



Selection of the best suitable BoP-Components for your Fuel Cell System

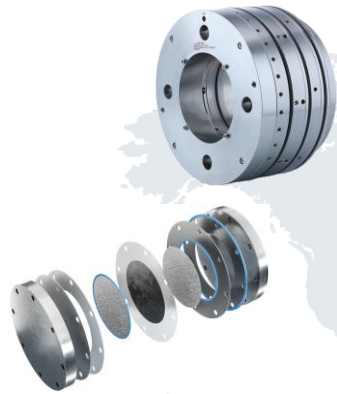
ZBT-Wasserstofftage

Tobias Beisel

Duisburg, February 04th-05th, 2025

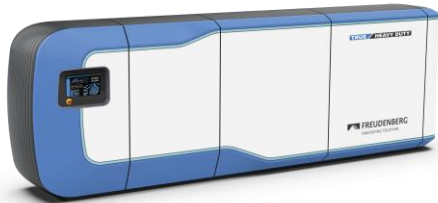
About Freudenberg

micronAir®



EAGLE BURGMANN

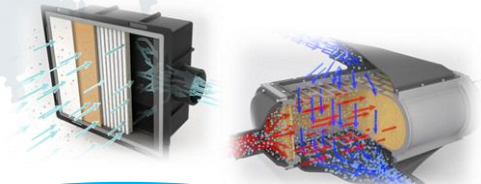
FREUDENBERG SEALING TECHNOLOGIES



FREUDENBERG E-POWER SYSTEMS



FREUDENBERG PERFORMANCE MATERIALS



FREUDENBERG FILTRATION TECHNOLOGIES

FREUDENBERG CHEMICAL SPECIALITIES



PRODUCTION

STORAGE

