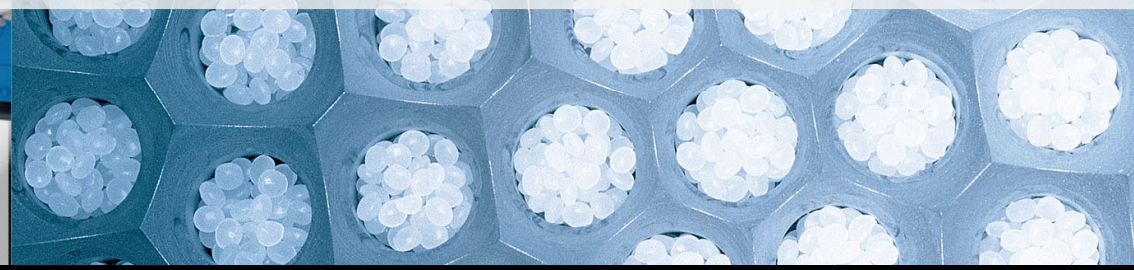
FLUIDLIFT ecoblue® - A Quantum Leap in Pneumatic Conveying

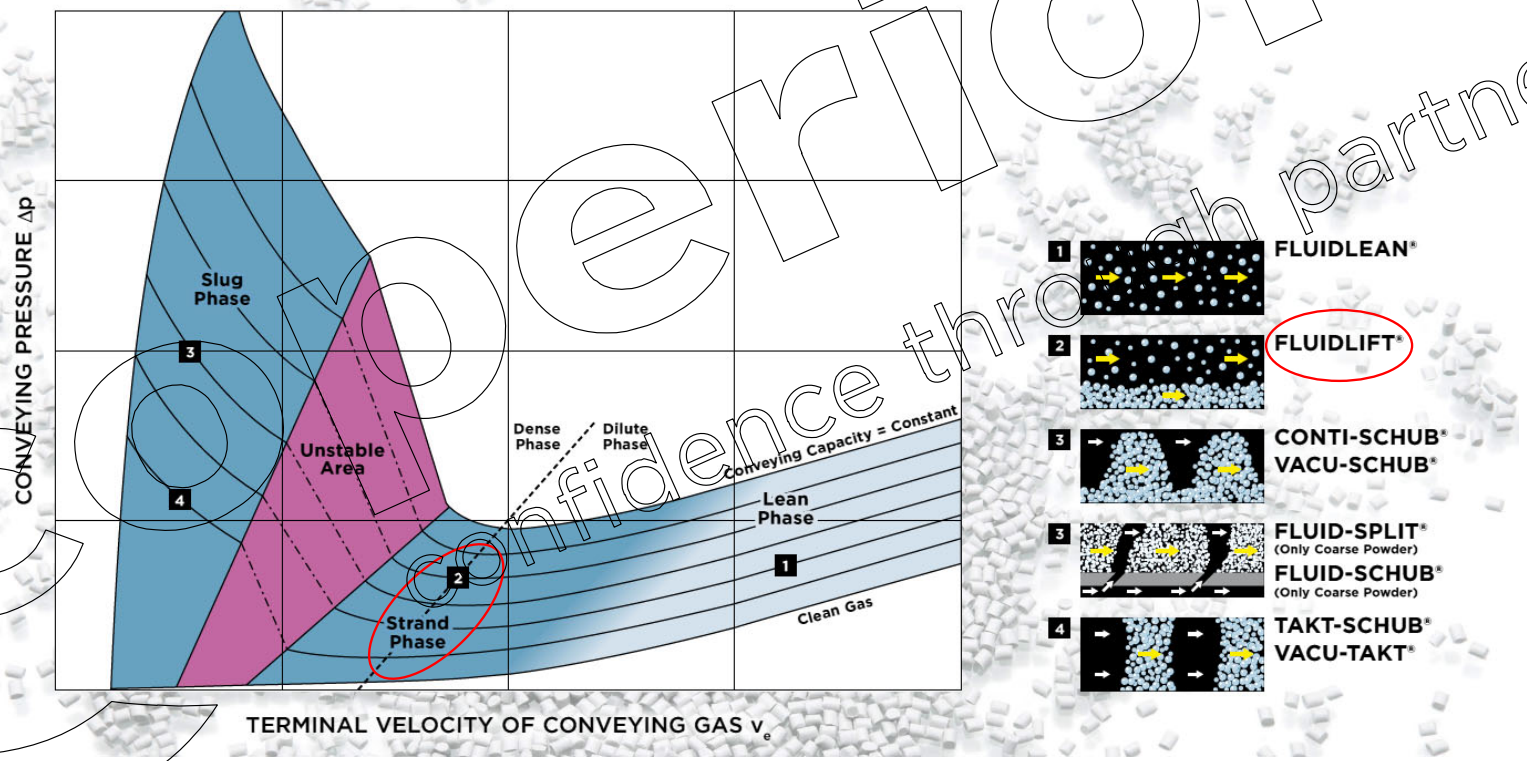
Christoph Schumacher – General Manager Material Handling Plants & Systems



