Optimizing the separation process in floating units for deep water fields: The Wash Tank technology

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Introduction

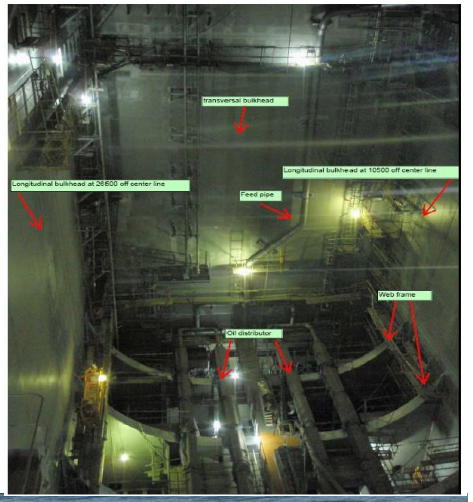
Total & Sulzer collaboration

Sulzer Acquires License for Total's Wash Tank Technology for Oil Processing

- News release from 5 September 2017

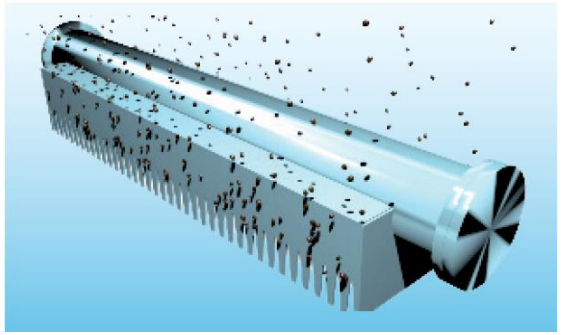
- Sulzer's license agreement will make the benefits associated with this technology available to oil field FPSO's around the world.

- Future technical papers & presentations will highlight main technology benefits and operational feedback.



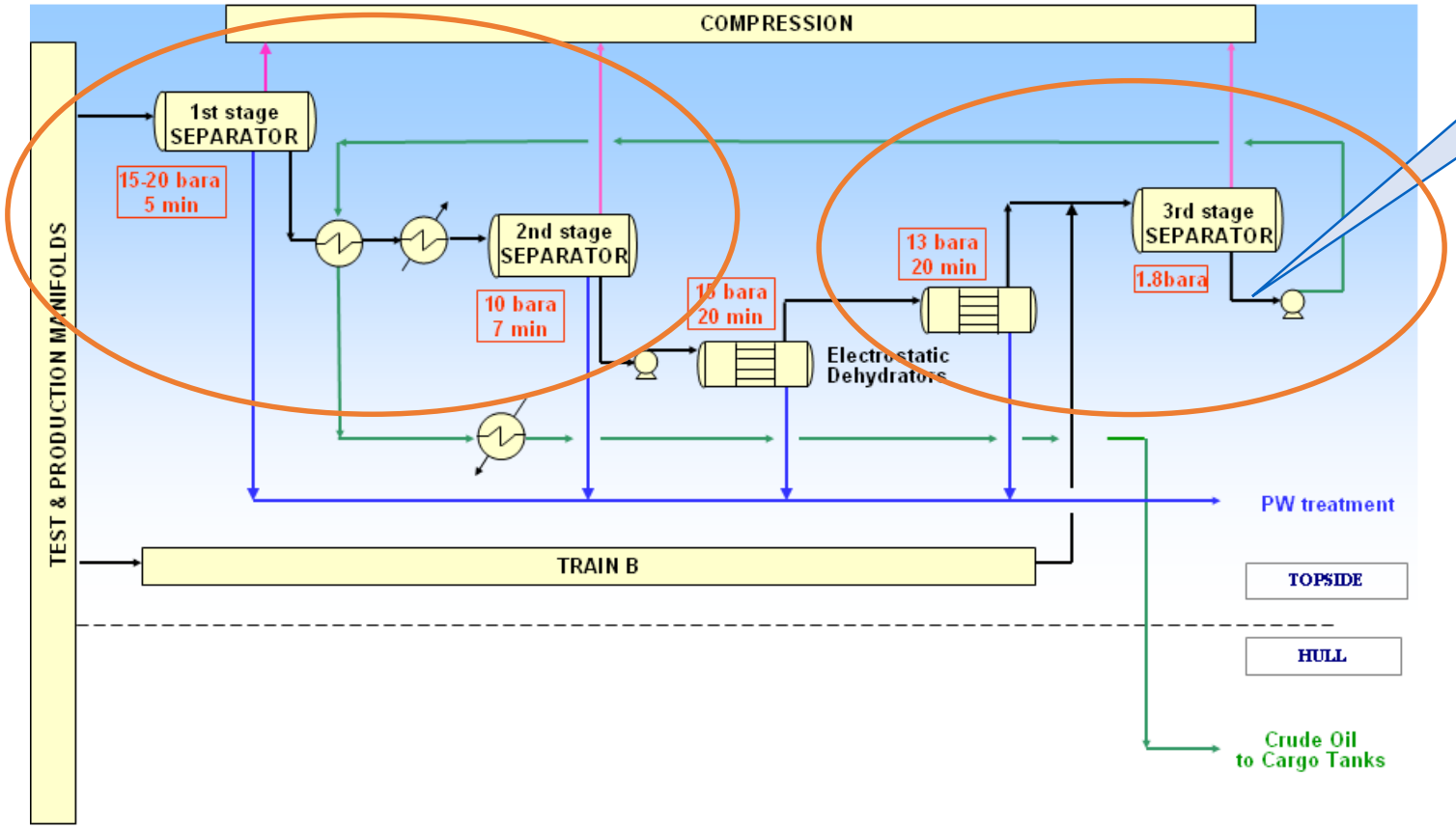
Sulzer Acquires License for Total's Wash Tank Technology for Oil Processing