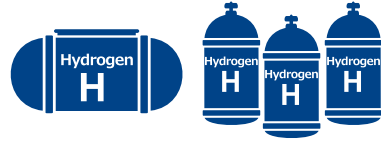
DISTRIBUTION

CONVERTING

Renewable Energy



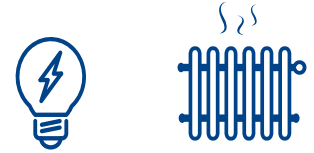
Tanks



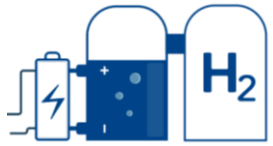
Pipelines



Energy supply



H₂-Production



Caverns



Hubs



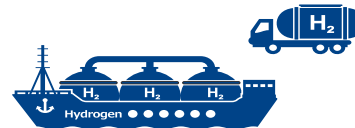
Mobility



H₂-based Energy storage



Transport



Industry

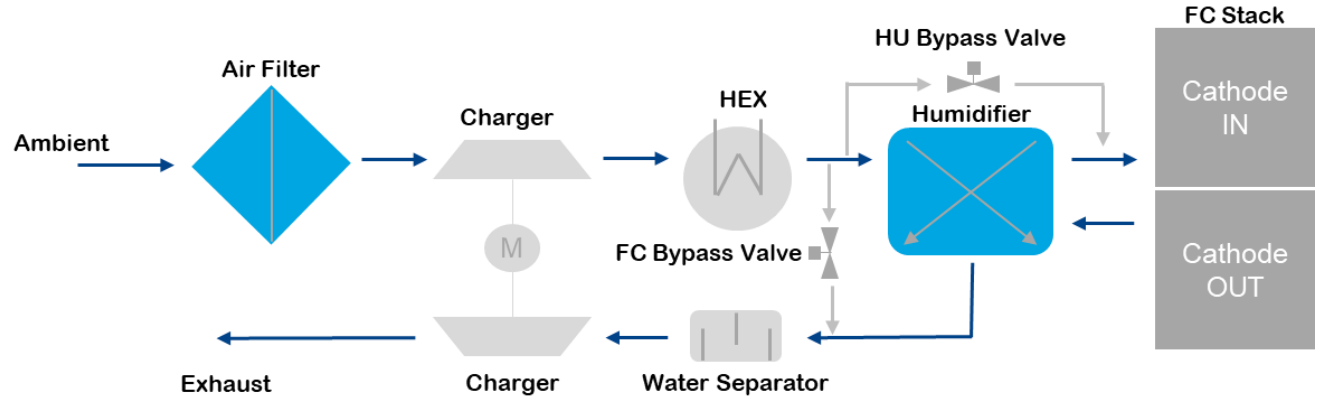


Fuel Cell System Layout

Application



System



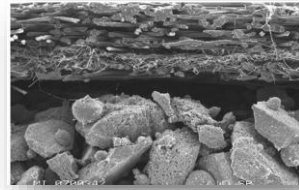
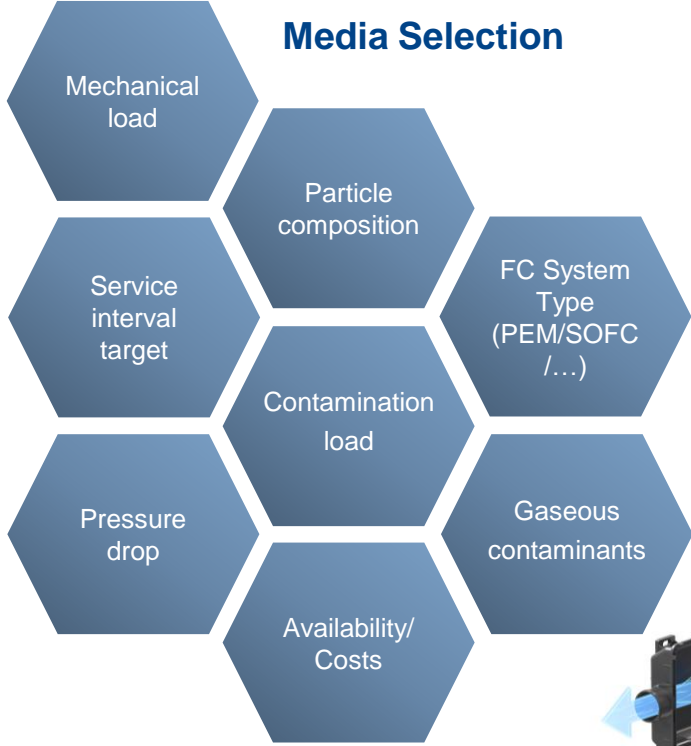
Environment



