
Using Hysys / UniSim as a Fast, Accurate and Robust Pipeline Transient Simulation Tool – Gas and Dense Phase Modelling

AOG Conference March 2015
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- > Fit for purpose modelling functionality
- > Dense phase modelling in Hysys dynamics
- > Gas and dense phase modelling case studies
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Introductions

Andy Jones, General Manager, Perth Office

- > Dynamic process simulation (Hysys, UniSim etc.)
- > Online monitoring package specification, development and commissioning
- > Modelling package integration (OLGA – Hysys / UniSim, Hysys – Pipesim)
- > Use of modelling packages to aid operations and commissioning



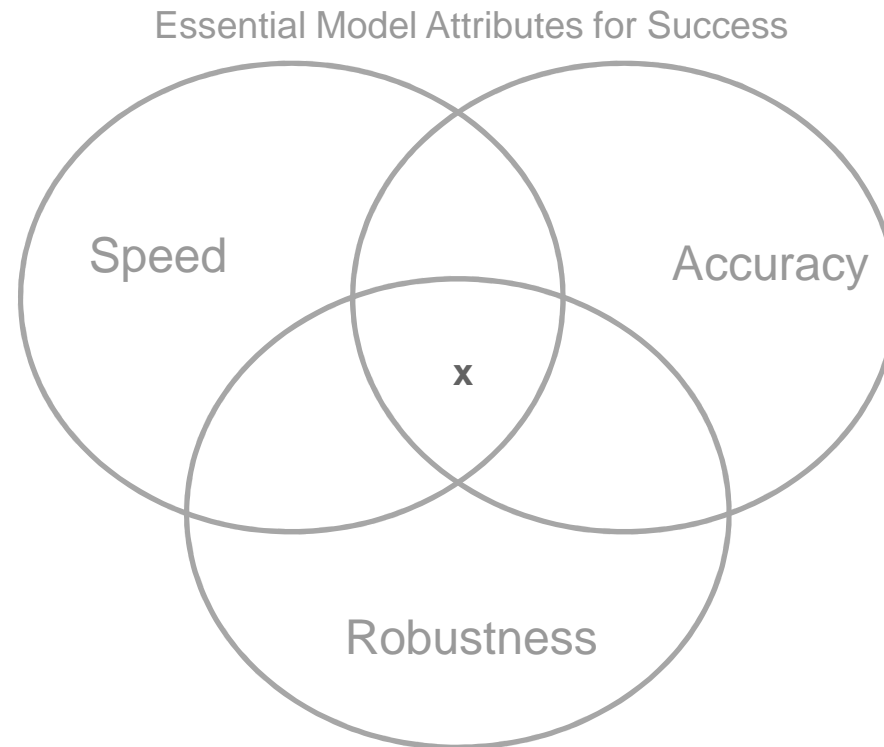
Fundamental Caveats

- > Hysys / UniSim are not a replacement for OLGA / Ledaflow (or similar rigorous multiphase fluid simulation software) in all circumstances by any means
- > There are only specific cases in which the concepts presented here are applicable
- > But where there are opportunities to use Hysys / UniSim, the benefits can be significant



Fit-For-Purpose Functionality

- > **Fit-For Purpose**
Stakeholders agree prioritisation of functionality
- > **Accuracy**
Based on agreed functionality, stakeholders assess minimum accuracy standards
- > **Robustness**
Continually assess the systems uptime and “operating envelope”
- > **Speed**
For simulation inclusive systems, fast computation is essential