- Technology patented by TOTAL.
- Operation for multiple years on the Usan, Pazflor and CLOV FPSO's, as well as on the recently started Moho Nord
- Facilities operated by TOTAL, with the exception of the Usan
- Future units: Egina FPSO and Martin Linge FSO
- All FPSO/FPU listed are custom-built, except for converted Martin Linge
- All systems include SULZER patented proprietary inlet distributors & static mixers.



Conventional Oil Processing System

Conventional process

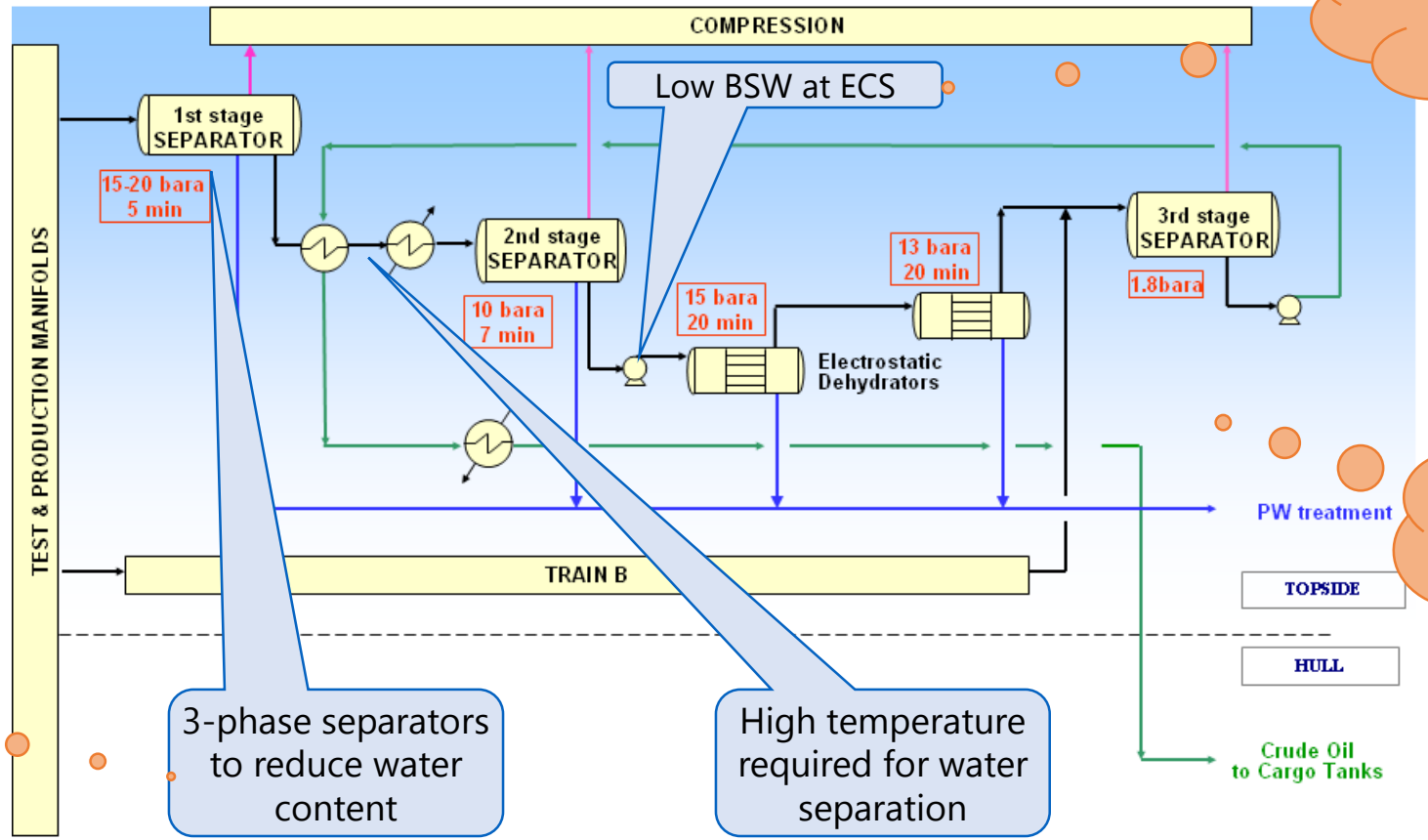


RVP, BSW, & salinity specifications achieved on the topside

Two steps:

- Rapidly reduce water content at high pressure
- Complete water separation and achieve **RVP, BSW, salinity** specs at lower pressure

