



ADVANCED MODELLING & SIMULATION – AMS

OIL & GAS (1) : PRODUCTION

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OFFER OF SERVICES

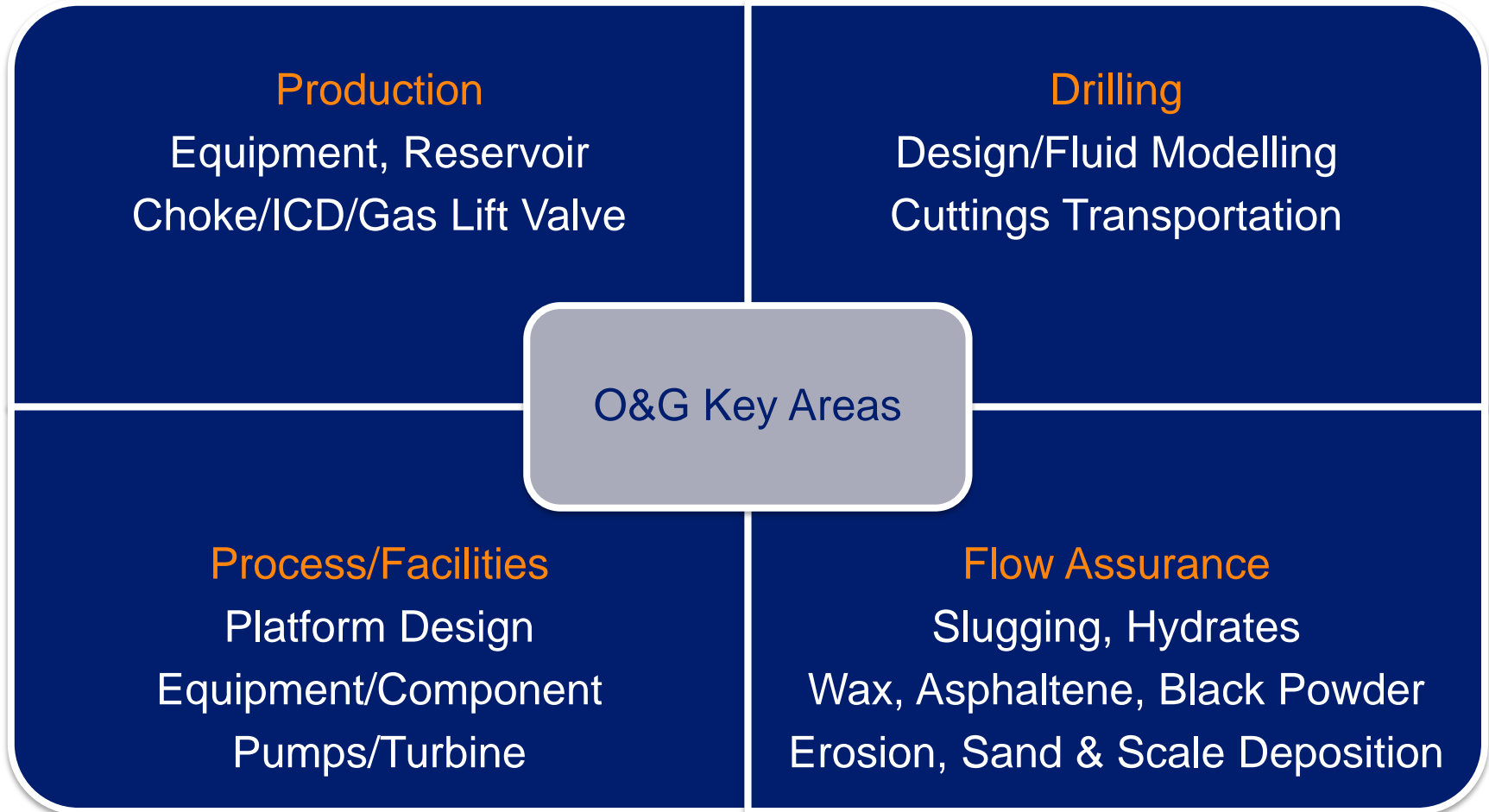
Pöyry AMS group:

- Pöyry's reputation in engineering services is worldwide acknowledged
- Pöyry's AMS has expertise in the 3D simulation (CFD & CMFD) of oil & gas flows using their own simulation platform TransAT
- The AMS group adapts and implements models required by the clients to meet their interests and solve their pressing problems
- New projects are ongoing with potential customers.