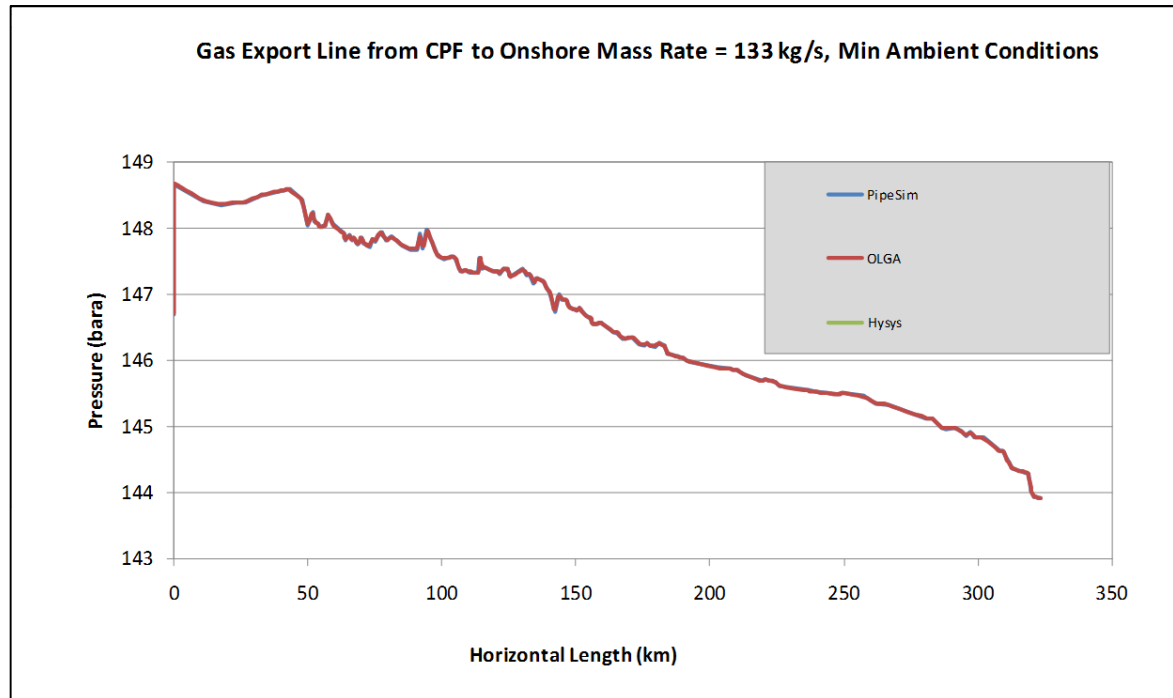
Dense Phase Modelling in Hysys Dynamics

Benefits

- > Quick to build
- > Compositionally tracked
- > Transient
- > Robust
- > Easy to automate
- > Easy to integrate with other packages
- > Fast – typically 40 times real time
- > Accurate in gas and dense phase
- > Cheaper licensing

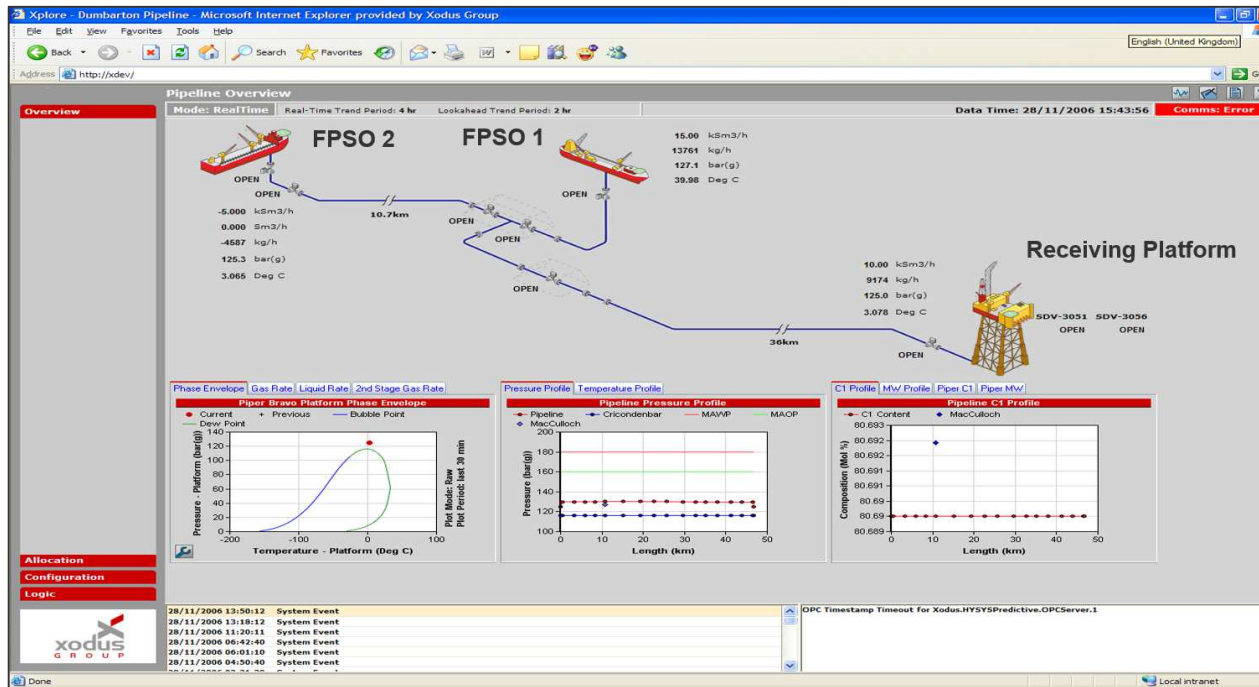
Challenges

- > Two phase results may be less accurate – specifically at very low liquid loading
- > Benchmarking required