Coperion Technology Update 2025

FLUIDLIFT ecoblue® - Basic Information

Phase diagram of pneumatic conveying



Challenges from Plants During the Years of Operation

Decreasing product quality

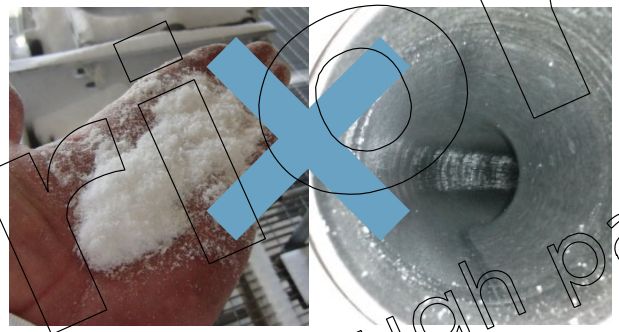
- attrition during conveying: fines, layers, streamers

High operating costs

- dust collection
- disposal of waste
- maintenance & housekeeping
- replacement of worn-out shot-peened piping

Environmental issues

- high energy consumption of conveying
- increasing rate of fines & streamers

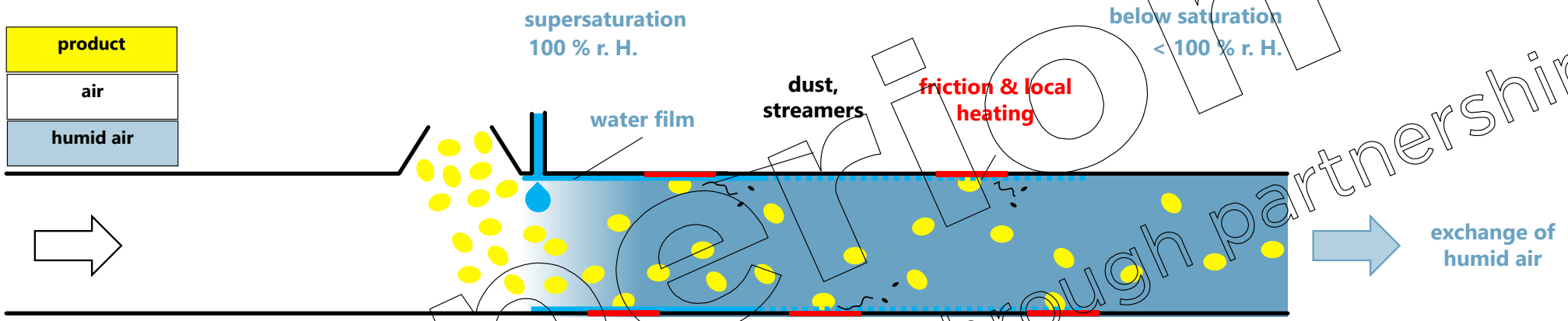


FLUIDLIFT ecoblue

>economic >clean >efficient

FLUIDLIFT ecoblue® Principle

Conveying



- injected water saturates the conveying air
- supersaturation at elevated pressure forms a **thin water film** on the piping wall