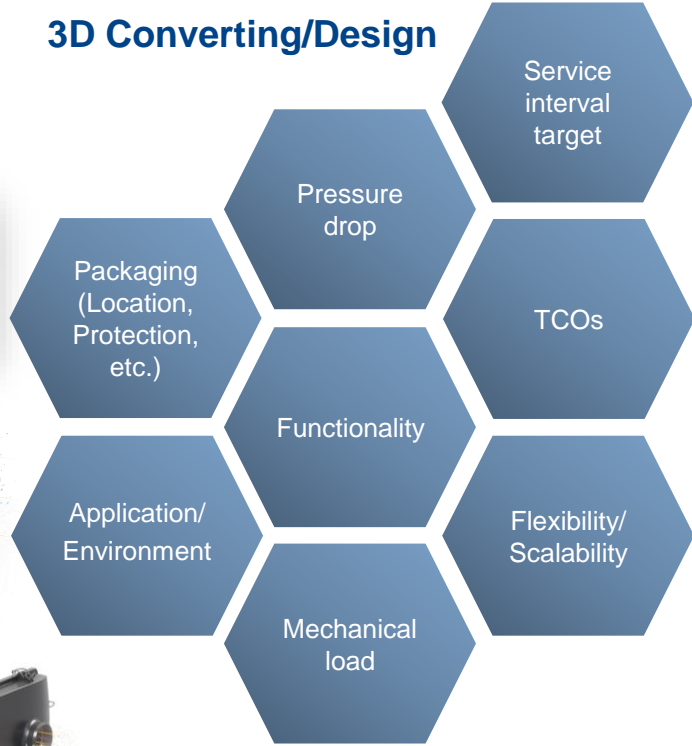
Insight: Cathode intake air filtration

Overview

Media Selection

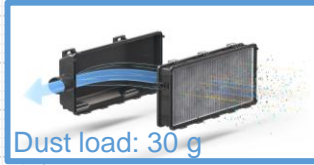
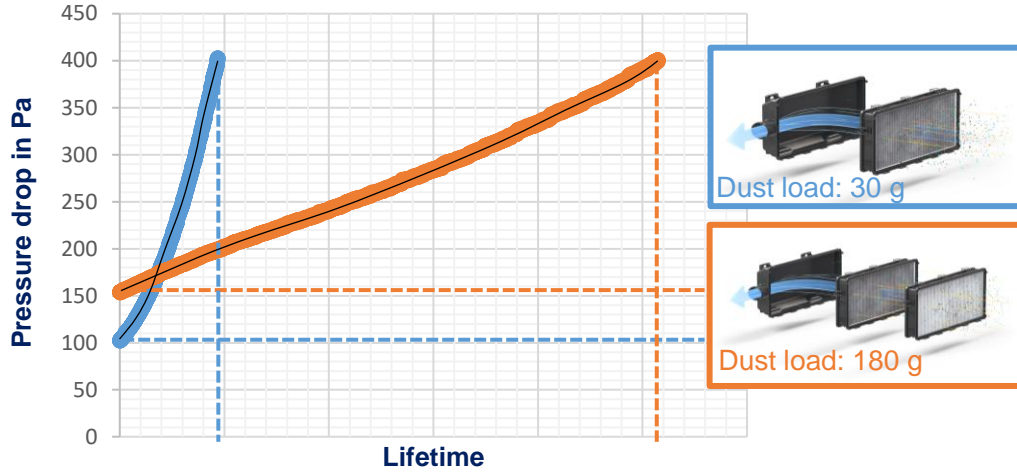


3D Converting/Design



Insight: Cathode intake air filtration

Pressure drop optimization

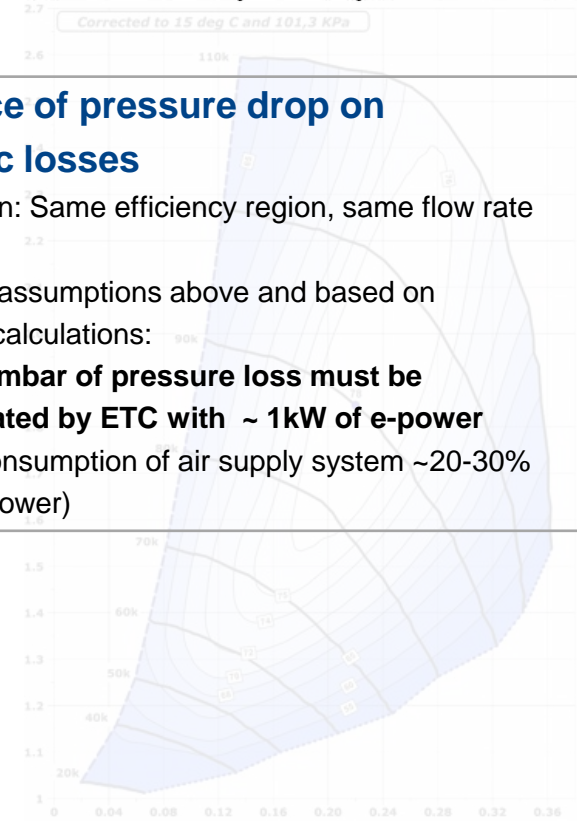
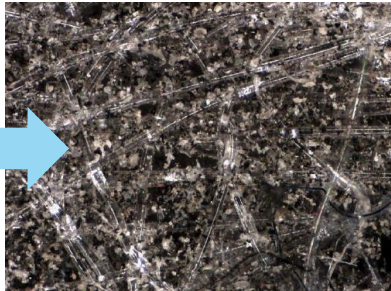
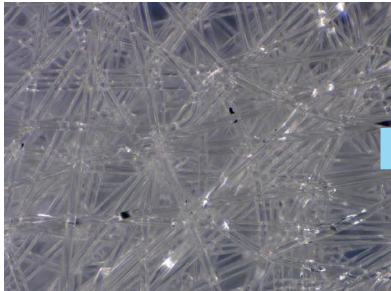


