rolls in a different way

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