→ the film acts as a cooling (& slipping) agent

→ evaporative cooling prevents local heating

✓ Product **friction and degradation (fines, streamers) is minimized**

- pressure loss along the conveying pipe

→ water absorption capacity of the air increases with decreasing pressure

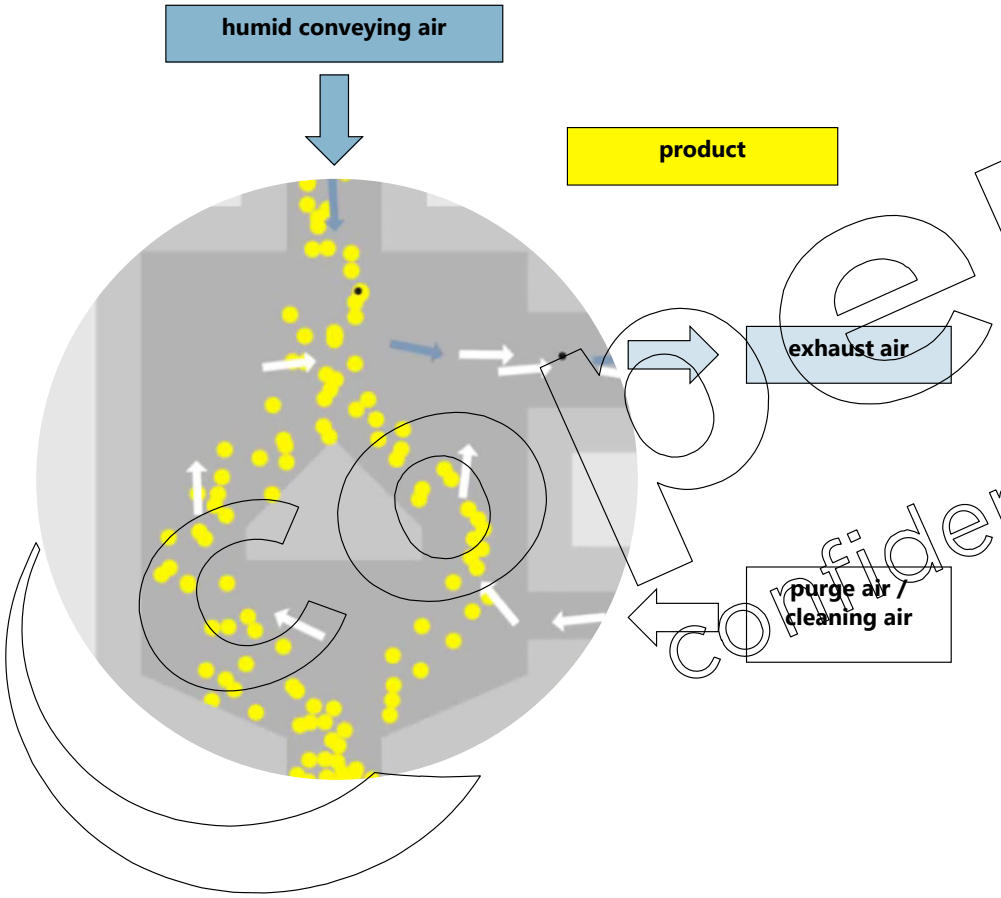
✓ at the target point, **all water is absorbed** by the conveying air

✓ **humid air is exchanged** (elutriator, degassing silo, conveying gas separator)

✓ **dry product**, no dryer needed

FLUIDLIFT ecoblue® Principle

Humid air exchange



Exchange of humid conveying air at destination point:

→ **prevent condensation** in silo / further handling

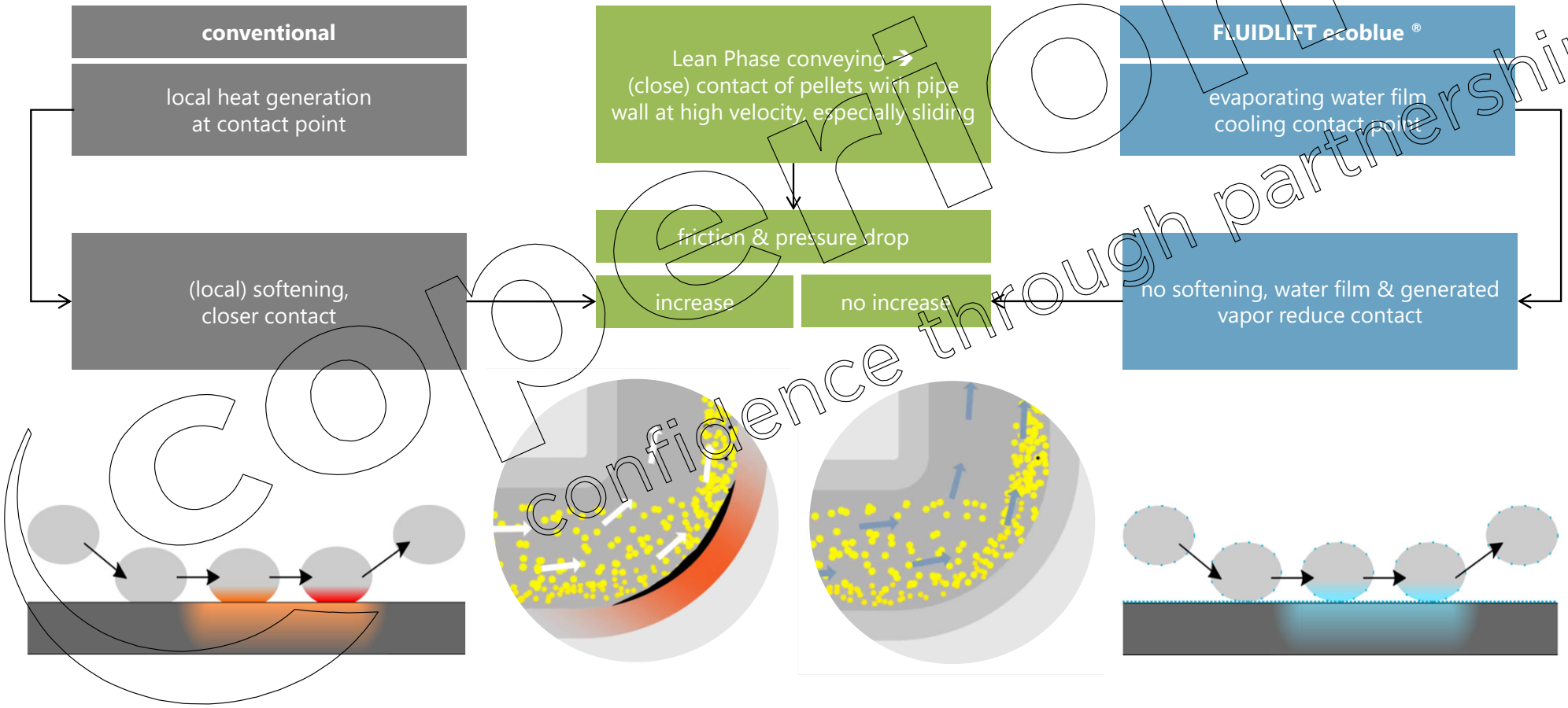
→ avoid increase of product moisture content