Influence of pressure drop on parasitic losses

Assumption: Same efficiency region, same flow rate

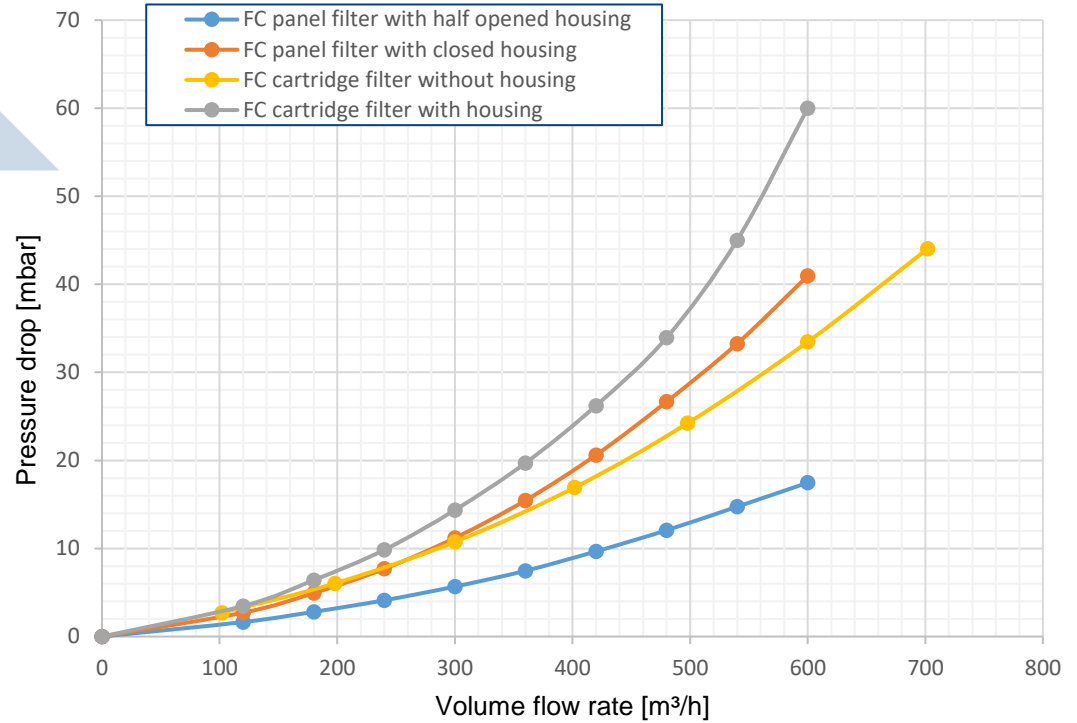
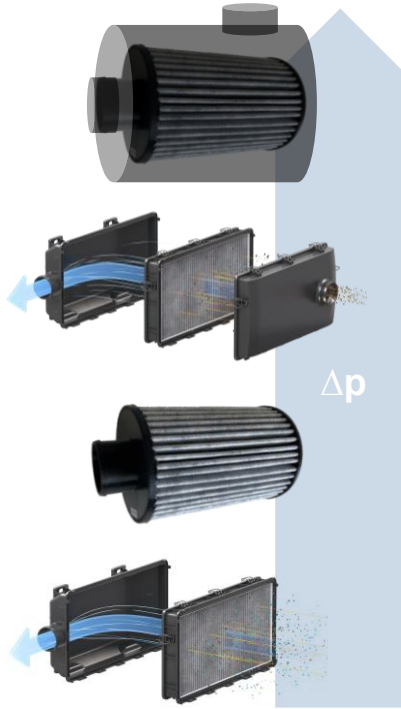
Under the assumptions above and based on simplified calculations:

Each 100 mbar of pressure loss must be compensated by ETC with ~1kW of e-power
(Energy consumption of air supply system ~20-30% of output power)



