

▼ Journée Eau & Céramique
27 JUIN 2023, Lycée Martin Malvy

Les membranes céramiques oxydes pour la gestion de l'eau

ALSYS
HEADING FOR THE FUTURE



ALSYS



In a nutshell

5 entities

40 M€

2022 TURNOVER

150

PEOPLE

14 countries

PRESENCE IN

3

PRODUCTION SITES

20% invested

IN R&D EACH YEAR

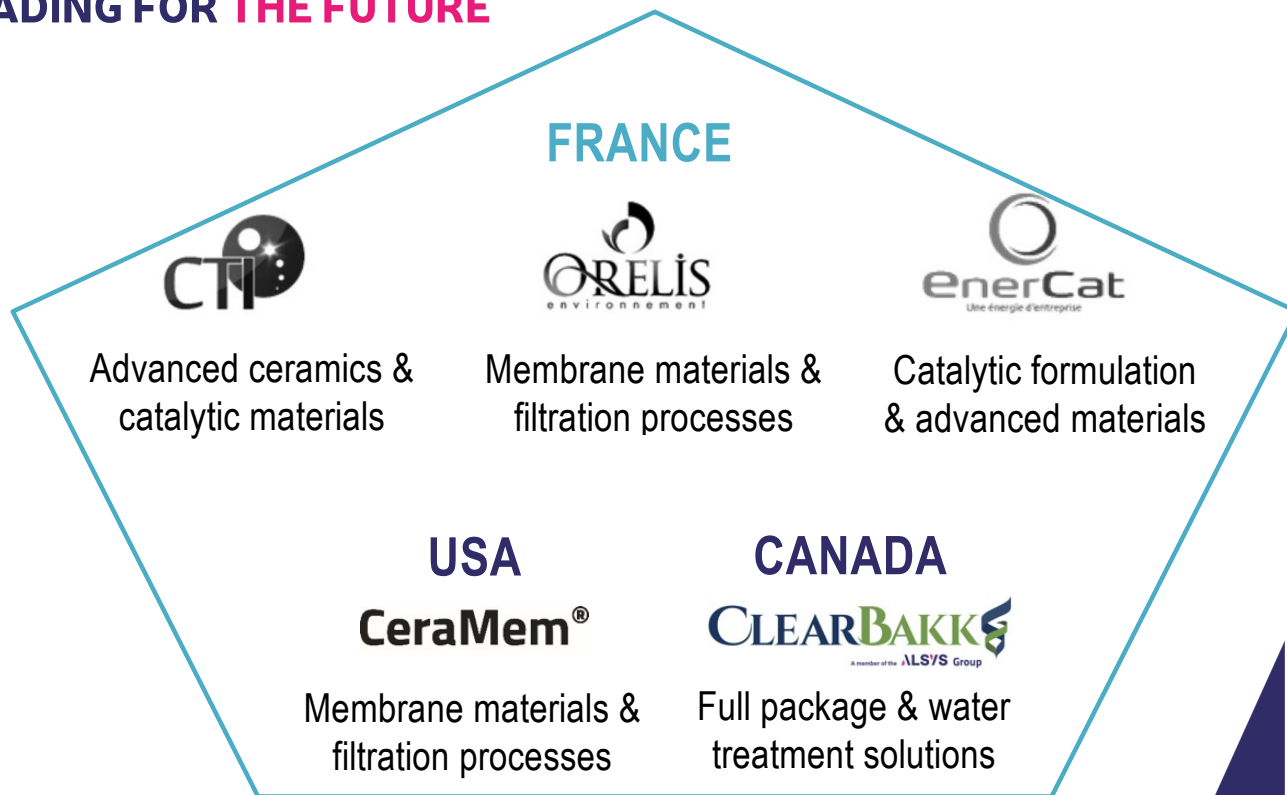
A group of **specialty products & services**

Experts in **filtration & catalysis technologies**

Focus on **sustainable innovation & growth**

ALSYS

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Highly involved in water treatment





3 Business Units – 5 Strategic markets



Water

Industrial or Urban waste water...



Oil & Gas

Upstream: Produced water, oil sand tailings...
Downstream: Refineries, alternative fuels ...



Chemicals

Fermentation-based intermediates,
agrochemicals, molten metals



Feed & Food

Fermentation-based ingredients,
beverage, antimicrobial solutions...



Gas emission control

Industrial emission, waste incineration...