→ **dry product at destination point**

Industrial scale solutions for exchange of the humid air:

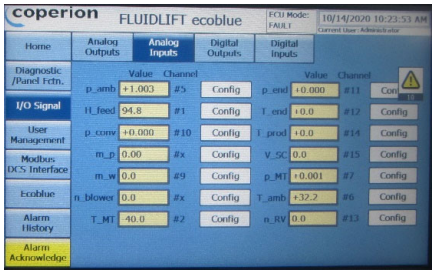
- counterflow elutriator upstream of destination silo
- purge air from degassing silo operation
- Conveying Gas Separator (CGS) on top of the destination silo

Reduction of (Contact) Temperature



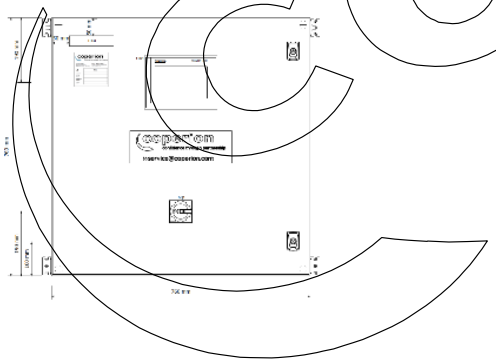
FLUIDLIFT ecoblue® Equipment

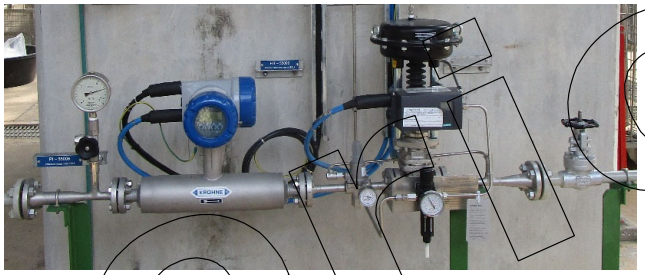
Control Unit ECU – Dosing Unit EDU – Water Inlet EWI



ECU: calculates water and air flow

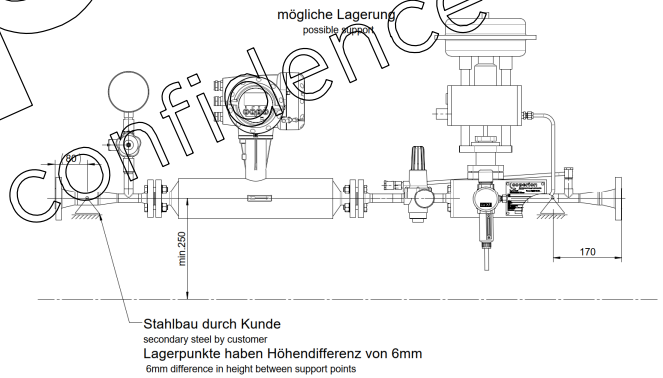
- Local PLC
- Coperion Software
- Incl. Coperion Service Box

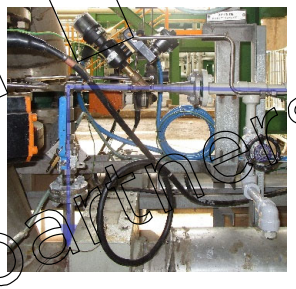




EDU: dose the water flow

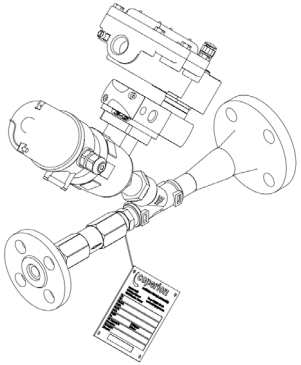
- Standardized "1 size fits all"
- Connected to the ECU