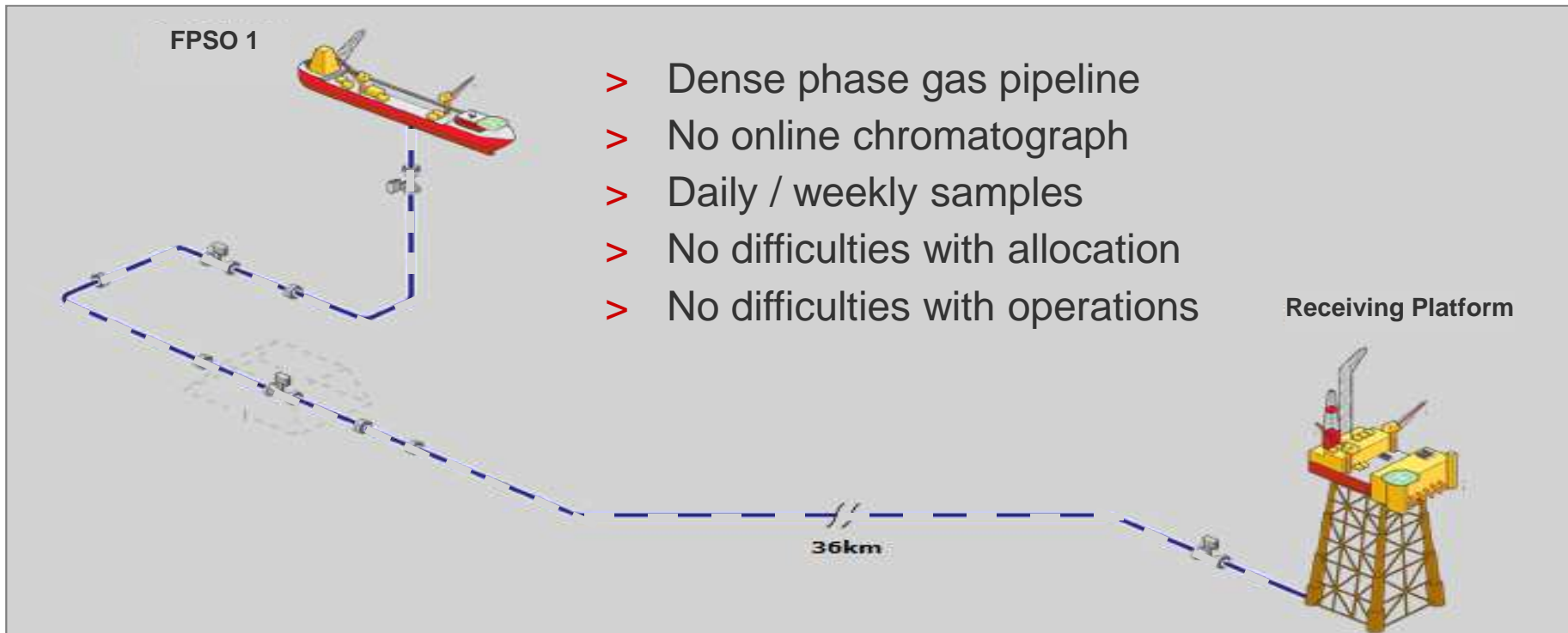
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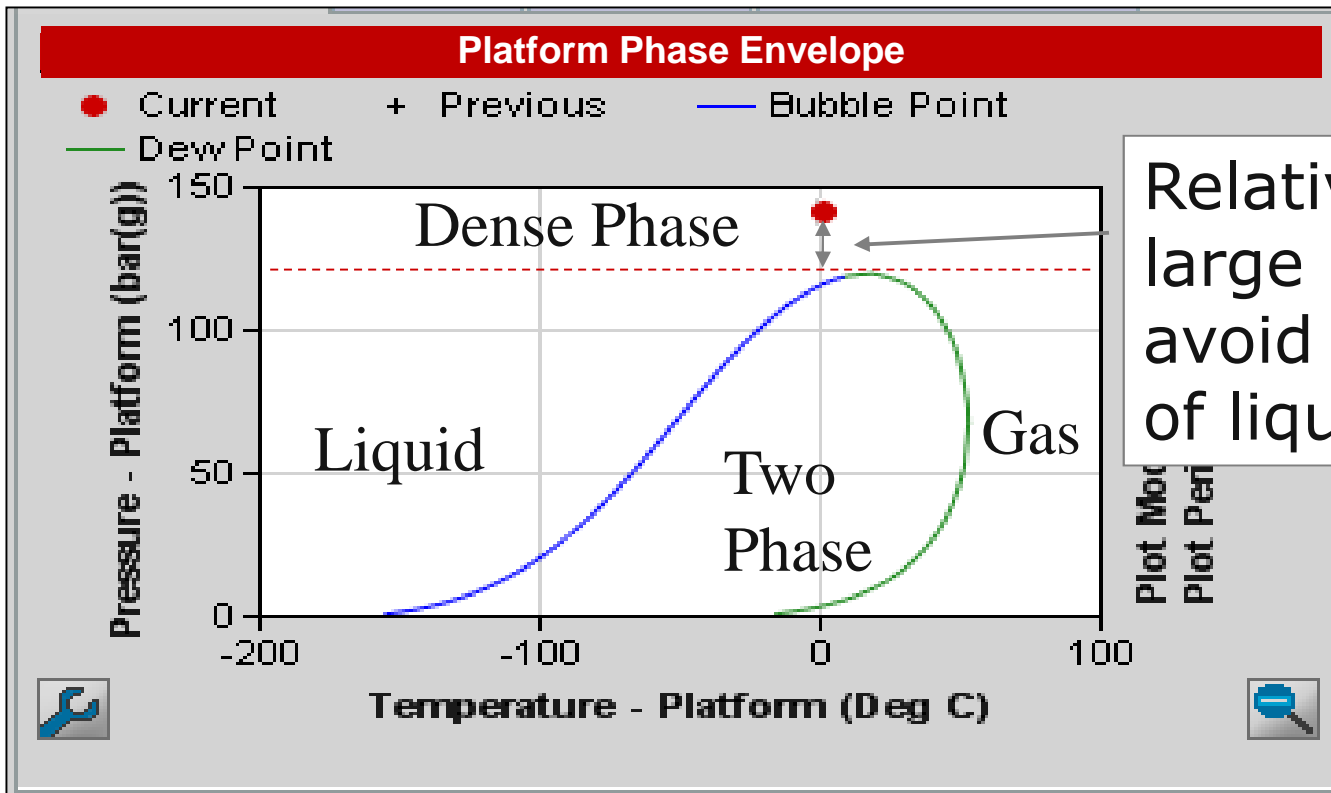
Case Study 1 – Online Monitoring of a Dense Phase Pipeline