Market trends

INDUSTRIAL PERFORMANCE

DEMOGRAPHIC INCREASE

SUSTAINABILITY

ENVIRONMENTAL REGULATIONS

WATER RESOURCE SCARCITY



Liquid & Membrane



Gas & Catalysis



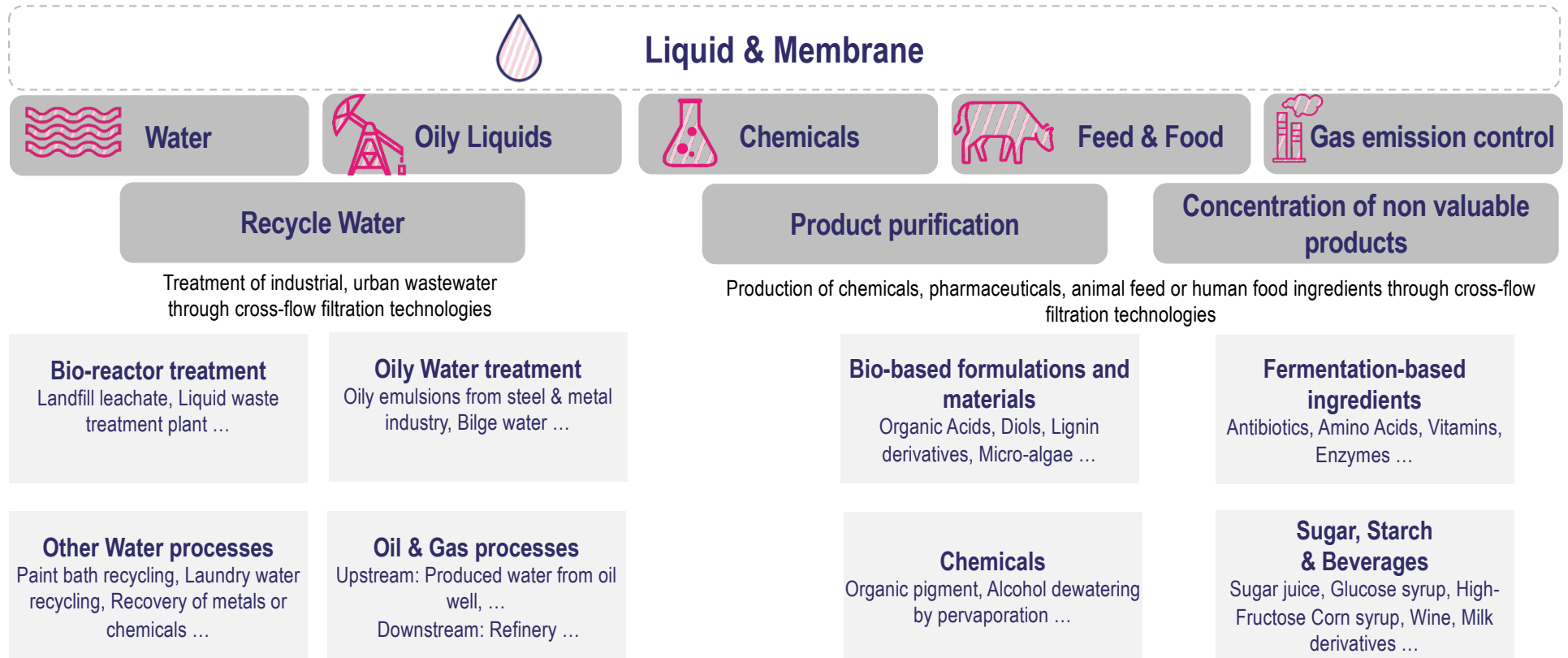
Specialty Materials





Liquid & Membrane Business Unit

Key membrane markets



A wide range of added-value products

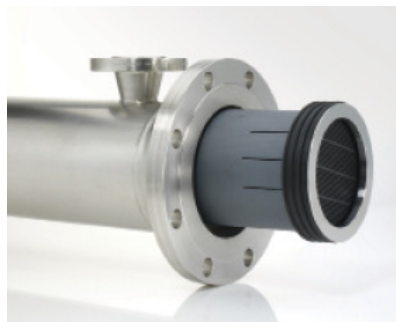


Liquid & Membrane

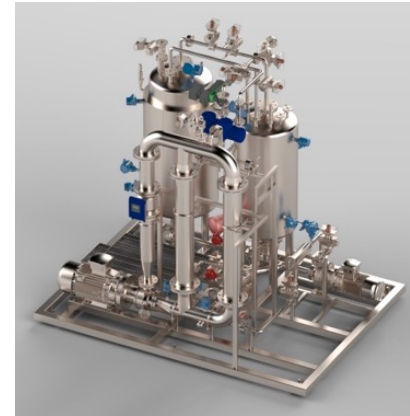
- Ceramic membranes: KLEANSEP™, CERAMEM®
- Polymeric membranes: PLEIADE®
- Filtration skids systems: KLEANSEP™, CERAMEM®
- Waste-water treatment plants: CLEARBAKK
- Polymer makedown / injection plants: CLEARBAKK



