

MCEDD
DEEPWATER DEVELOPMENT

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Economic and Efficient Subsea Compression of Wet Gas

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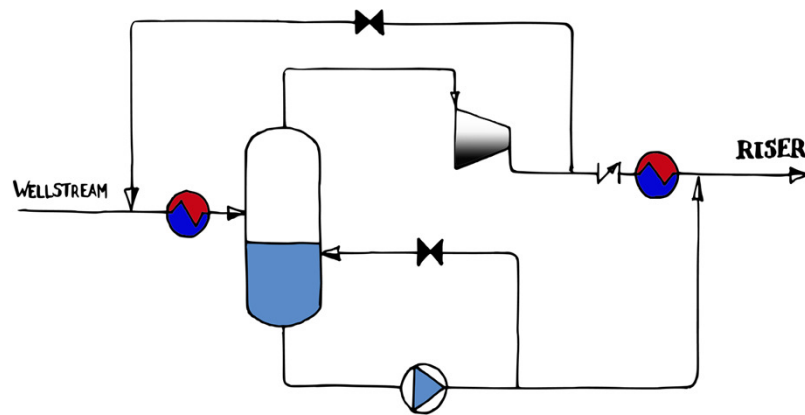
I
State of the art of subsea compression systems

2
**Economic and efficient subsea compression
for wet gas fields**

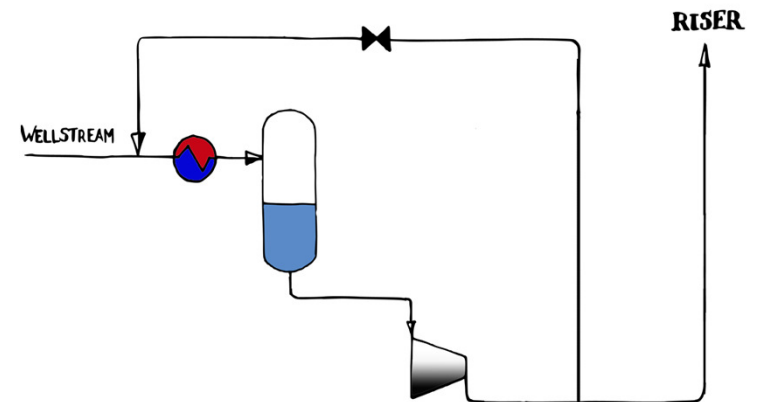
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Summary & conclusion