Conventional process – Main issues
Unsuccessful design strategy



Short circuit between electrodes

Large & heavy equipment on topside
➔ High Cost

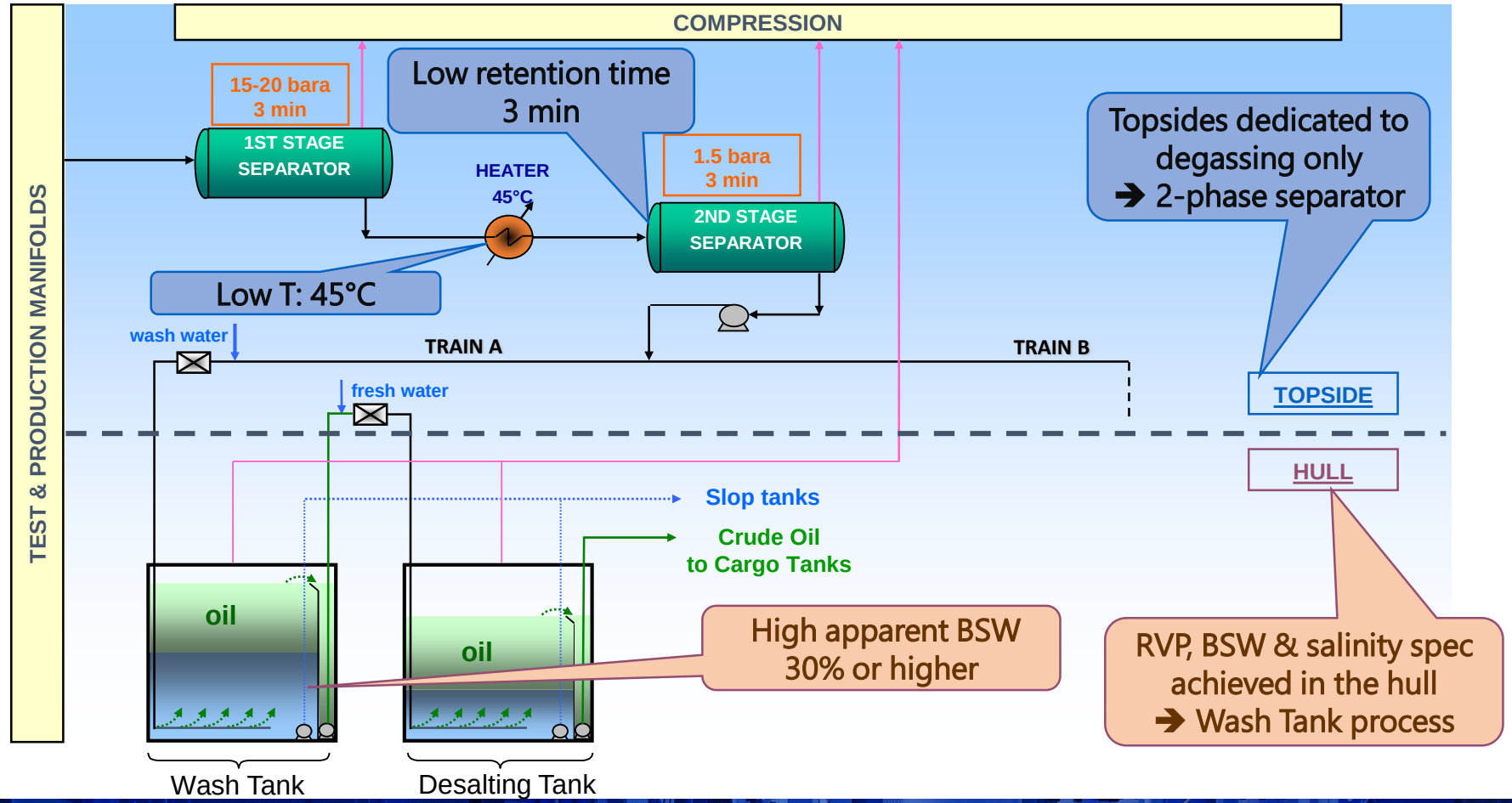
Potential interface issues