EWI: open/close (not control)

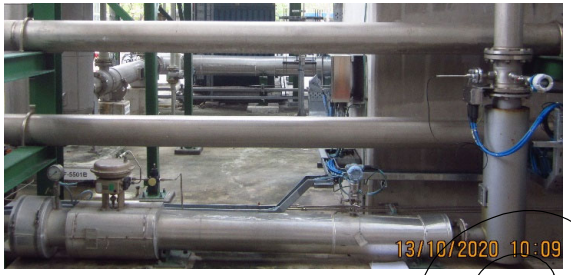
- Standardized "1 size fits all"
- Connected to DCS



FLUIDLIFT ecoblue® Equipment

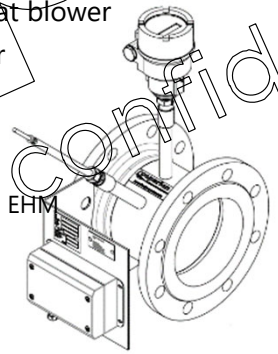
Ambient – Blow off – Instruments

Ambient T, p

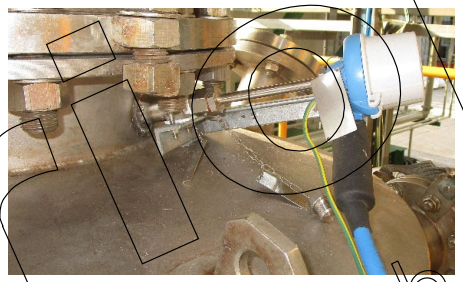


Blow-off (T, rH, p)

- LMR-11 including EHM (Ecoblue Humidity Measurement)
- Alternative: variable speed device / frequency converter at blower
- EHM needed (here or in clean gas line)



EHM



Product T

- Pellet stream above RV
- To determine mass flow of RV leakage

End of line T, p

- Deflector bend of UGS
- or similar

Ecoblue Control Unit

One box – many benefits

Ecoblue process know-how in a ready-to-use PLC:

- Algorithms proven in various plants ensure safe and reliable operation
- Tailored to your plant by means of sophisticated parameterization
- Programming effort on customer DCS reduced to the minimum
- Water dosing control loop
  - Fast reaction due to short PLC cycle times
  - Tuned & tested at Coperion workshop for highest accuracy and fast on-site commissioning
- Full flexibility: I/O signals via Modbus TCP or hardwired, also for Ex-poof transmitters
- Comfortable touchscreen interface
- Secured remote service

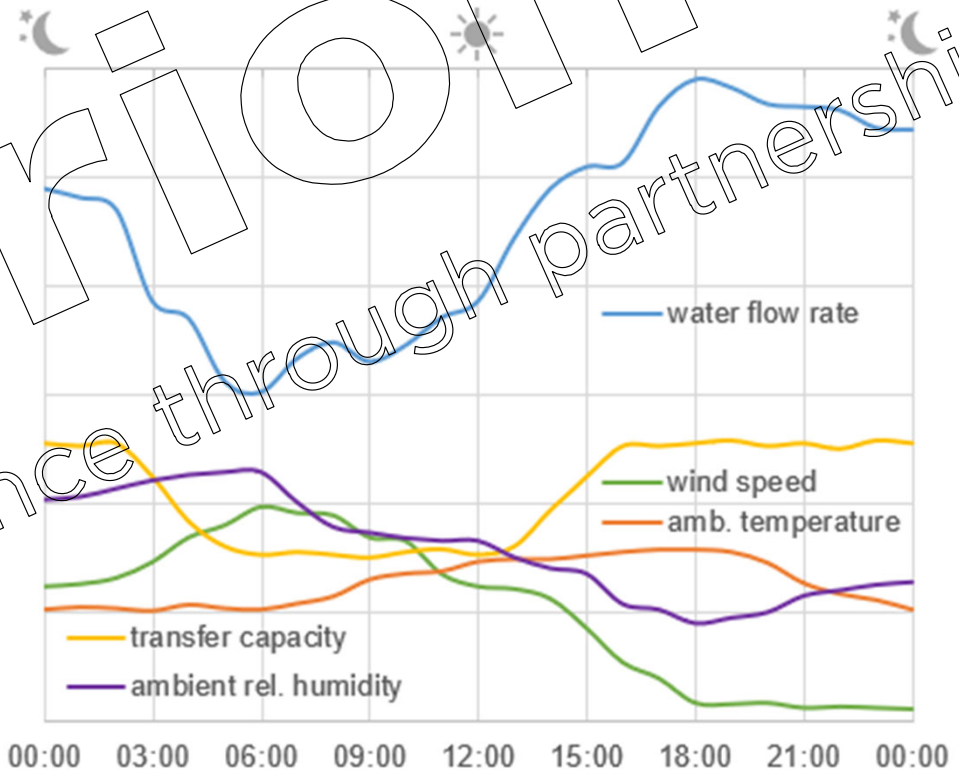
Ecoblue Water Dosing Control

Safe, optimum dosing in every process condition

Optimum water demand varies strongly depending on:

- Ambient conditions (day/night, seasons):
  - Precipitation, ambient humidity
  - Temperature
  - Wind
- Transfer capacity
- Product & process temperature
- Conveying pressure
- Air flow adjustment
- Leakage air
- …

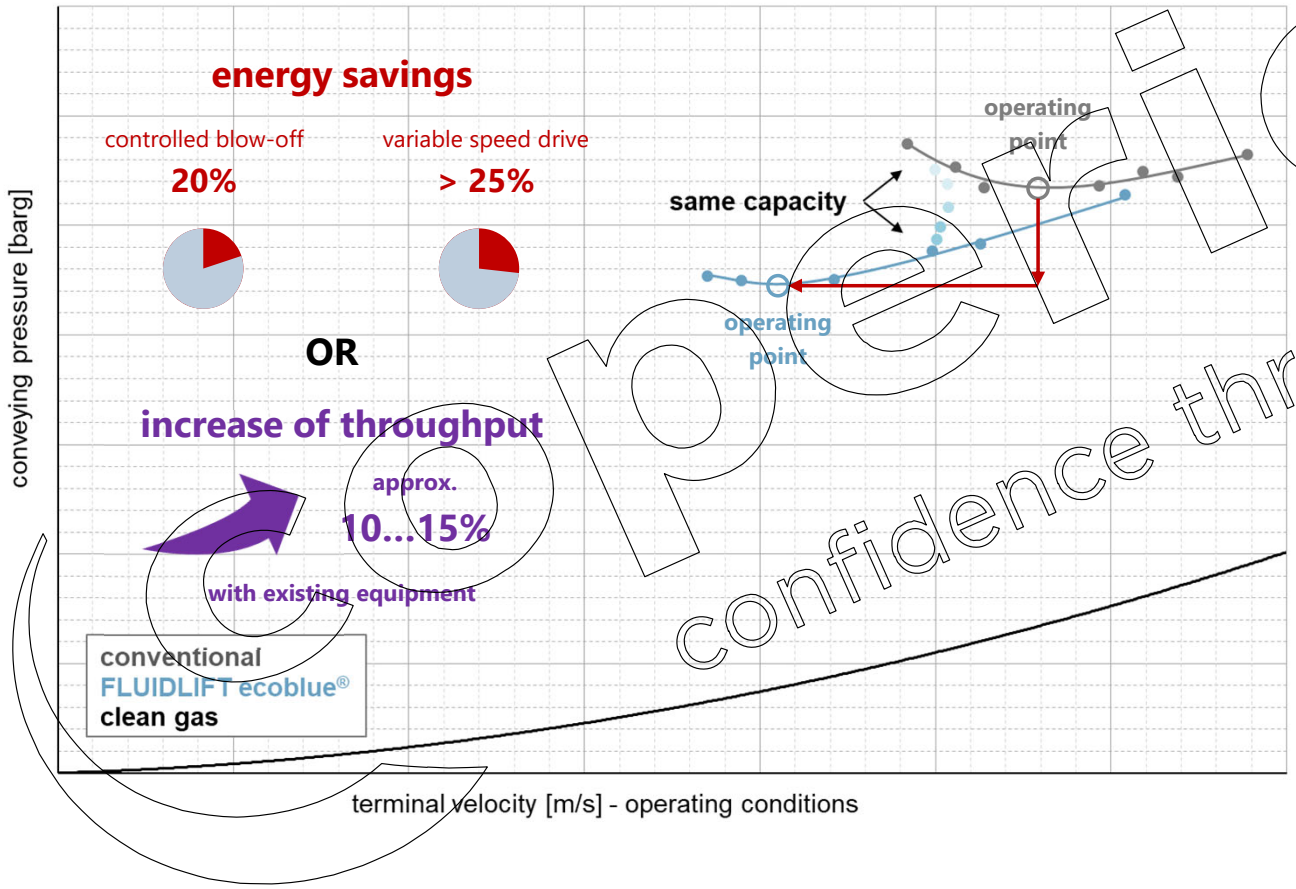
Sophisticated algorithms combined with measurement know-how and expertise in technical execution ensure the safe, optimum water dosing in every process condition.