Our Offering:

- If there is an interest in consulting then Pöyry AMS can prepare a project work and financial plan
- Alternatively, Pöyry can license its TransAT CFD/CMFD tool under competitive conditions to the clients.

TYPICAL O&G APPLICATION AREAS REQUIRING CFD/CMFD



1- PRODUCTION

Issues & Challenges:

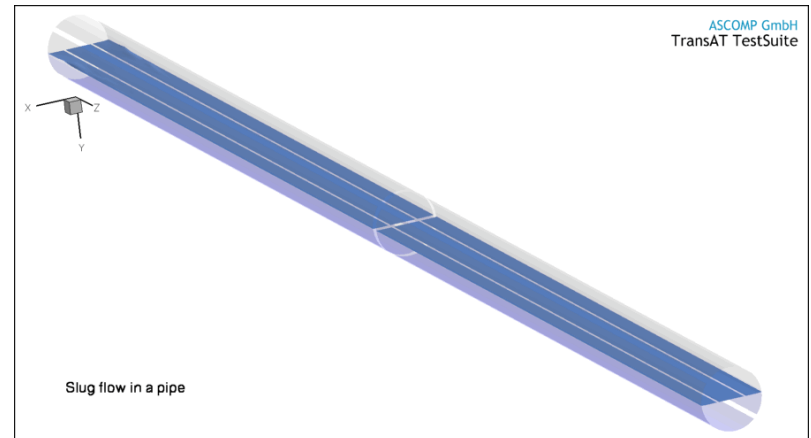
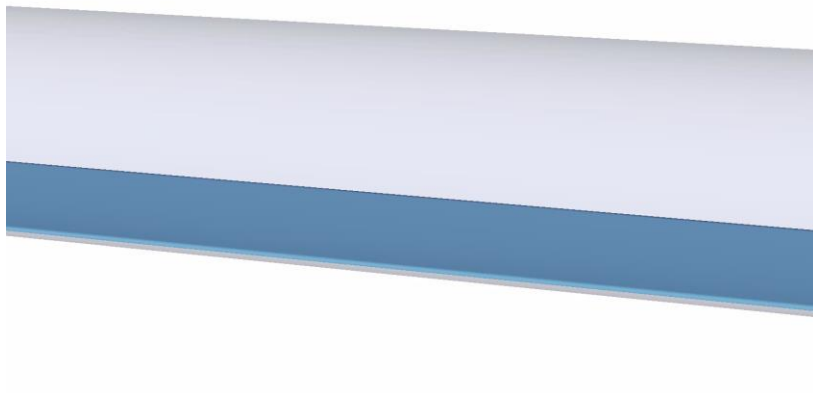
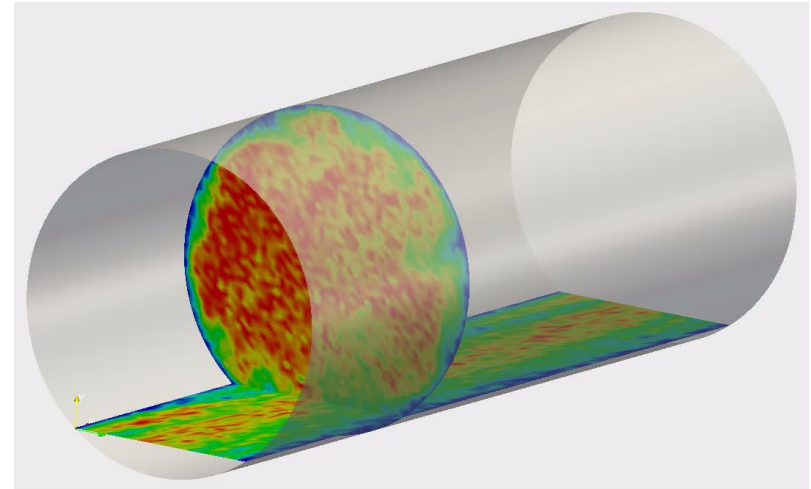
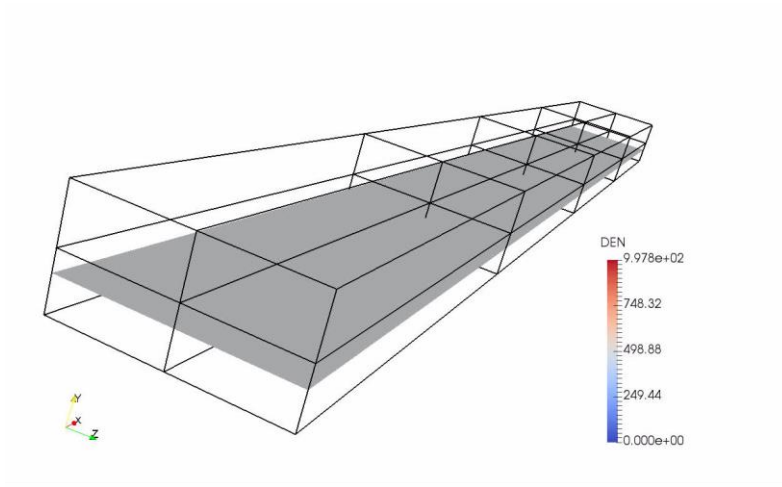
- Growing demand, the need for sustainable operations, declining production, and new resources in harder to reach environments.
- New technologies are developed for:
 - Higher resolution subsurface modelling
 - Enhanced Oil Recovery
 - CO2 capture sequestration.