- > Single phase dense gas pipeline
- > Online Hysys dynamics models
- > 3 instances of the model
 - Real time
 - 'What if'
 - Predictive
- > Primary functions
 - Liquids management
 - Hydrocarbon accountancy
 - Process visualisation

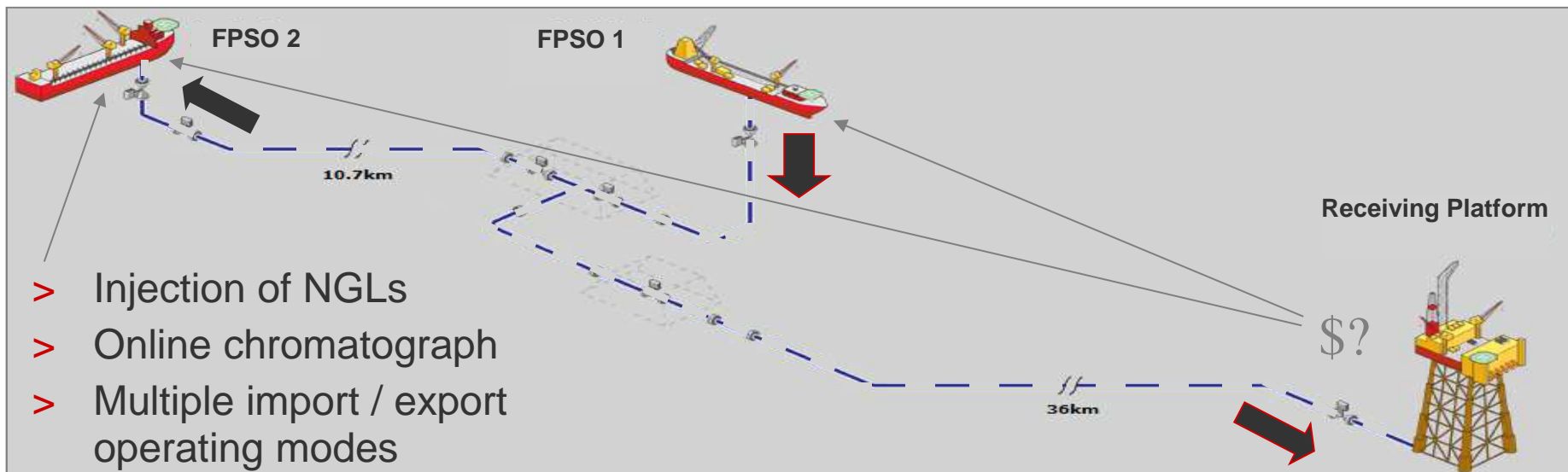
Case Study 1 – Online Monitoring of a Dense Phase Pipeline – Initial Status