3-phase separators to reduce water content

High temperature required for water separation

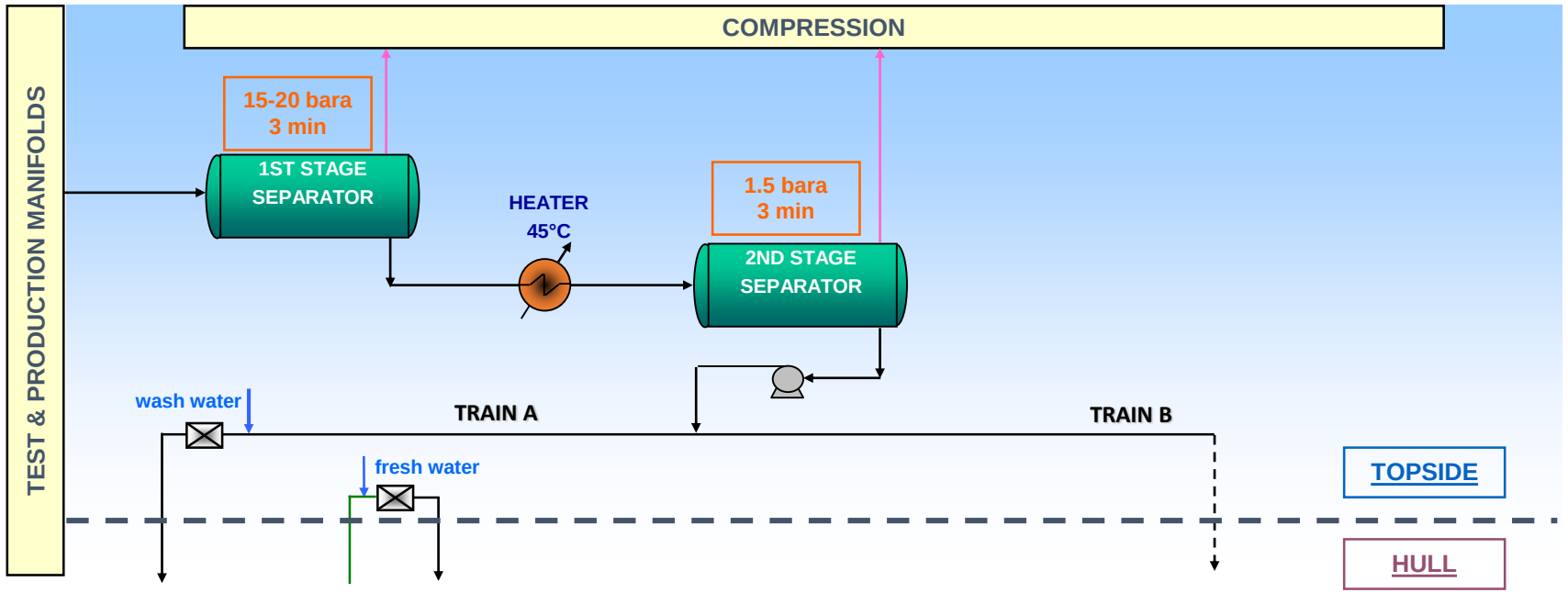
The Wash Tank Process System

The Wash Tank Process

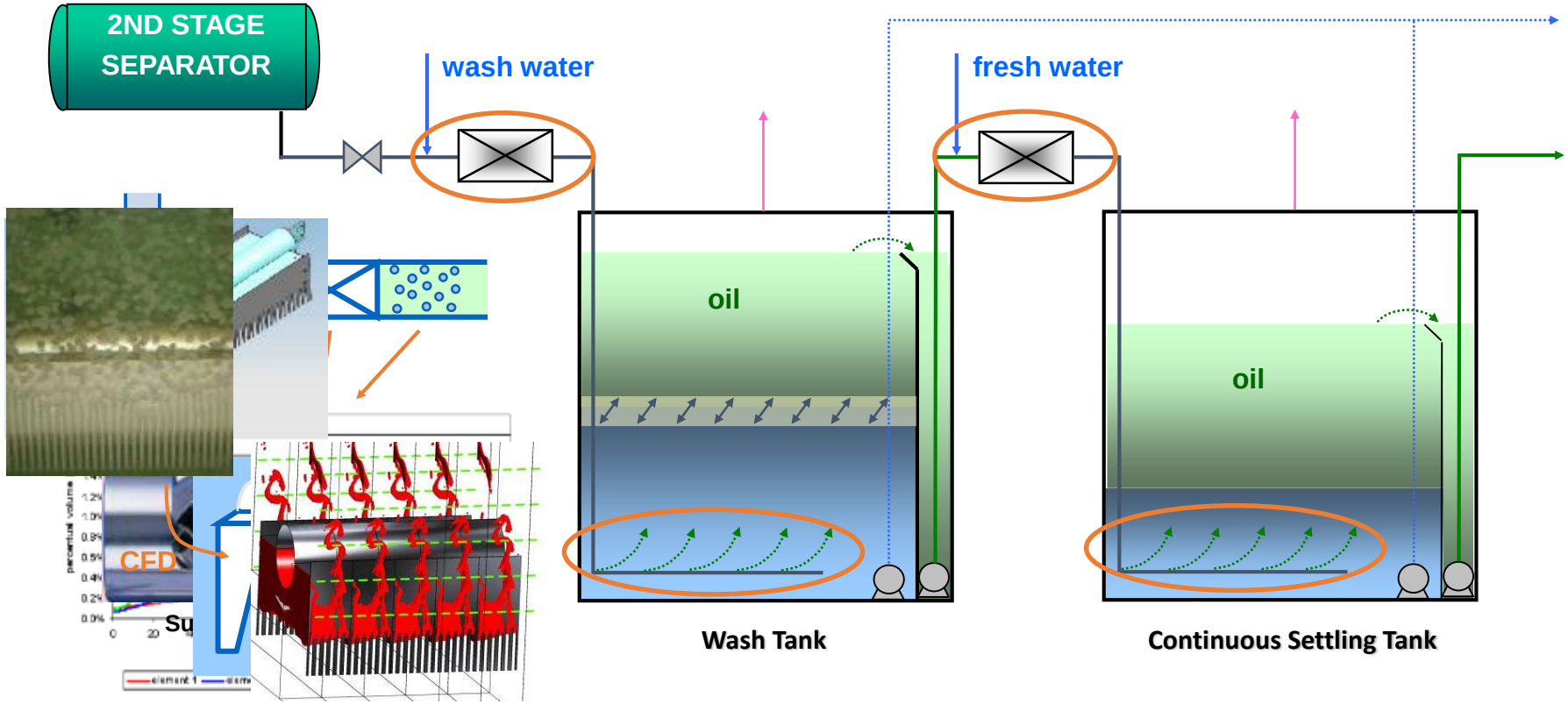


Wash Tank Process. Degassing step

- 2 separation stages (HP/LP) at low retention time
- Heating just enough to reach RVP specification in wash tank
- Ex: USAN = 45°C to reach 10 psi RVP under atm conditions