Insight: Cathode intake air filtration

Pressure drop optimization



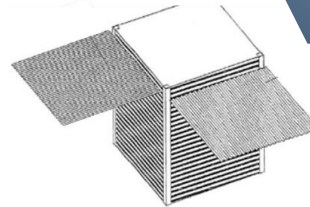
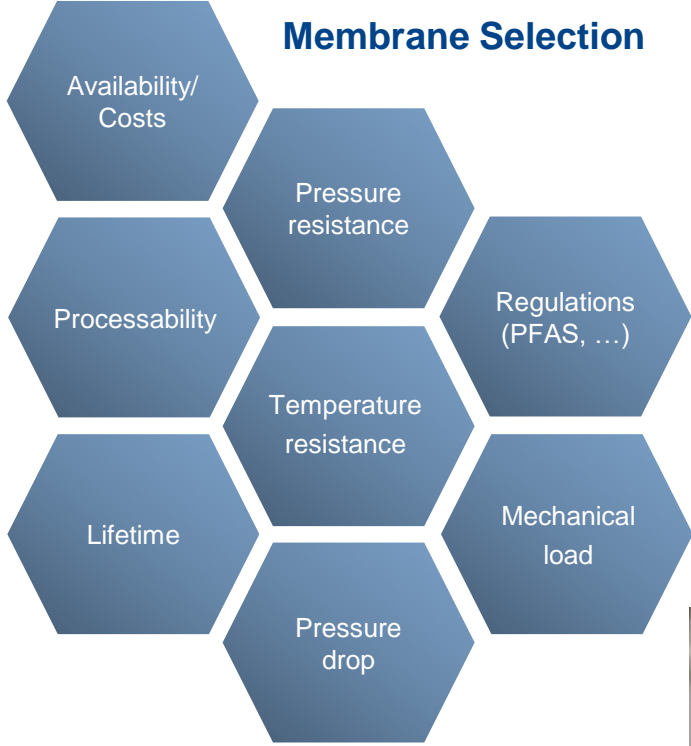
Note: Same media, media amount, port diameter & comparable installation space