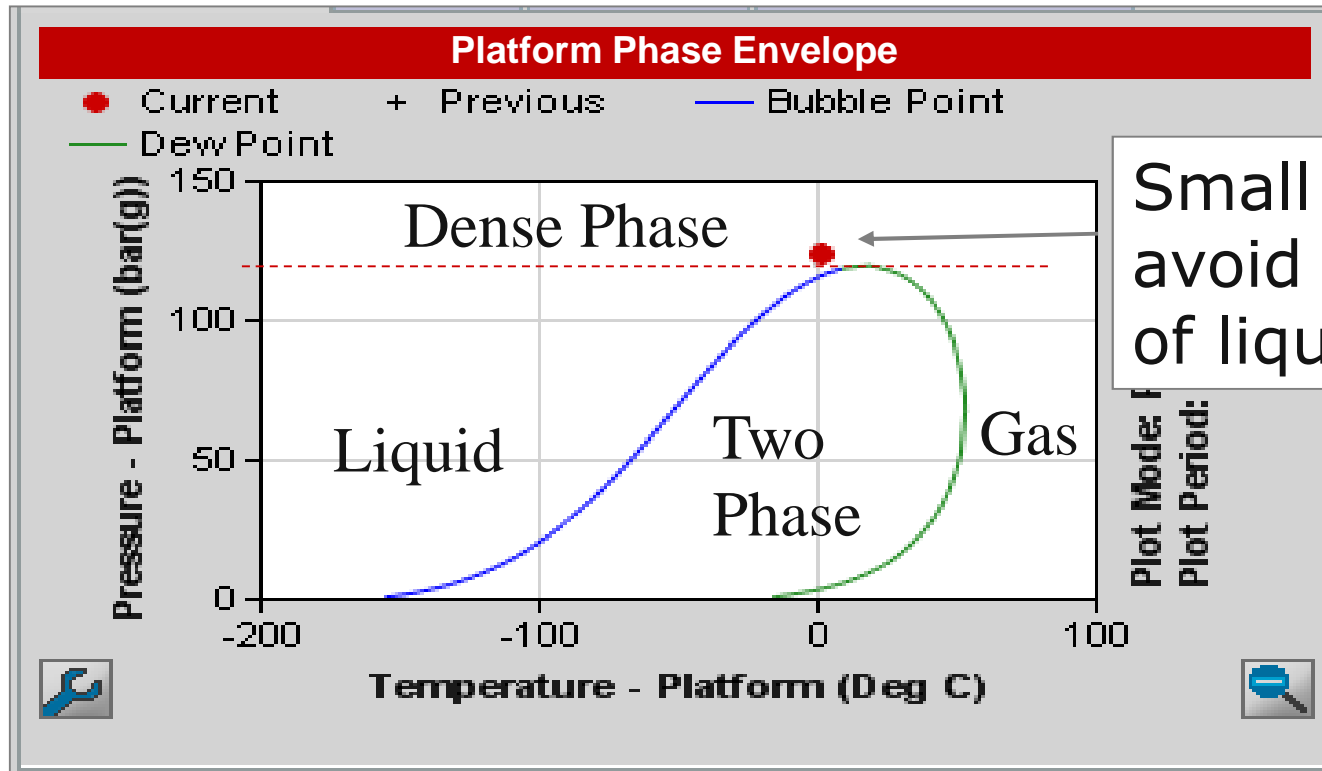
Relatively large headroom to avoid generation of liquids

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Case Study 1 – Problem – FPSO 2 Exports Rich Gas