State of the Art of Subsea Compression

❑ Dry Gas Compression (DGC) Separation, compression, pumping



❑ Wellstream Compression Boosting of unprocessed wellstream



Wet Gas
Performance

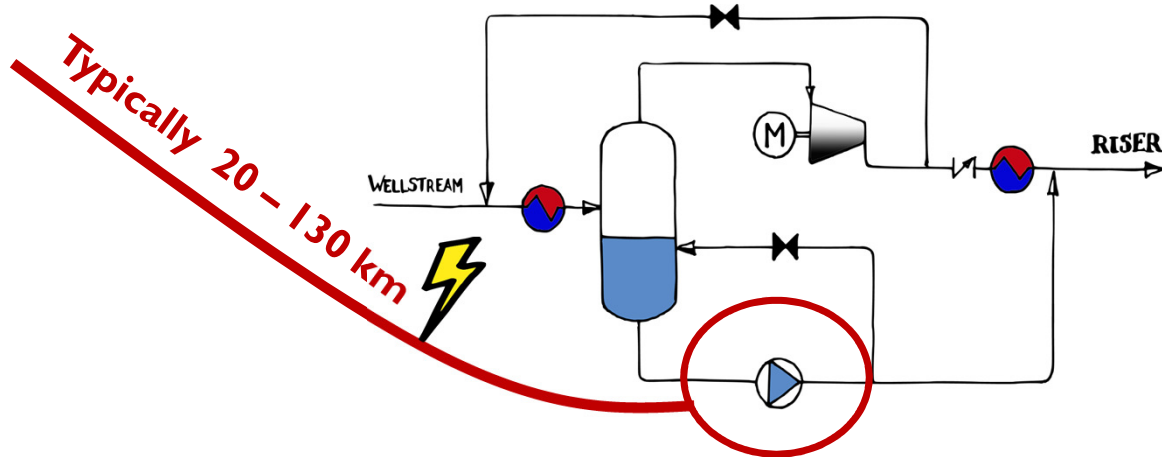


COST



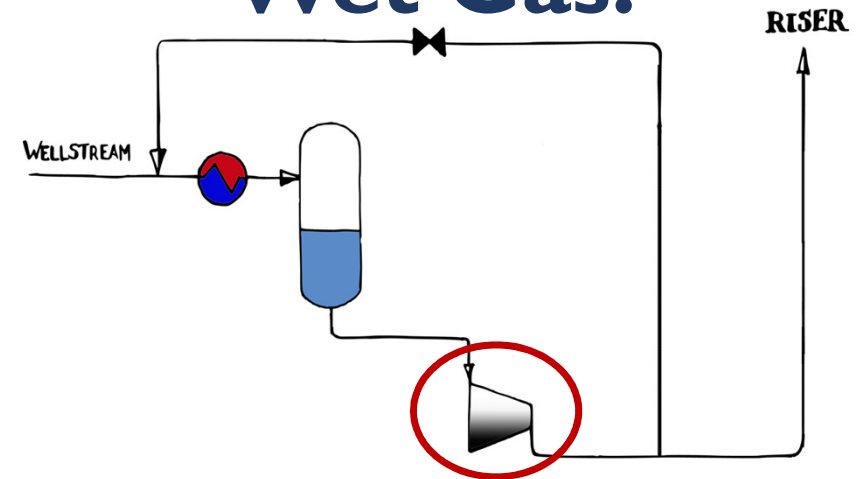
Liquid handling is an Achilles heel in subsea compression systems

Dry Gas:



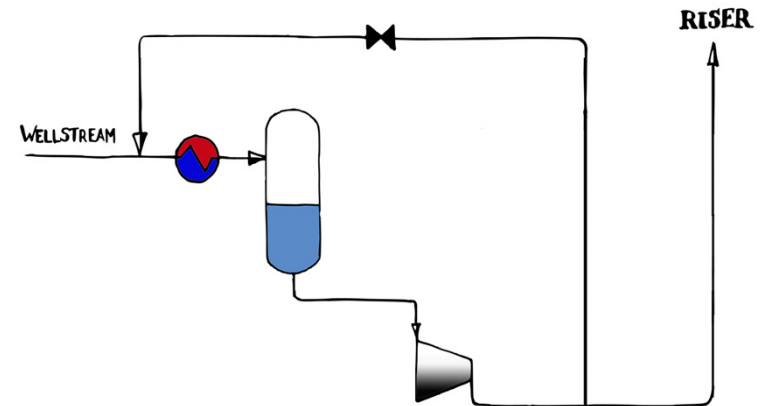
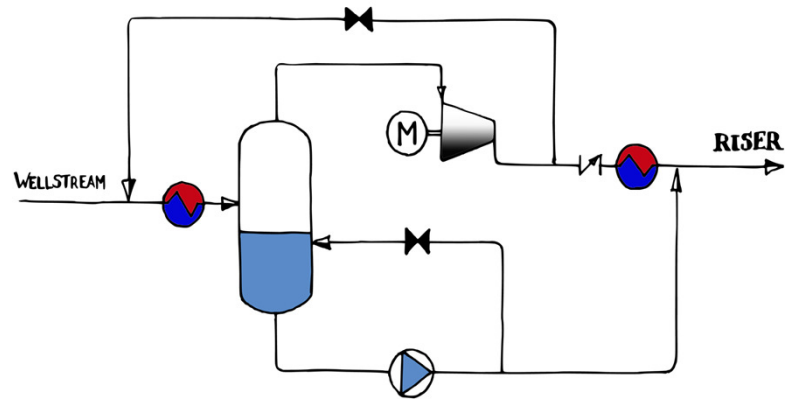
A liquid pump with utilities **add cost**