Membranes



Filter housings



Filtration skids



Waste water treatment plant

Ceramic membranes Products line

	Channels diameter (mm)	Membrane area (m ²)	Ceramic tube length (mm)	External diameter (mm)	Number of channels	Code
	6	0,16	1178 ± 0,5 mm	25 ± 0,5 mm	7	BX
	5	0,2	1178 ± 0,5 mm	25 ± 0,5 mm	8	BE
	4,5	0,2	1178 ± 0,5 mm	25 ± 0,5 mm	12	BD
	3,5	0,25	1178 ± 0,5 mm	25 ± 0,5 mm	19	BW
	2,8	0,34	1178 ± 0,5 mm	25 ± 0,5 mm	31	BH
	2,2	0,5	1178 ± 0,5 mm	25 ± 0,5 mm	55	BC
	2	0,45	1178 ± 0,5 mm	25 ± 0,5 mm	61	BS

Mechanical and chemical resistance

Maximum TransMembrane Pressure:	10 bar
Bursting pressure:	80 bar
pH range:	0 to 14
Unaffected by solvents:	yes

Thermal and chemical resistance

Maximum Temperature :	Up to 150°C
Sterilization :	121°C
Sterilization by oxidizing agents :	yes

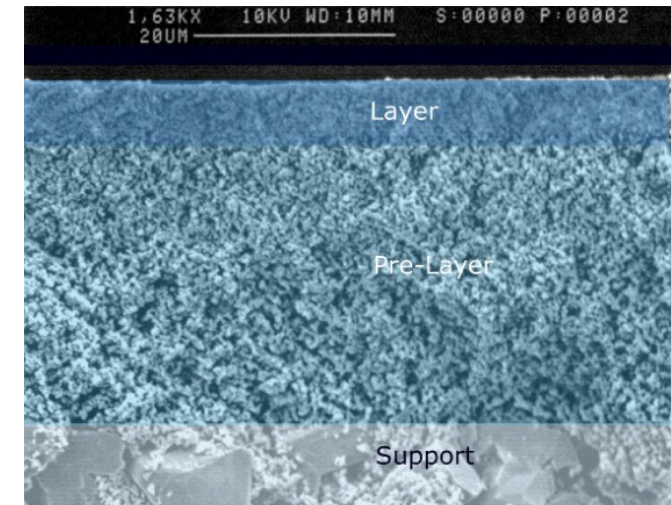
Ceramic support material

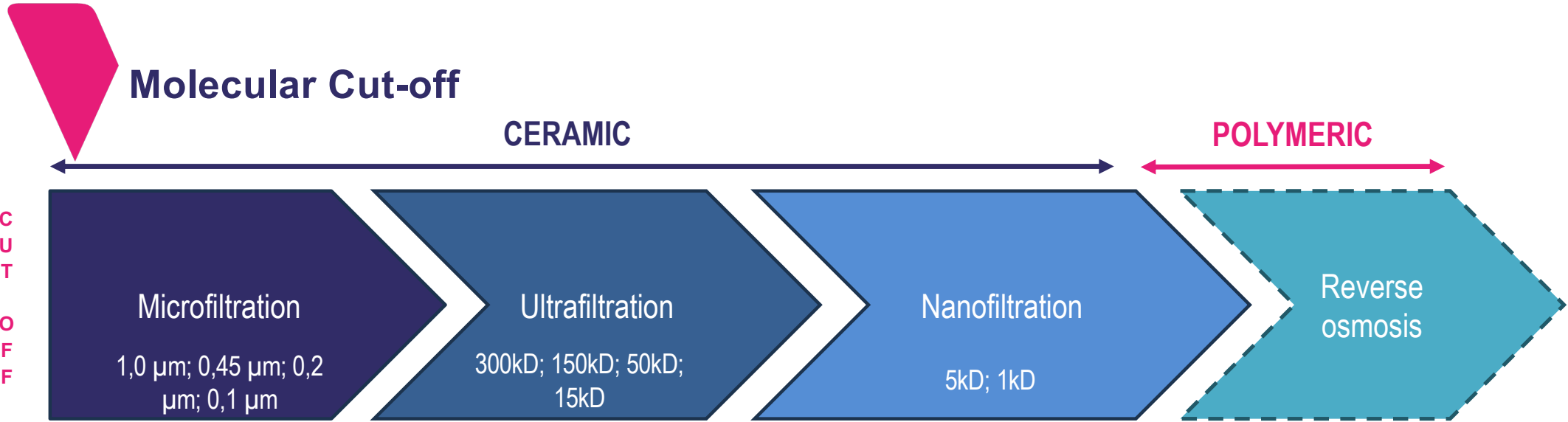
TiO₂-Al₂O₃



Ceramic membrane material

TiO₂-ZrO₂





Pore size

> 0,1 μm

0,1 – 0,01 μm

0,01 – 0,001 μm

< 0,001 μm

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- Bacteria
- Virus
- Solid suspension