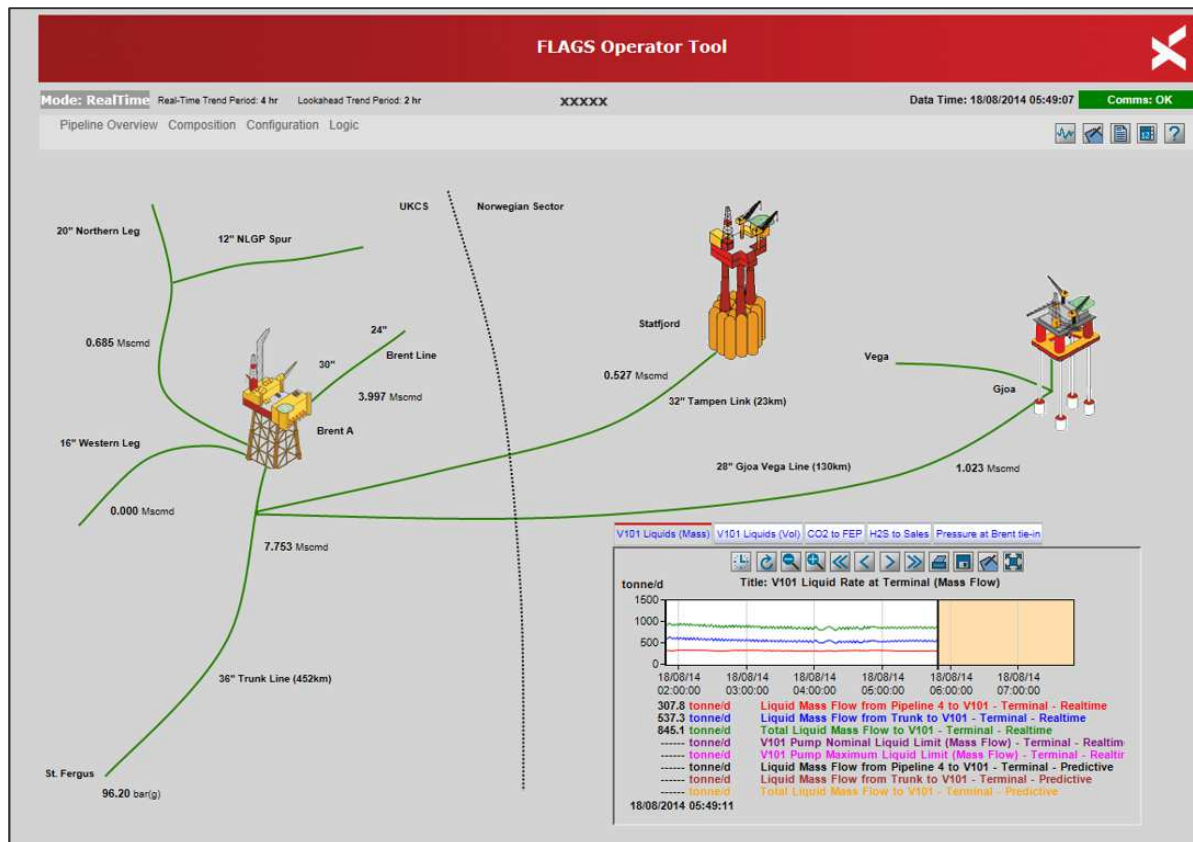


Case Study 1 – Combined Feed Phase Envelope



Small headroom to avoid generation of liquids

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 Case Study 2 – UK North Sea Multiphase Pipeline System