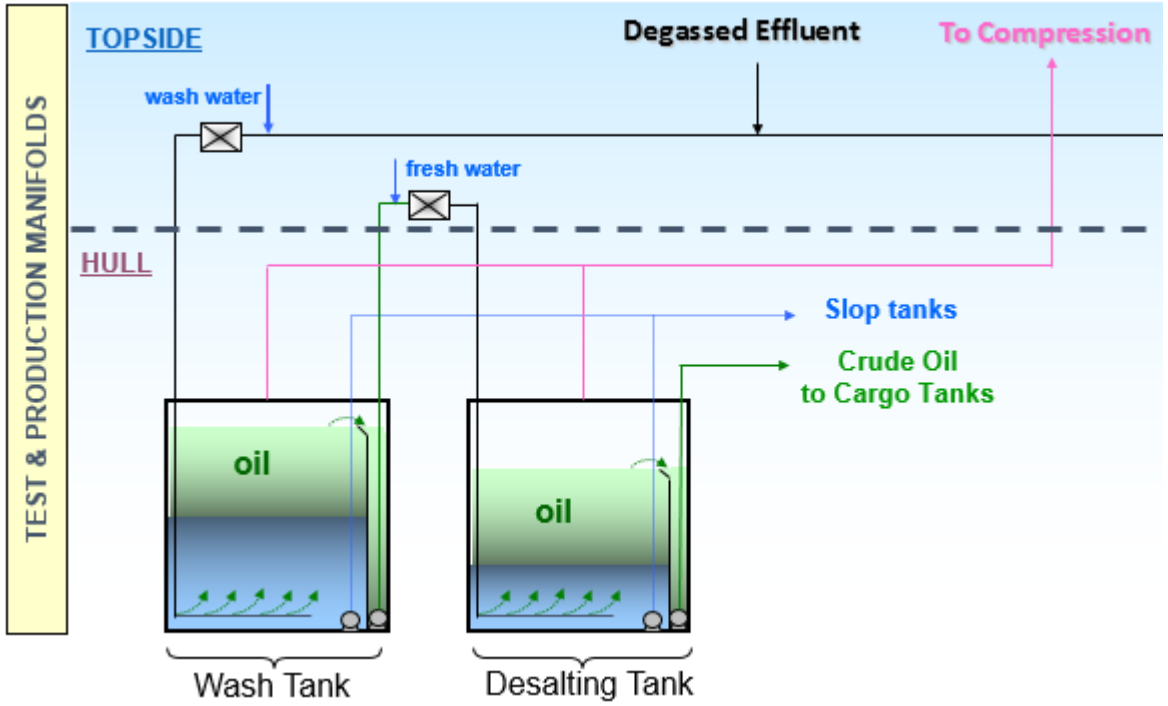
Wash Tank process description



- 2 **static mixing** technologies required upstream each tank.
- High efficiency **distributor** technology required at the bottom leg of each tank

Washing / stabilization operation

- In the hull : atmospheric conditions
- Filled with water leg: high apparent BSW
- Coalescence is promoted by the emulsion layer
- Water withdrawn from bottom of tank → water treatment
- Oil at BSW and RVP spec pumped from oil-compartment of wash tank
- If salt content is high: transfer from wash tank to desalting continuous settling tank (fresh water)



Design experimental tools

Determining the maximum allowable flux

DUSS: 1m x ϕ 0.4m

SVC: 1m x ϕ 1m

WTP: 6m x ϕ 0.1m

Experimental data can be described by the Dispersion Band Model (Total)