Wet Gas:

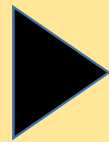


Liquid in compressor
“steals” power

- and it gets even worse with time



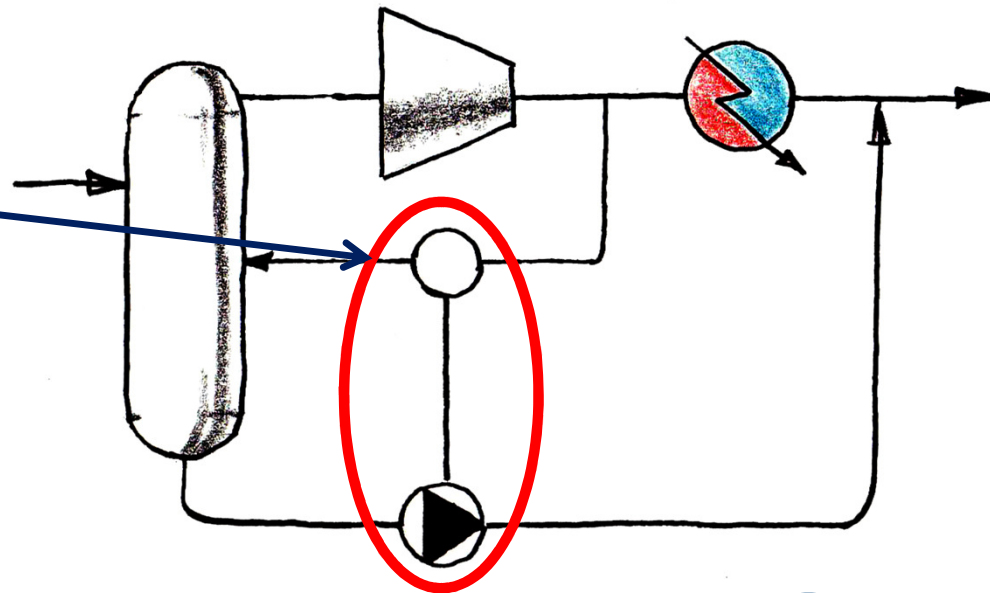
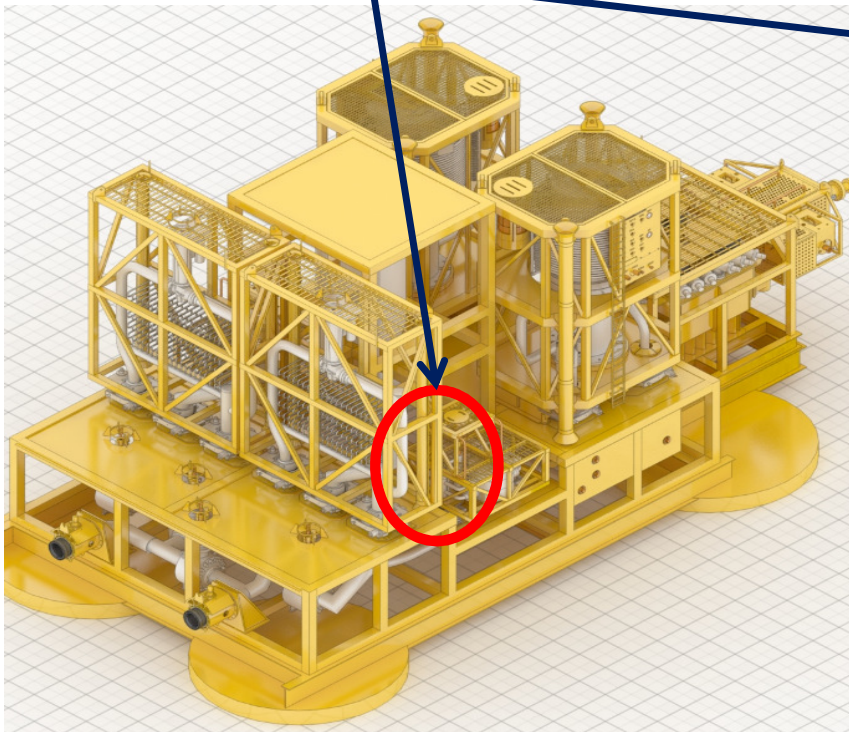
Next Generation
Compression System:



- ☐ No electric pump
- ☐ No (or little) liquid in compressor

ECONOMIC compression system for wet gas fields:

CoBoost
Gas operated liquid pump



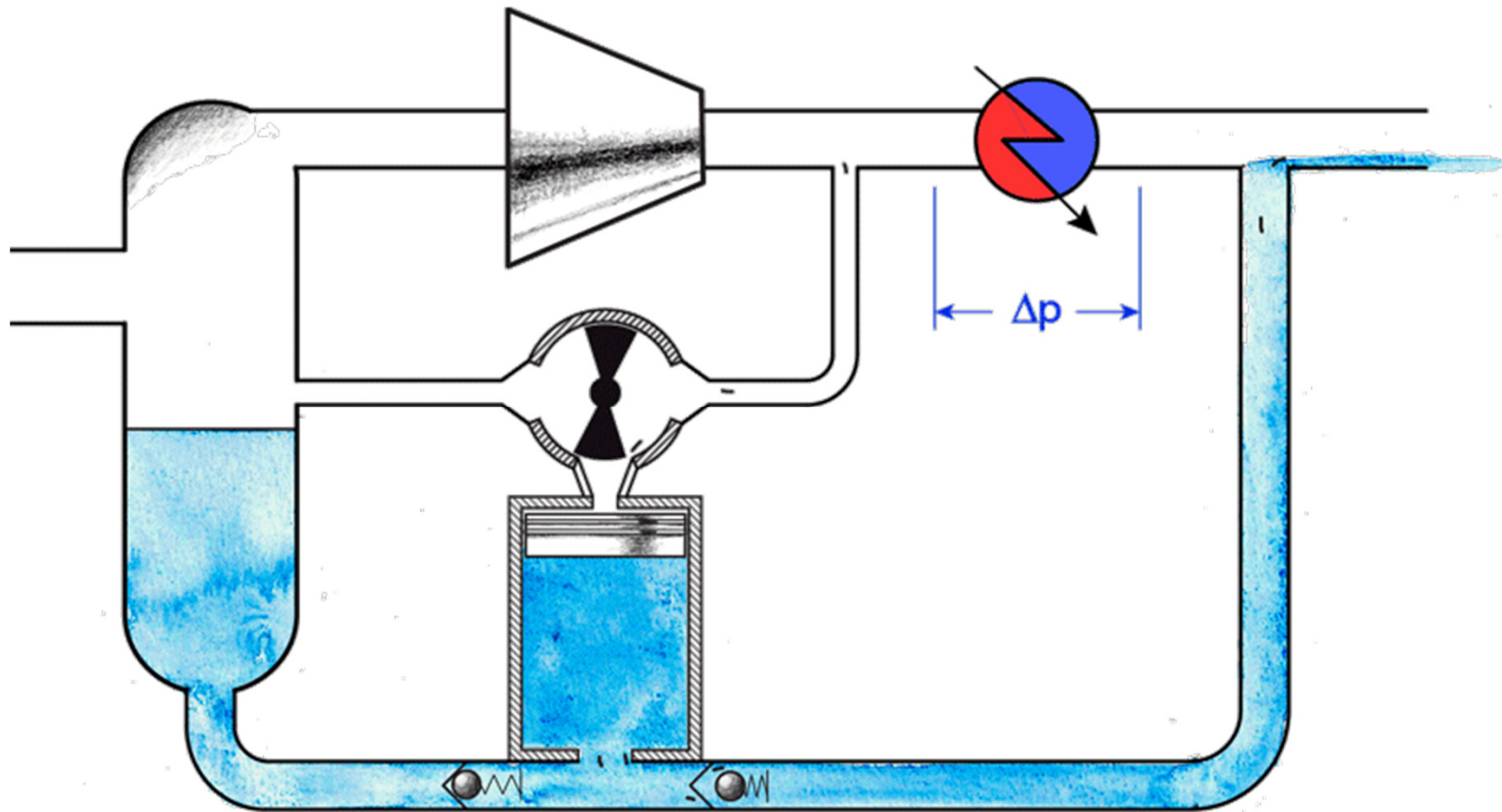
Wet Gas Performance



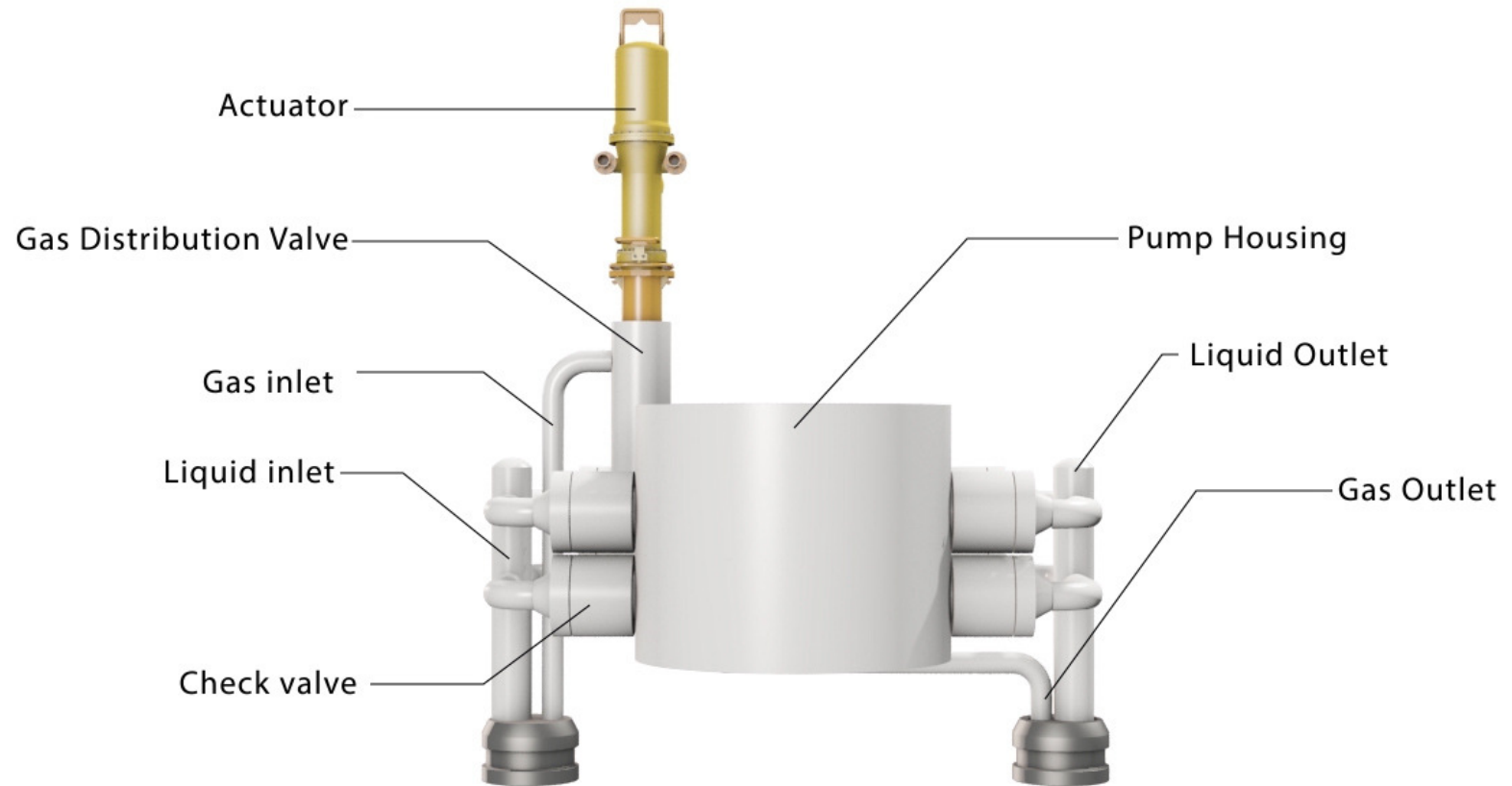