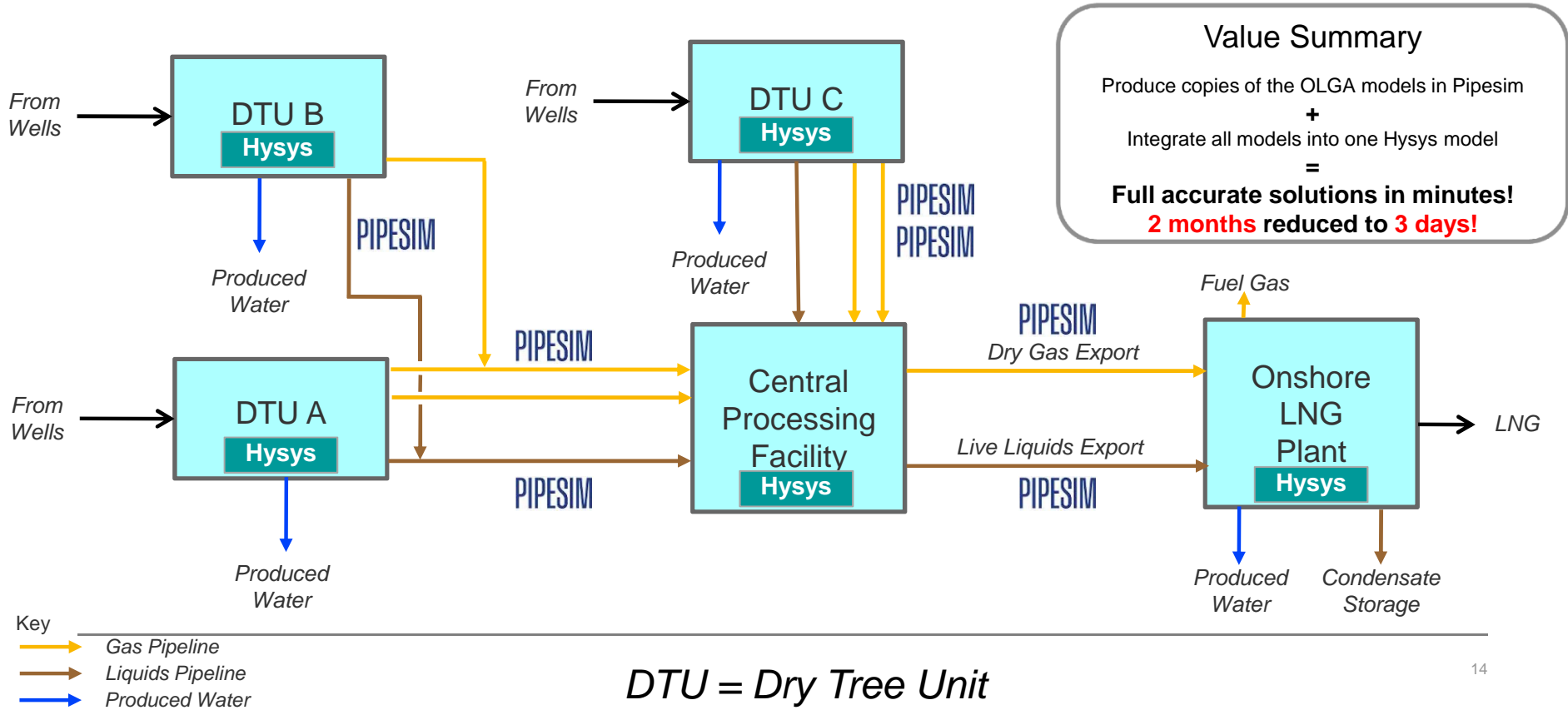


- > Multiphase pipeline
- > Online linked COMPAS and UniSim models
- > 2 instances of the model
 - Real time
 - 'What if'
- > Primary functions
 - Liquids management
 - H2S / CO2 management

XPLORE



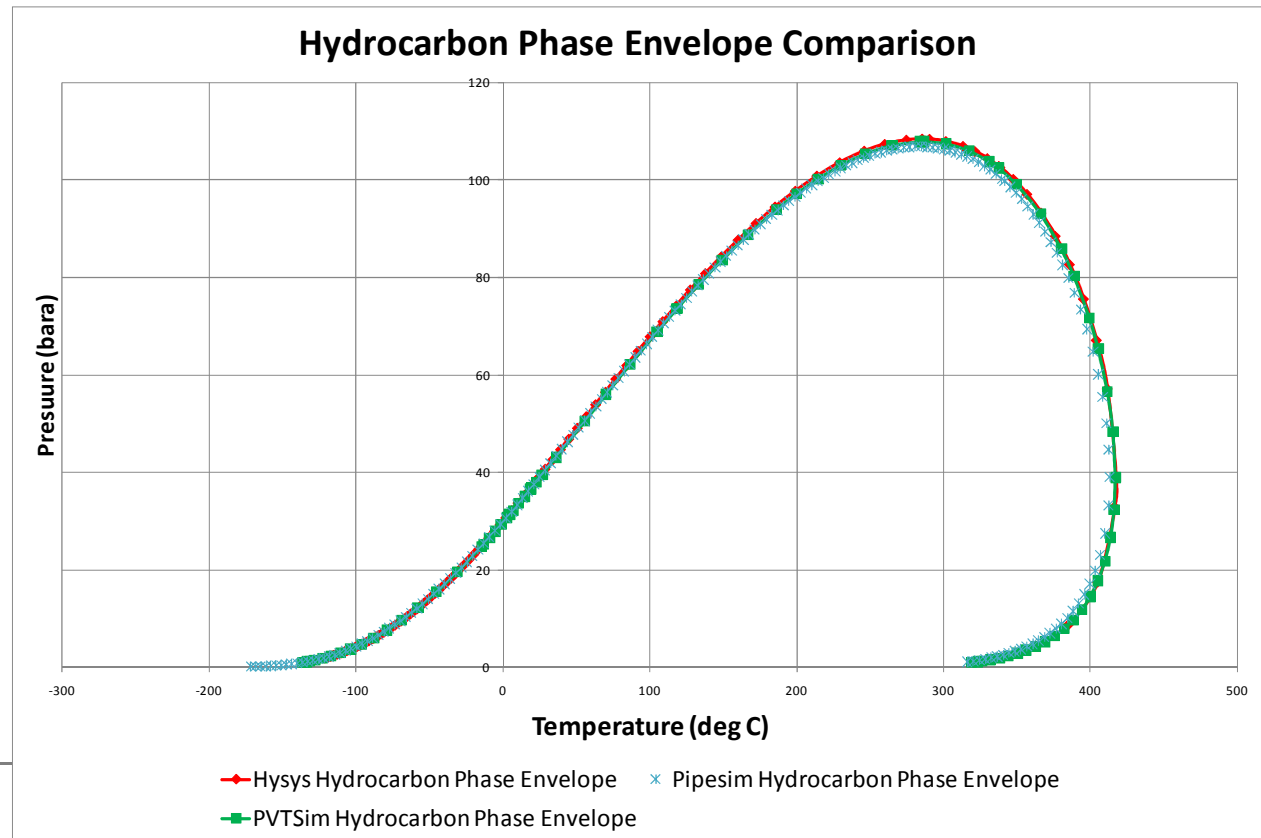
Case Study 3 – Integrated Topsides and Subsea Flowlines Modelling