- Protein**
- Starch**
- Antibiotic**
- Virus**
- Colloidal silica
- Gelatin
- Organics
- Bacteria
- Dye**
- Fat**
- Solid paints

- Starch
- Sugar**
- Pesticides**
- Herbicides**
- Divalent ions
- Organic
- Detergent
- Metal
- Dye

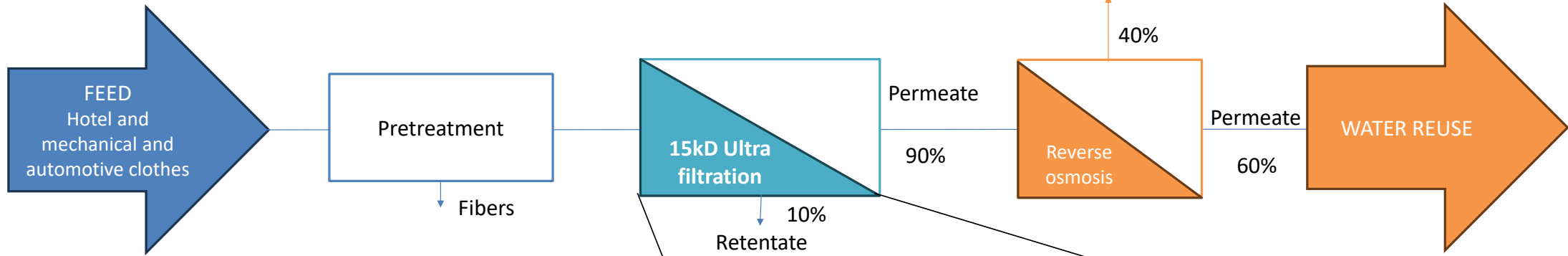
- Metallic ions
- Acids
- Sugar
- Salts
- Dye
- Natural resin
- Ions**





Laundry water recycling

Goal: Decrease DCO, turbidity, hydrocarbons to feed reverse osmosis

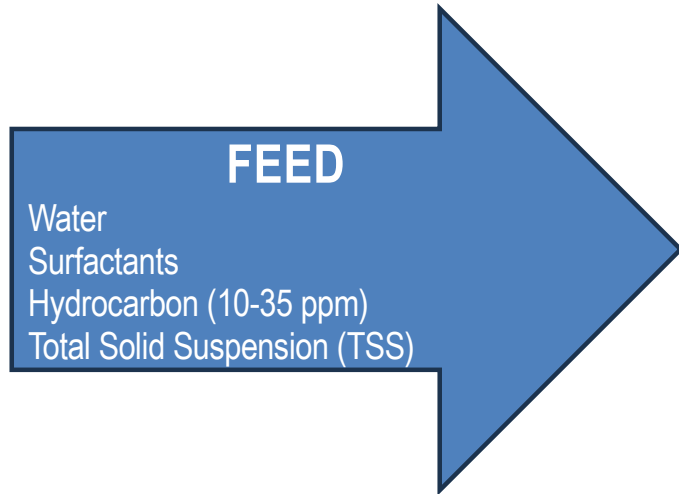


Process	4 modules 99 memb.	Permeate flow rate	15 m ³ /h
Membrane	15kD, 55cx	Concentration factor (FCV)	10
Washing Procedure	NaOH/week	Lifetime	5 years