Scenario: January in maritime climate in North America

FLUIDLIFT ecoblue® Process Technology

Reduction of conveying pressure and velocity



Reduction of...

...conveying pressure (depending on product, isometry, temperature...):

- HDPE: **- 15 %**
- LLDPE: **- 17...35 %**
- LDPE: **- 15...31 %**
- PP: **- 15...25 %**

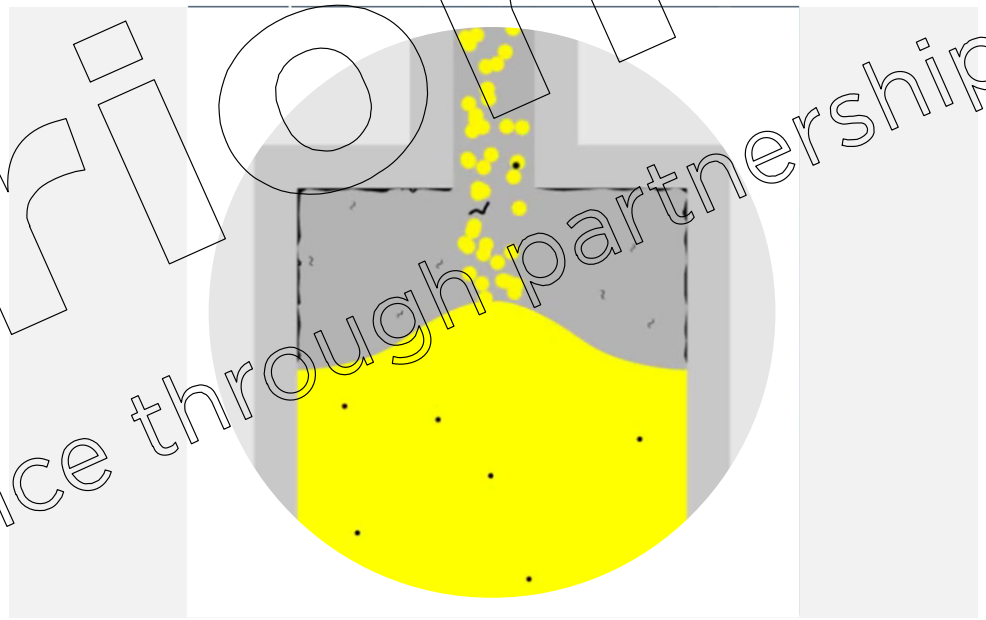
...conveying velocity:

- approx. **- 25 %**

Background: Results of Attrition Tests

Roof of holding bin after test run

dry / conventional
thick dust layer



dry / conventional
airborne dust accumulating on walls

Background: Results of Attrition Tests

Roof of holding bin after test run

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almost no visible dust

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no dust accumulations

Background: Results of Attrition Tests

Bend bin after test run

dry / conventional

layers / generation of streamers

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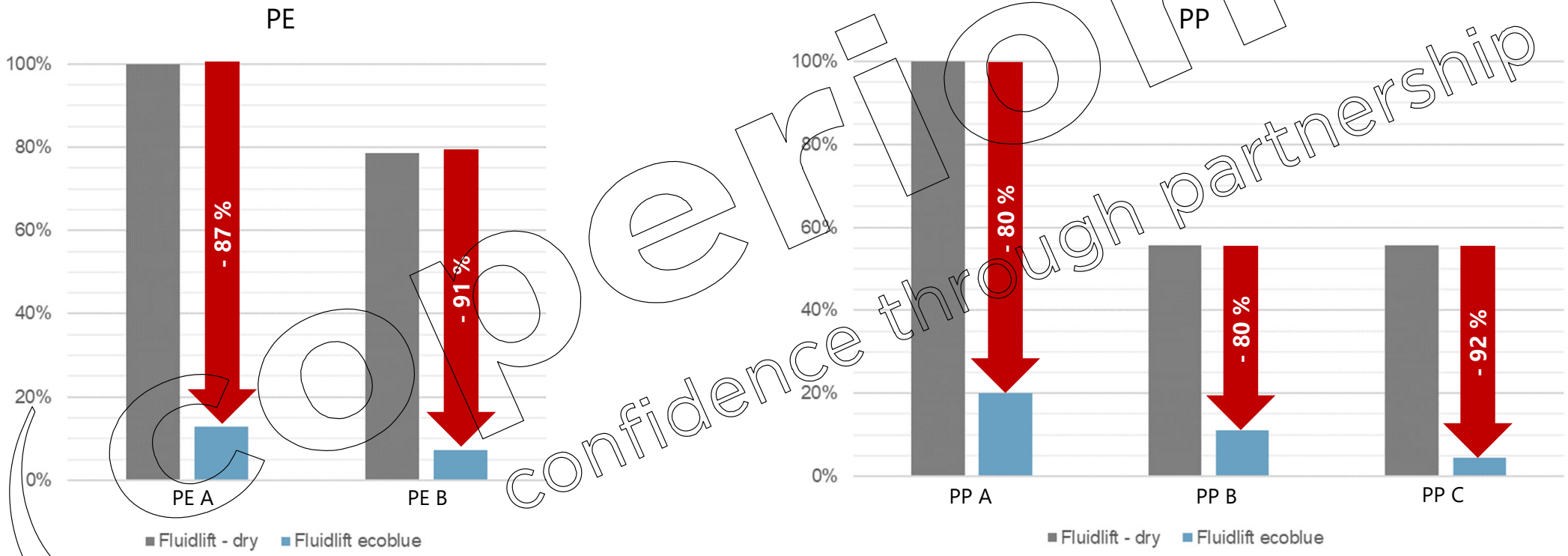
no layers / no streamer generation