COST



CoBoost – Principle of Operation

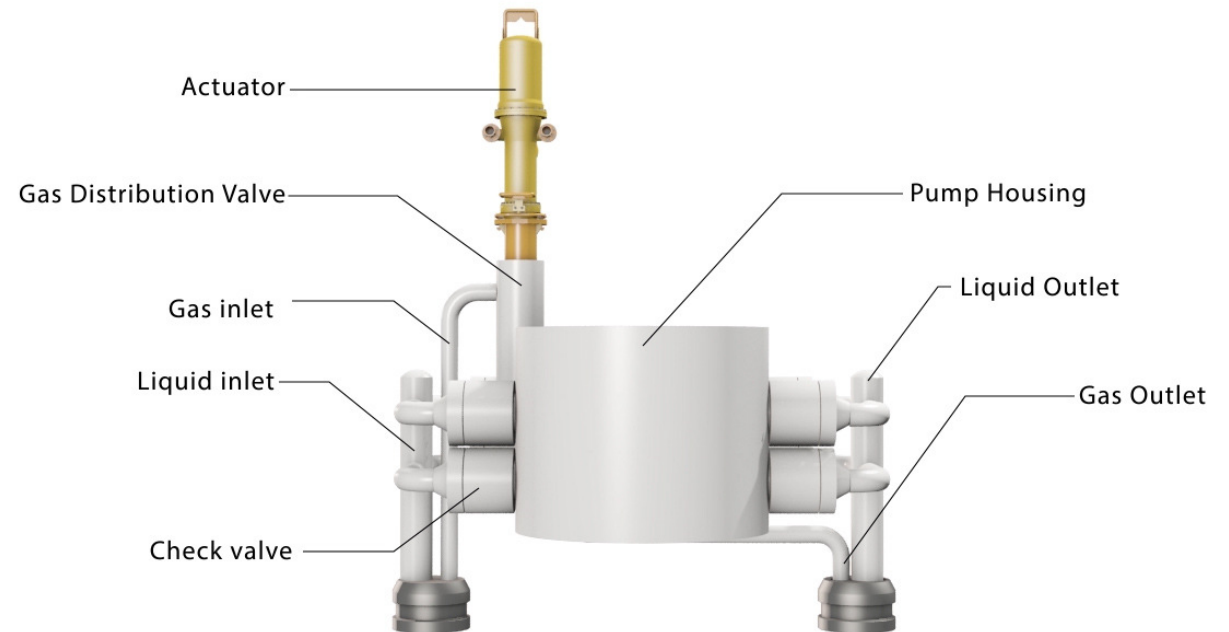
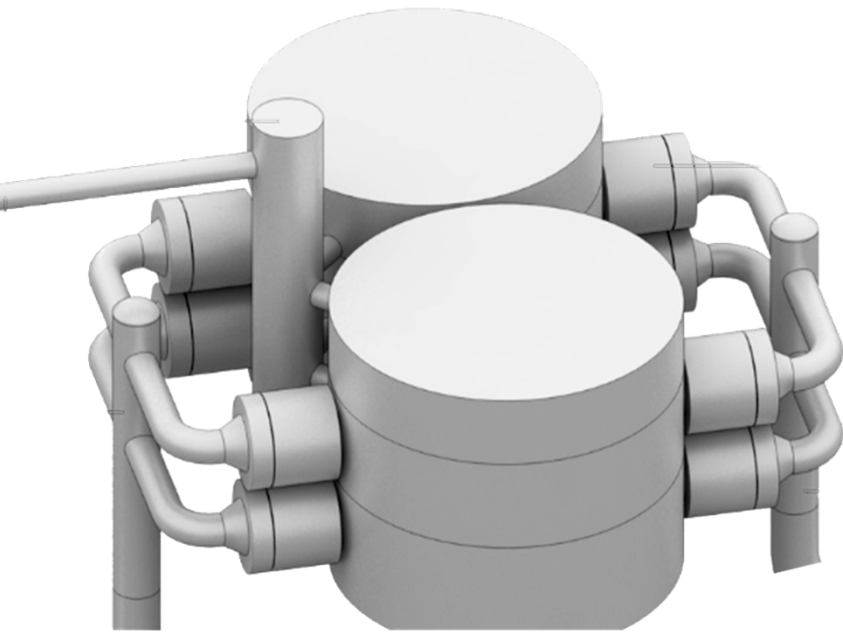