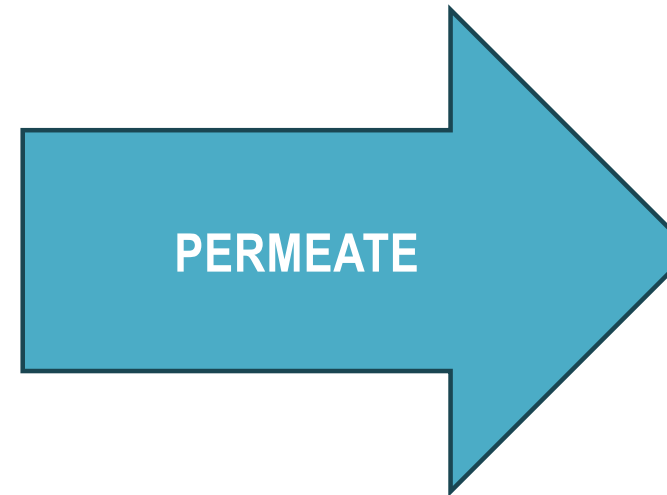




Water quality



GOAL
 [Hydrocarbon] < 1 ppm
 TSS=0 mg/L
 COD as low as possible



	Unit	Feed	Retentate UF FCV10	Permeate UF FCV10
COD	mg/l	1400	7000	330*
TSS	mg/l	140	1500	0
Dry Matter	mg/l	1000	3800	640
Hydrocarbon C10-C40	mg/l	31	130	0,4

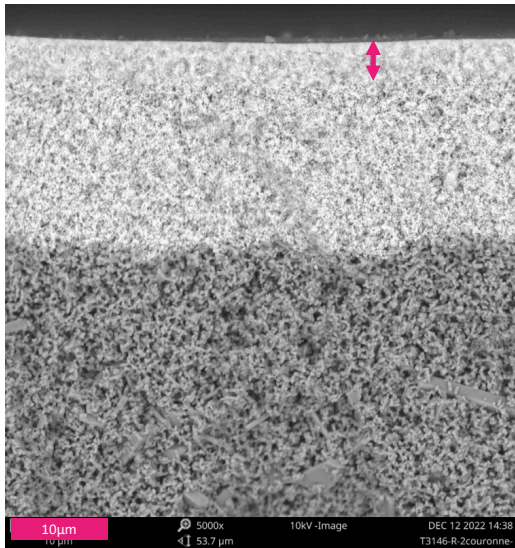
77% reduction COD
 100% reduction TSS
 99% reduction C10-C40





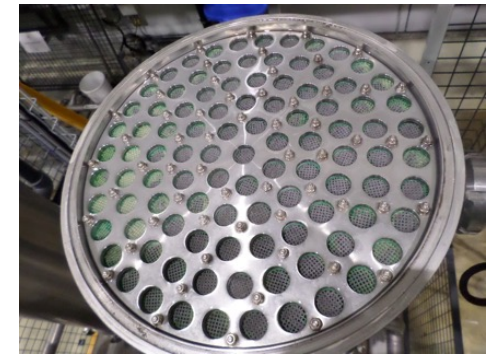
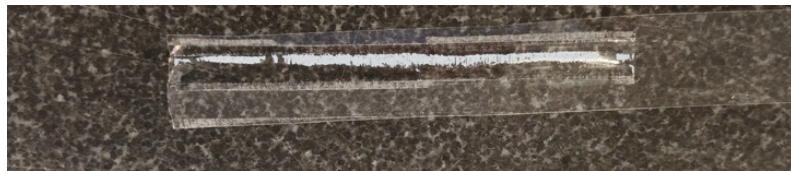
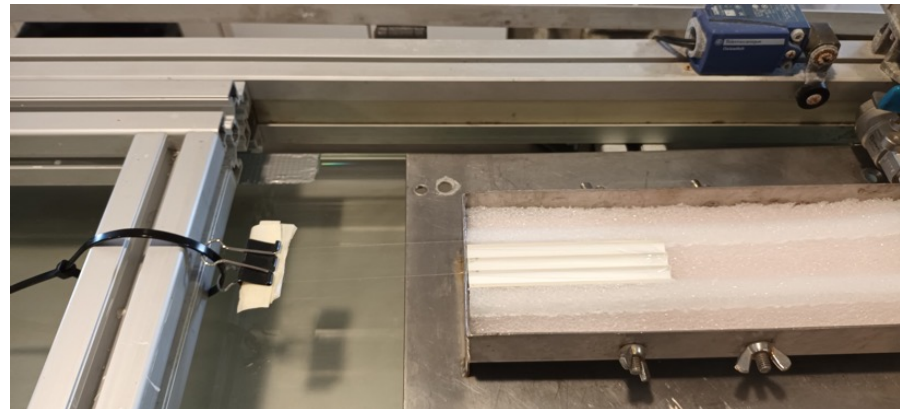
How to judge the lifetime of a 15kD membrane?

- Textile microfibers lead to soft abrasion
- Resistance of a thin membrane layer $t \approx 4-5 \mu\text{m}$



EXPERIMENTS

- 1) Dynamic test : in filtration process but it spend time
- 2) Peeling test: scotch with controled speed ($v \approx 5 \text{ mm/s}$)





Thank you for your attention

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