Benefits of using CMFD:

- Ability to predict complex situations featuring new physics in real geometries
- Better understanding of processes in existing and new technologies
- Put decision making on firmer grounds.



FREE-SURFACE HORIZONTAL FLOWS

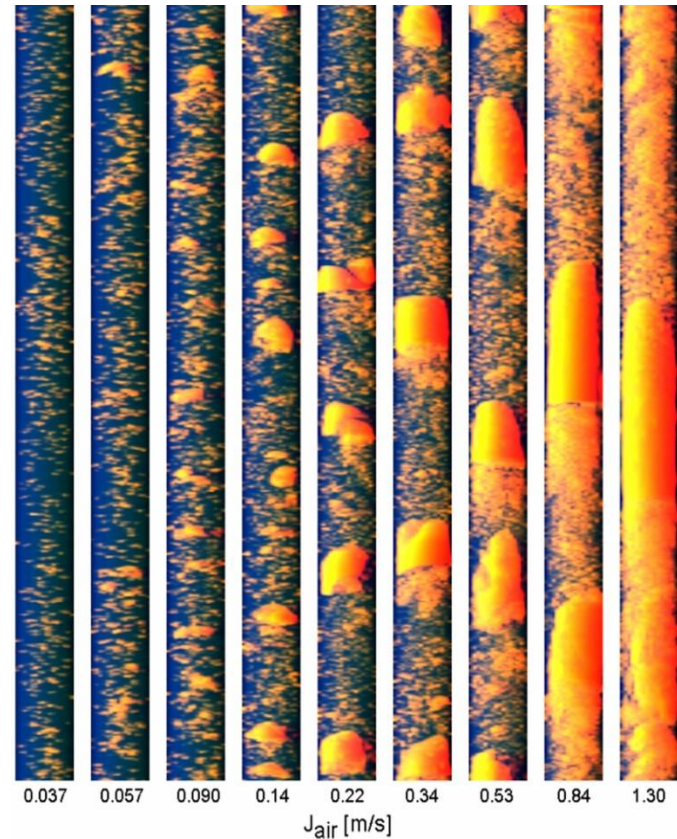


RISER FLOW: THE ISSUES

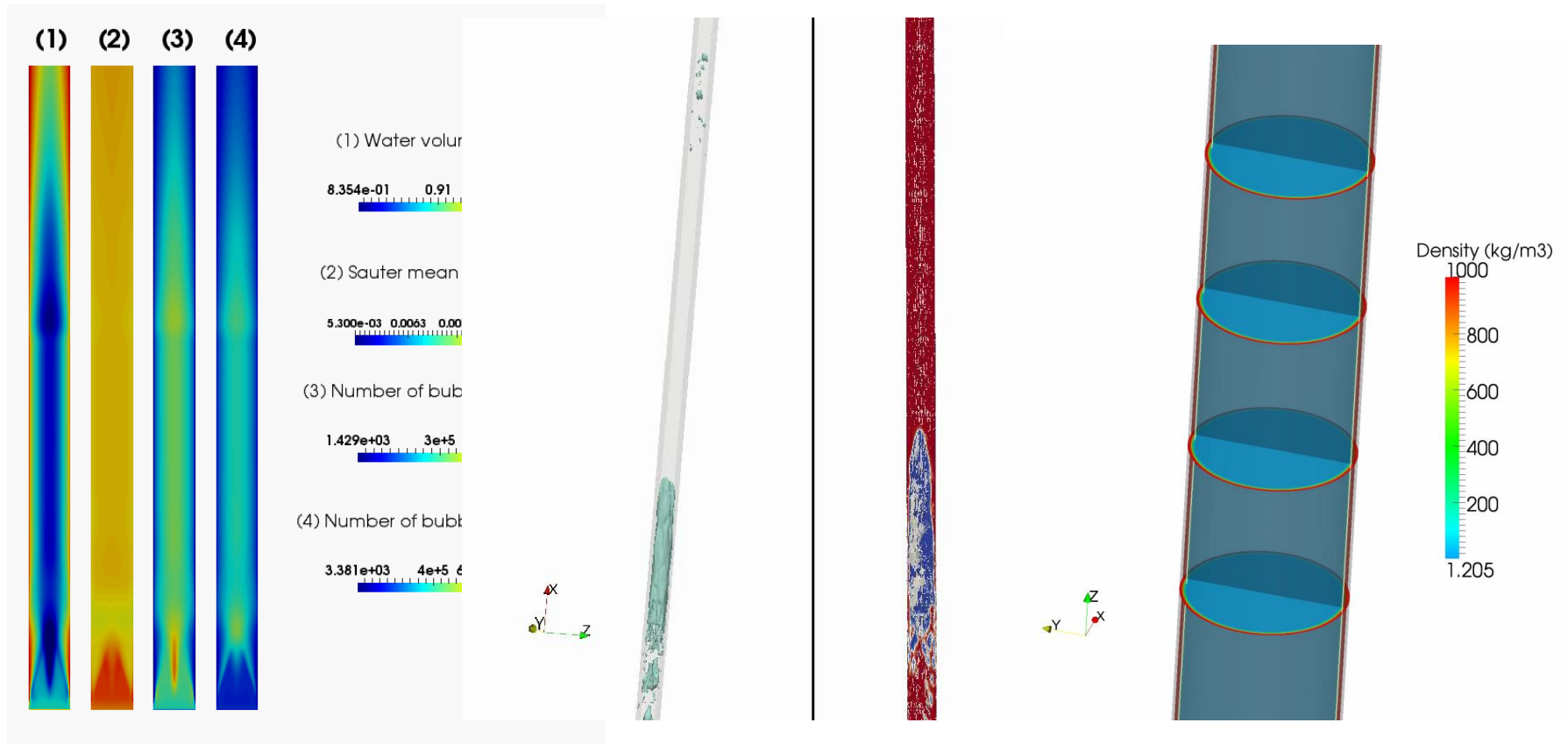
- Flow regime map definition (e.g. slug speeds & size, etc.)
- Phase distribution
- Pressure drop and thermal transients
- Large diameter risers.

Why CMFD?

- Can simulate various flow regimes.
- Advanced models (ITM) are needed for certain flow patterns (e.g. slugging), and
- Can help identify flow regimes for large-diameter risers, as
- Shown in examples of next slide.