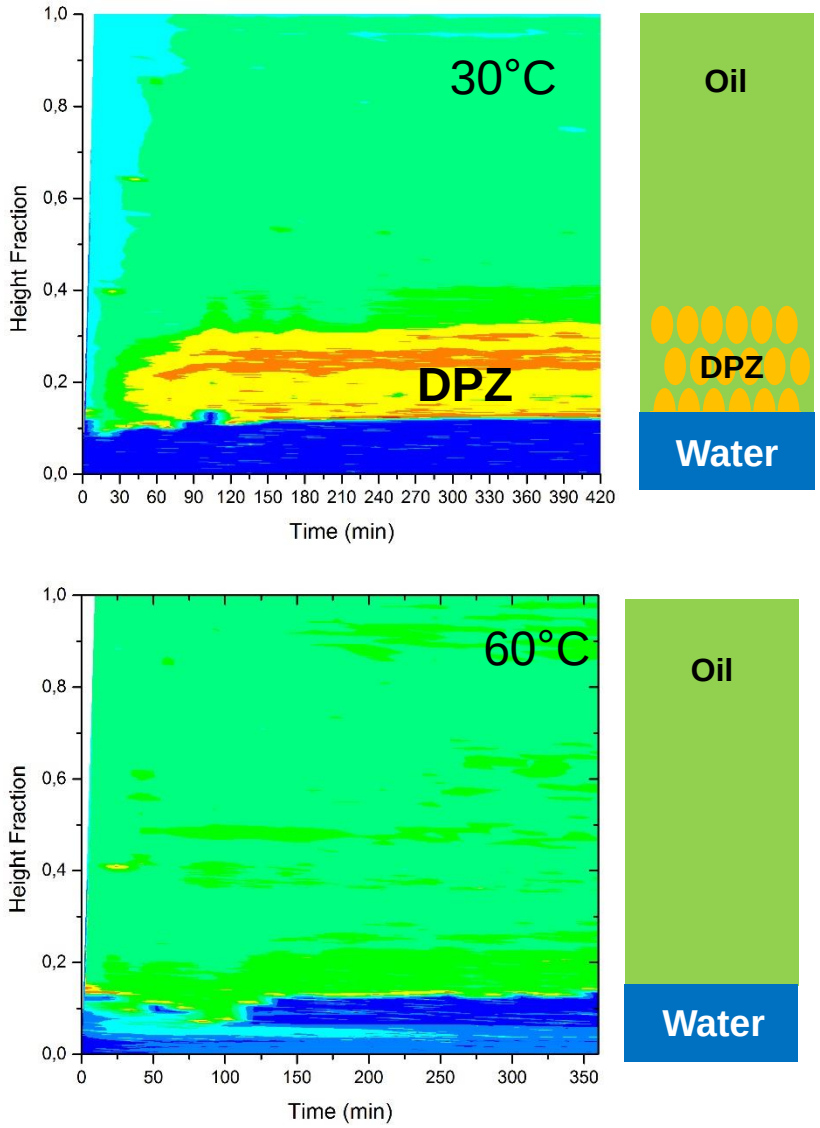
Dense Packed Zone: role

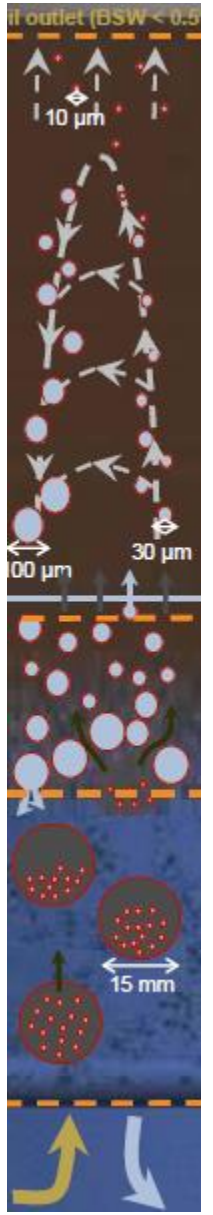
- DPZ: Dense drops accumulation above water
- Optimal thickness => leads efficient separation
- Experimental illustration: T ↗ Efficiency ↘ !!