FLUIDLIFT ecoblue® Process Technology

Measured attrition rates on worn-out shot peened piping



FLUIDLIFT ecoblue® ➔ **no streamers under all conditions**

Benefits and OPEX Savings Through FLUIDLIFT ecoblue®

Example: 500 kta LDPE production:
Conveying distances: 150 m from extruder to degassing / 350 m from degassing to storage area

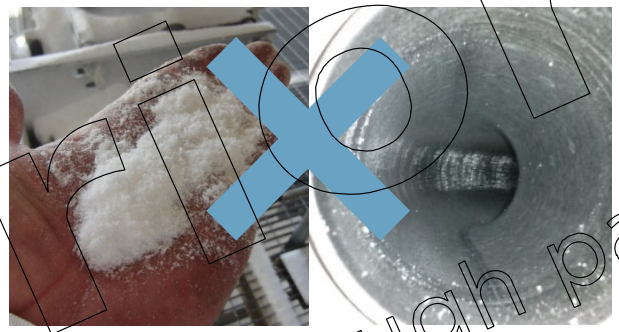
Attrition reduction / less waste
→ convert into product sold (= 100% profit)
+ 375 kUSD/y more profit

Reduced maintenance / lower operating costs
→ low wear of shot-peened piping/bends
(no need for replacement = 100% profit)
+ 336 kUSD/y more profit

Environmental issues
→ reduction of energy consumption (= 100% profit)
+ 48 kUSD/y more profit

Utility: de-min water
→ small consumption
+ 33 kUSD/y more cost

Total benefit + 726 kUSD/year



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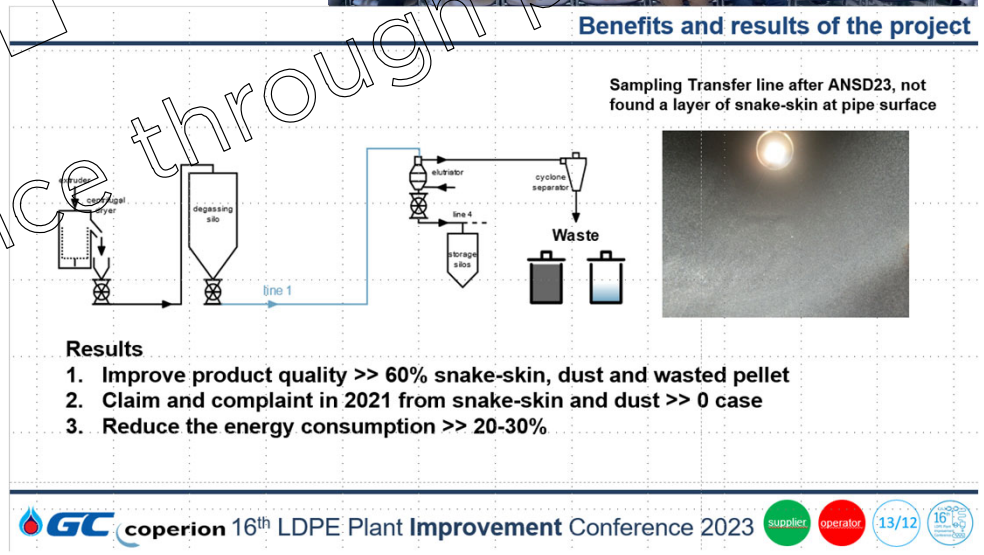
Reference

LDPE Production Thailand

Commissioned 2010: 60 t/h capacity | Lupotech-T
ecoblue retrofit commissioned 2020
since then continuously operating without interruption
Joint presentation on Uhde LDPE conference, May 2023



Thank you very much for your attention.