CoBoost Design



CoBoost Design

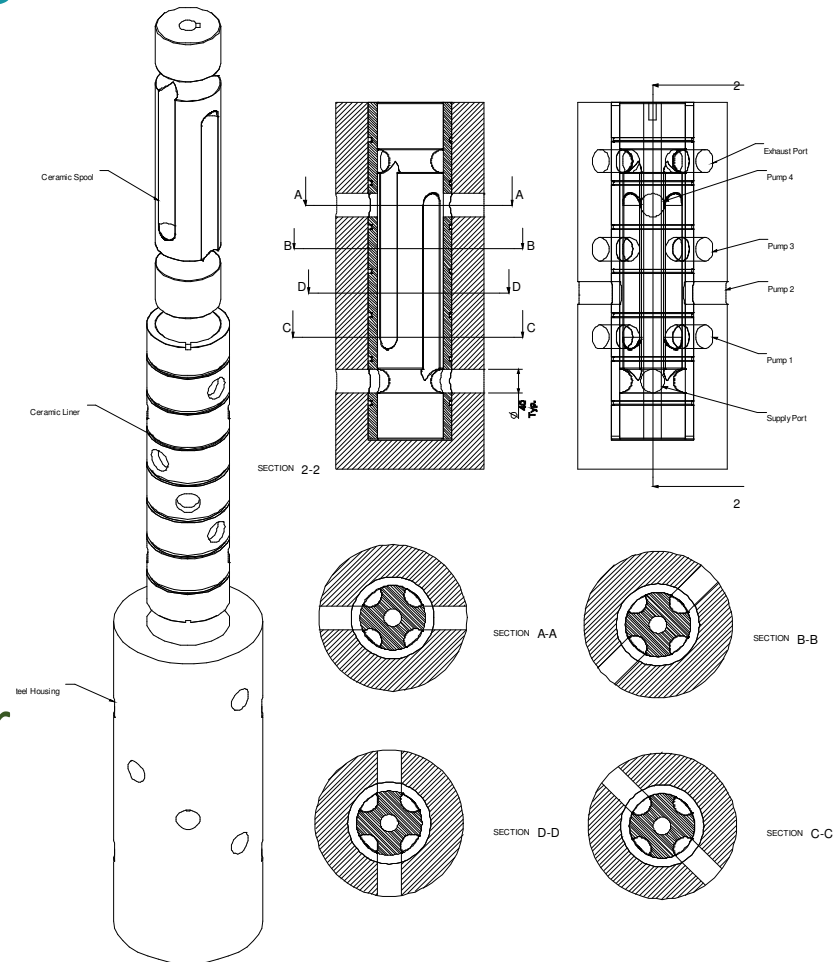
The unit consists of 4 pump chambers



CoBoost – Distributor Design

One rotating gas distributor serving all pump chambers

- Pressure balanced - no radial forces
- Max rotating speed: 8 rpm
- Driven by a standard subsea actuator