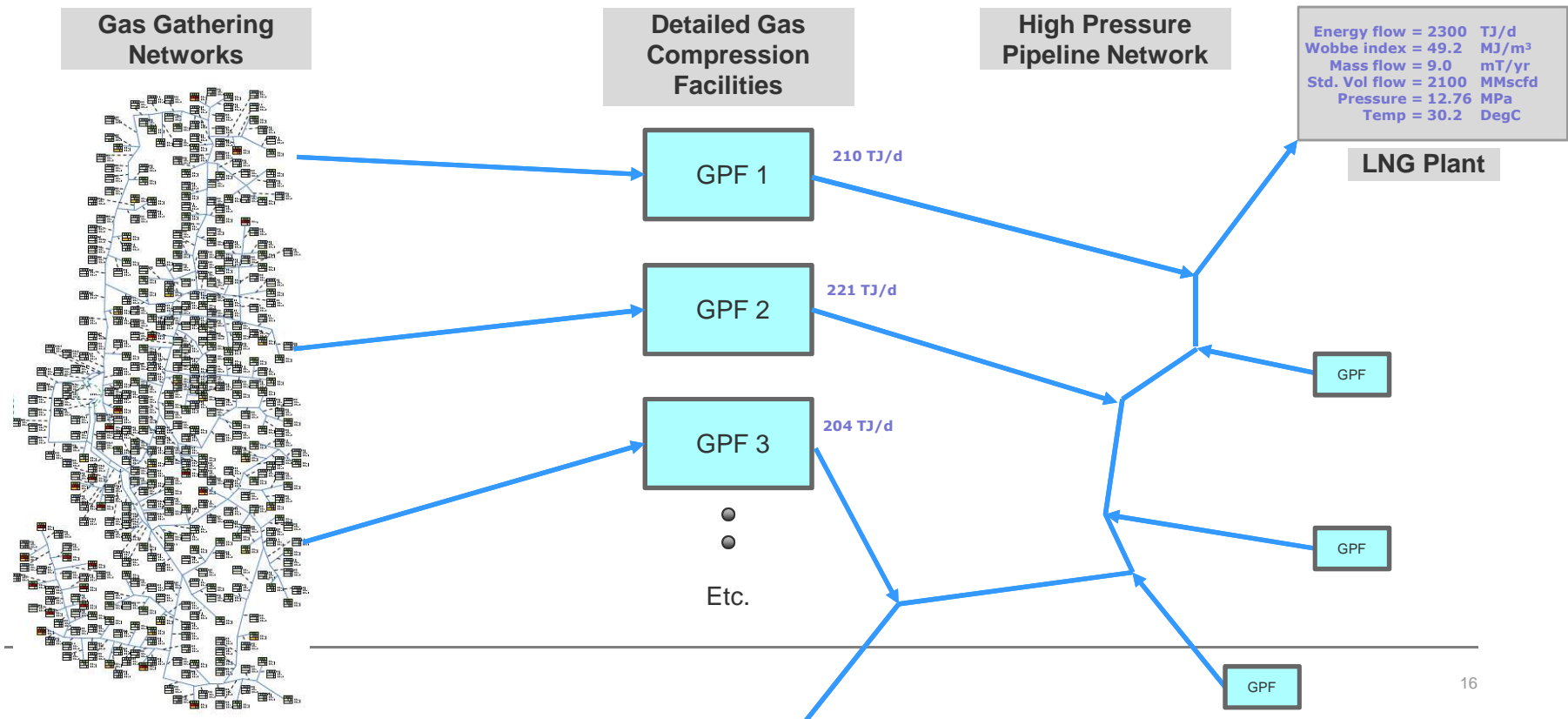
Case Study 3 – Benchmarking Results

- > Correlations showed that for this application the PVT data was almost identical with those used in PVT Sim





Case Study 4 – Coal Seam Gas to LNG Simulation



Summary of the Benefits of Modelling Pipelines in Hysys / UniSim



HARDER

- > More robust without sacrificing accuracy
- > Fully automated solutions removing human error

BETTER

- > Increased productivity
- > Reduced downtime
- > More cost effective

FASTER

- > Reduced detailed design turnaround times
- > Increased run times

STRONGER

- > Fully integrated solutions
- > Using industry standard software which is future proofed



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Thank you – any Questions?



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