FLOW REGIME PREDICTION



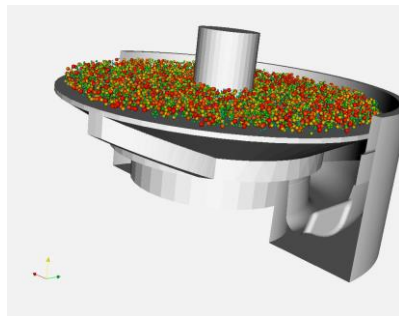
EROSION OF A DOWNHOLE PUMP

Schlumberger

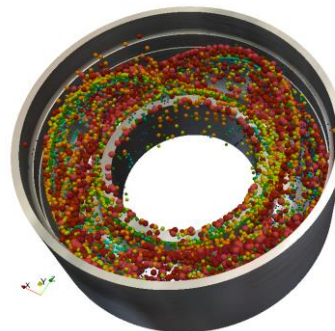
- Downhole compressor pumps a multiphase mixture.
- Sand in the production causes erosion.
- If prediction of erosion is good, then it can be a useful tool for design.

Why CFD?

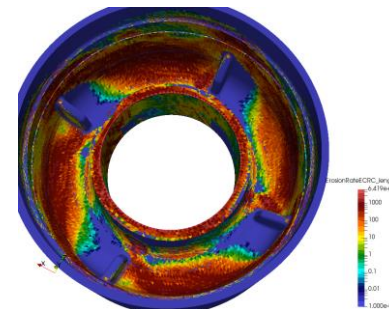
- Can simulate rotating objects ab-initio, flow turbulence, sand dispersion and collision, and estimate erosion.



Simulation of Sand Particles



Sand distribution



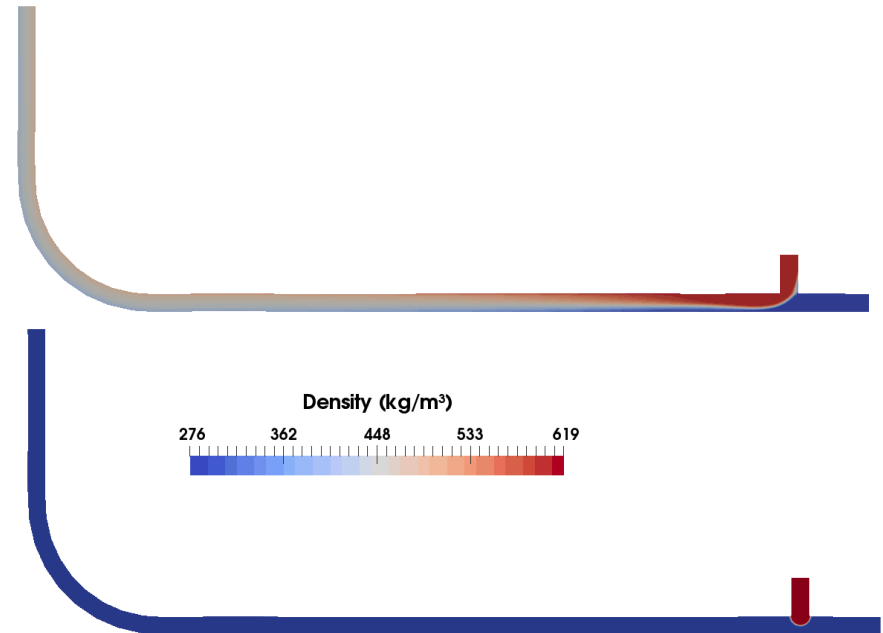
Erosion Rate

EROSION OF FLOWLINES

- Effect of flow patterns can affect erosion in multiphase flow (churn, bubbly, slug).

Why CMFD?

- Can simulate flow patterns, and infer wall shear (thus erosion) for each flow regime.



2-phase flow model	Flow regime	average wall shear (Pa)	max wall shear (Pa)
interface tracking	churn	13	26
homogeneous	bubbly	7	10

EROSION OF PIPES AND CONDUITS

- Phase distribution and solids transport control erosion.

Why CMFD?

- Can simulate flow patterns and particle distribution, and thus determine erosion rate in critical zones.