Insight: Cathode Air Humidifier

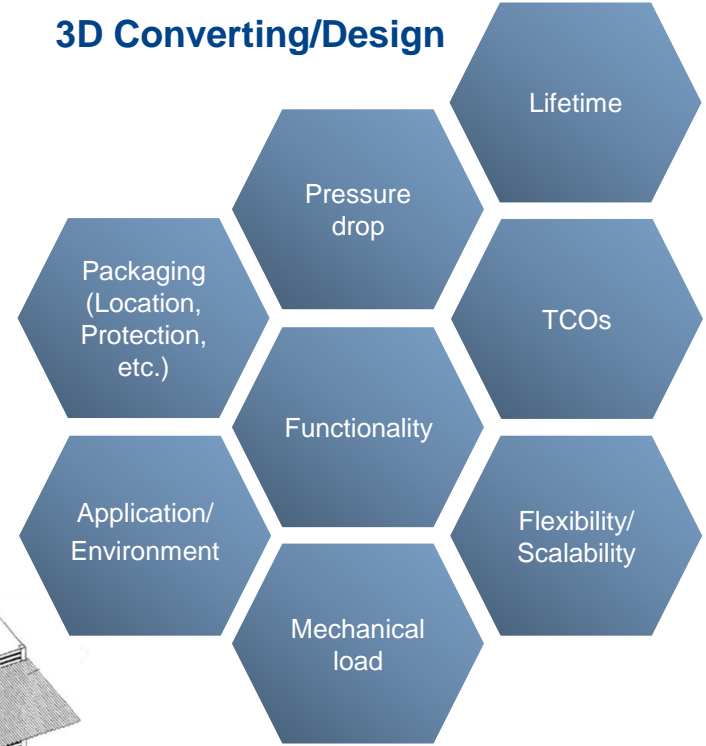
Overview

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Membrane Selection



3D Converting/Design



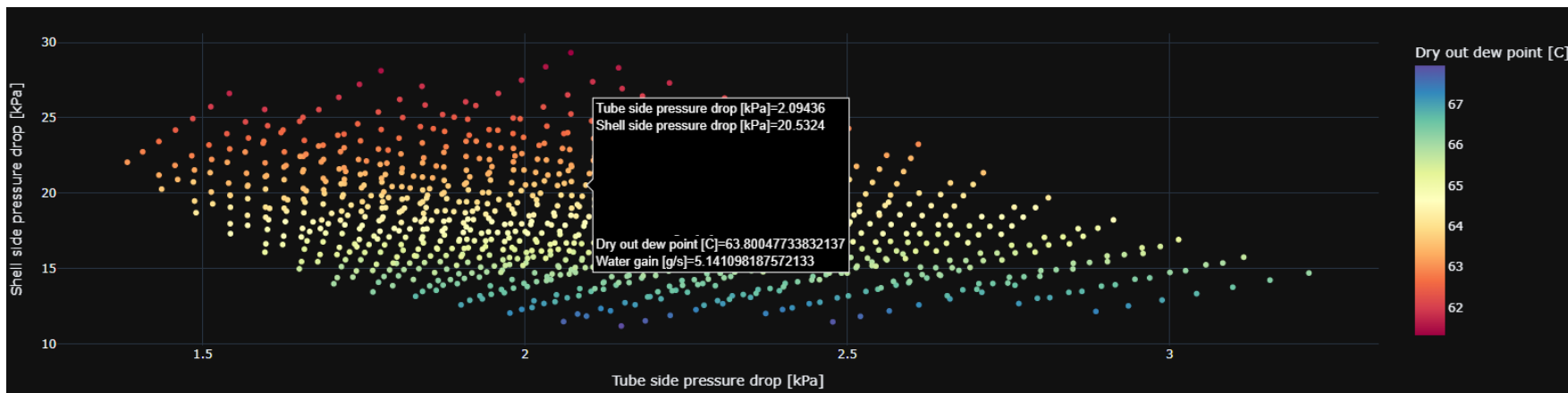
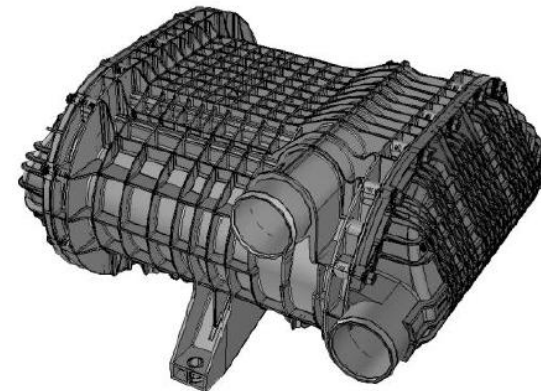
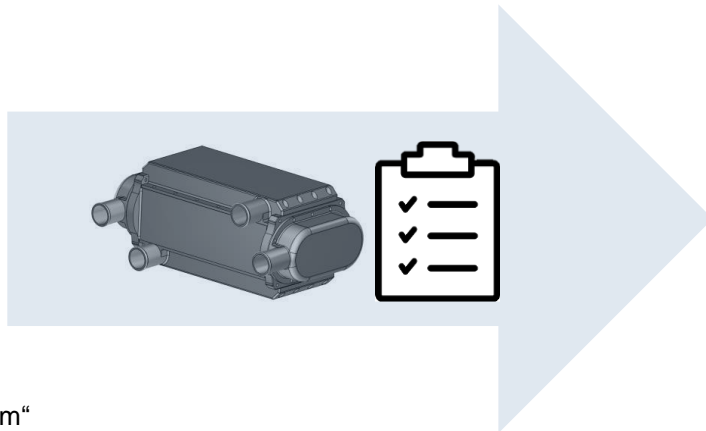
Insight: Cathode Air Humidifier

What needs to be done to make it „ready to rumble“?



AI-generated picture

„Humidifier module for a fuel cell system“





Source: Title Page Domenica della Gordiere, 1962



Source: Hyundai Motor Company



Thank you.

Tobias Beisel
tobias.beisel@freudenberg-filter.com
+49 6201 7107 652