  T= 30°C, Water outlet flow rate: 2.8g/min

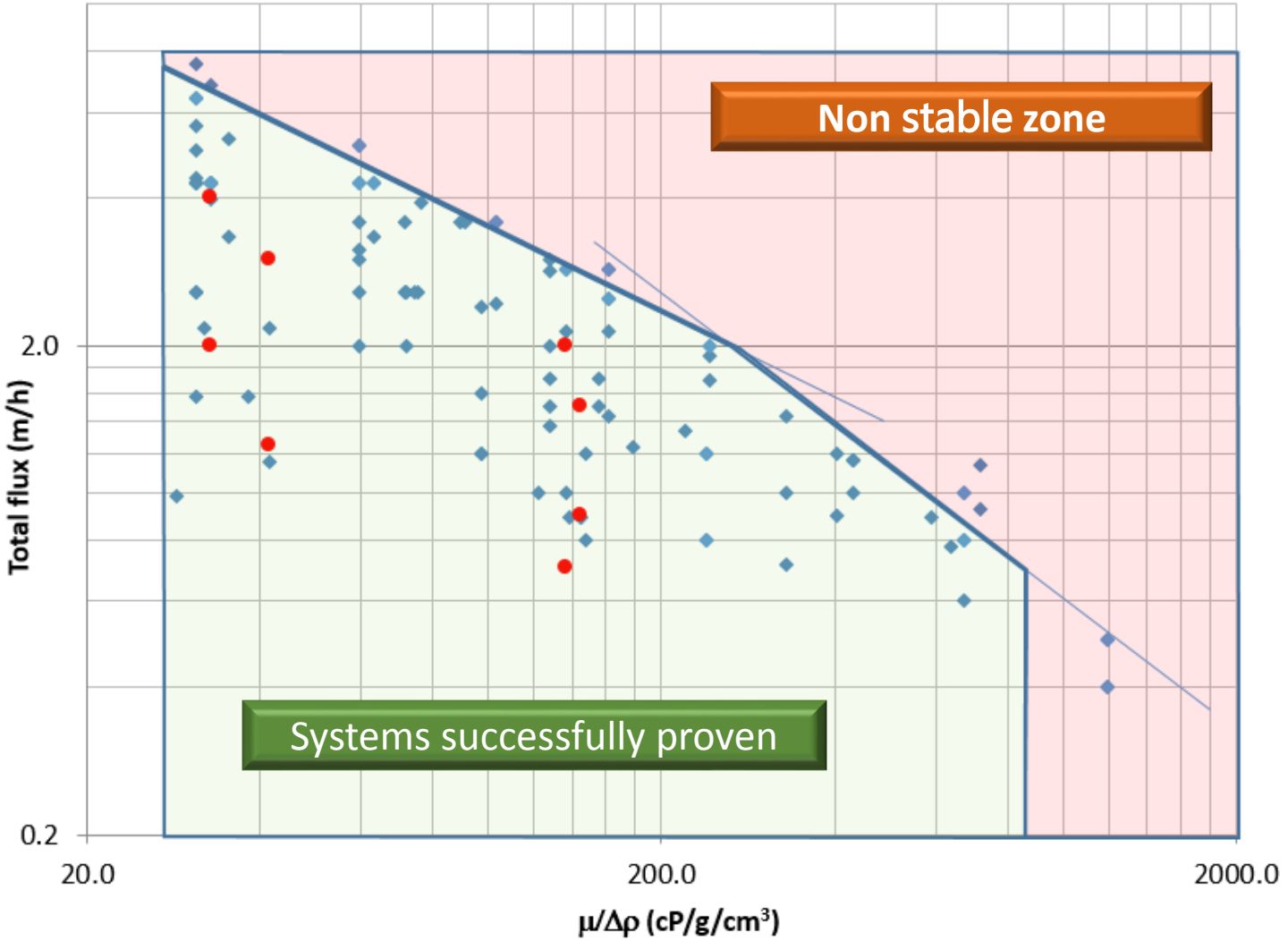
  T=60°C, Water outlet flow rate: 1.1 g/min

The Dense Packed Zone (DPZ) is an efficient coalescence promotor





Performance Map



- ♦ Experimental points / Different oils (Wash Tank Pilot)
- ● Current operational points (4 production fields)

Comparison between Conventional & Wash Tank Schemes

Technology benefits

Technology Benefits (1/2)

- Reduction in :
  - Topsides weight (> 3000 ton topsides saving reported for Martin Linge FSO)
  - CAPEX
  - Complexity
- Achieved through significant minimization of topsides processing equipment and elimination of electrostatic coalescers
- Robust performance and more flexibility towards flow rate variations
- Improved energy efficiency and Lower OPEX through reduction of utility consumptions (heating, cooling and electrical loads)

Technology Benefits (2/2)

- Improved Safety through a more aerated layout of the FPSO topsides
- Benefits are maximized by an early concept selection of the technology.
- Sulzer's license agreement will make the benefits associated with this technology available to oil field FPSO's around the world.
- Future technical papers & presentations will highlight main technology benefits and operational feedback from selected facilities.

SULZER

TOTAL

THANK YOU!

Questions?