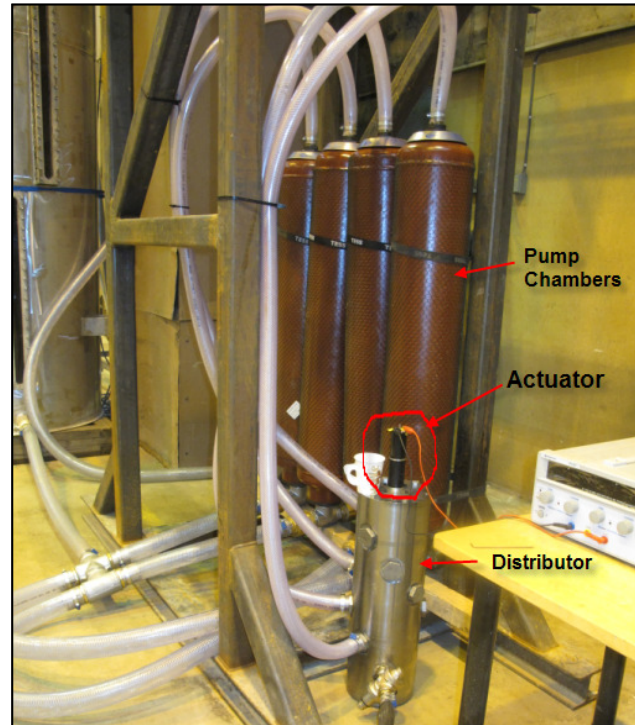


CoBoost – Proof of Concept

- 4 pump chambers represented by bladder accumulators.
- 1 full scale TCFMC-designed gas distributor

Demonstrated:

- 50 m³/h
- Stable flow
- Robustness to variations



Benchmark Case: Åsgard – How it is

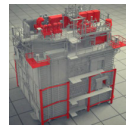
HV Power & Control module

Compressor VSD &
Transformer

Pump VSD & Transformer

Pump Barrier fluid HPU

Switchboards



Åsgard A



Åsgard B

Umbilical System

Dynamic part < 1500m

Fibre link

42 km
tieback

Combined umbilical

Static part ~42km

Power cable

Cable splice

Power umbilical

Pump
Trafo

Pump jumpers
& connectors

Pump

SCSt

Umbilical

Compressor power

Pump power

Pump Barrier fluid

Control power

Fibre optic

Benchmark Case: Åsgard – How it could be with CoBoost

HV Power & Control module

Compressor VSD &
Transformer

~~Pump VSD & Transformer~~

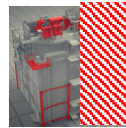
~~Pump Barrier fluid HPU~~

Switchboards

Cost saving:

~ 80 Million USD

... by just replacing the
electric pump with CoBoost



Åsgard A

Dynamic part < 1500m

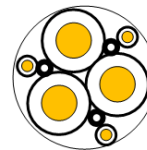
Umbilical System



Åsgard B

Fibre link

42 km
tieback



Umbilical

Compressor power

~~Pump power~~

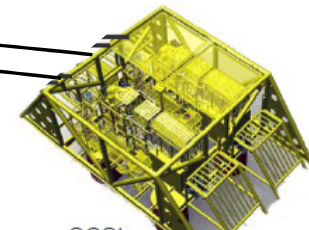
~~Pump Barrier fluid~~

Control power

Fibre optic



CoBoost



SCS*

TechnipFMC

Summary & Conclusion

Economic subsea compression:

**Wellstream Compression is ok for «dry» fields,
but consider upgrading to CoBoost late in life**

**Wet tolerant compression & CoBoost is superior
for wet fields, **OR** for fields with liquid slugs/surges**

Contact details

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