



Multiphase flow

Solutions for oil and gas production



Slug suppression system for the Otter tie-back at the North Cormorant platform in the North Sea.

The Shell Global Solutions multiphase flow consultants form a global team that helps to provide fit-for-purpose solutions and operations support for oil and gas production. The team's expertise is broad and multidisciplinary, and is based on many years of technology development and extensive operational experience. Their work focuses on flow- and heat-transfer-related issues in the design and operation of oil and gas wells, pipelines and production facilities.

Your business problem

How can we optimise a pipeline design?

How do we operate a multiphase flow system (pigging, start-up, ramp-up)?

How can we design slug catchers and separators?

Will there be slugging in the pipeline? How can we avoid or mitigate it?

How should flow regimes in the pipeline be controlled?

How long will it take subsea hardware to cool down under shut-in conditions? What will be the effect of cold spots?

Meeting your challenges

We use our extensive experimental facilities and employ state-of-the-art tools in steady-state and transient multiphase-flow simulations to help you develop solutions for your most challenging flow problems. Our expertise goes beyond the application of commercial software such as PIPESIM, OLGA and HYSYS. We have integrated Shell proprietary multiphase-flow models and field experience into these tools to significantly expand and improve their predictive capabilities. Working with Statoil and Norsk Hydro, we have developed the new transient multiphase flow simulator, PeTra (currently marketed by Scandpower).

We routinely work with our customers to define the root causes of production problems, thus helping them to minimise downtime and maximise production.

Services

We offer a diverse range of services in equipment design, troubleshooting of operational problems and system debottlenecking, including

- dynamic and steady-state simulations of multiphase gathering, transmission and distribution systems
- liquid management analysis, including slugging potential and optimal solutions to help mitigate slugging
- provision of dedicated on- and off-line simulation tools designed for monitoring and optimising platform, pipeline or plant performance
- provision of easy-to-use Excel spreadsheets to check gas-oil-water flow patterns, liquid hold-up, and pressure drop
- dehydration services, including the design of free-water knock-out vessels
- heat-transfer analysis for wellbores, risers and flow lines
- thermal analysis of subsea hardware using computational fluid dynamics tools
- analysis of flow-induced erosion and stresses in subsea tees and nozzles
- gas-lift analysis.

Products

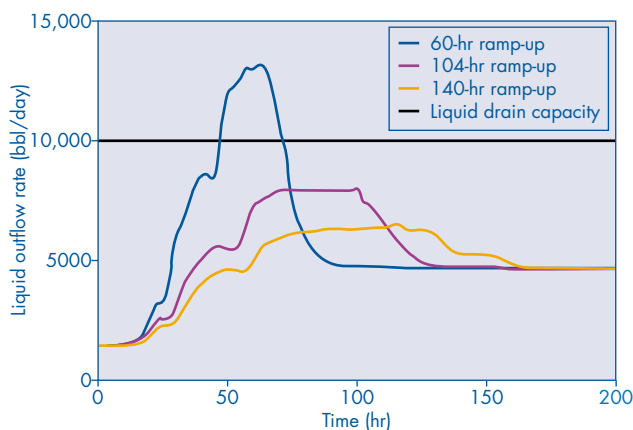
For liquid management, we offer a number of hardware products for smart, active mitigation and control of liquid and gas surges. These products include the Vessel-Less Slug Suppression System and the S³ slug suppression system. The systems are designed to handle most slug types, including severe and transient slugs.

In addition, our product portfolio includes specialised tools, which harness the power of software such as Hyflow, that enable you to perform integrated dynamic modeling of your production systems. Hyflow integrates with HYSYS for the dynamic modelling of facilities and plants and with Aspen Trawflow for dynamic multiphase flow transport in pipelines.

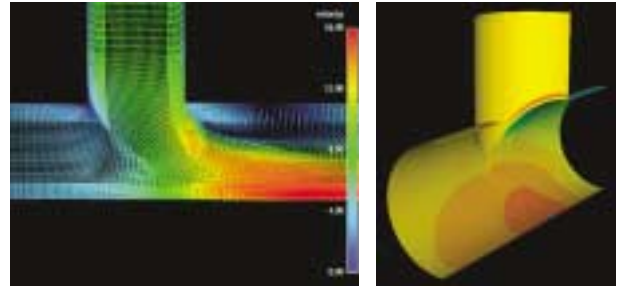
Our track record

We have provided many innovative solutions to customers worldwide to help them improve their operations. Recent services include

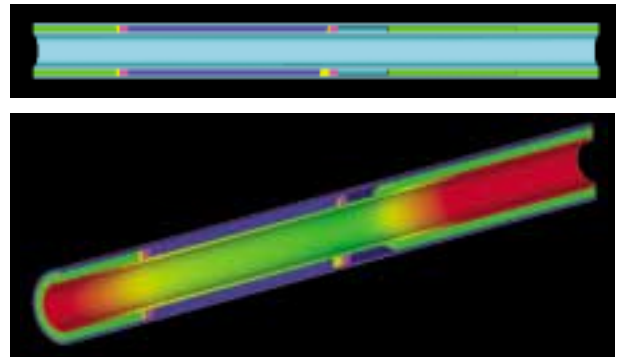
- dynamic simulations for liquid management in a North Sea multiphase flow pipeline
- slug mitigation for a northern European gas–condensate pipeline
- slug mitigation for a Middle East multiphase flow pipeline
- analysis of field-joint cool-down for a development in the Gulf of Mexico.



Liquid flow rate at the riser top: Dynamic simulation to determine the minimum ramp-up time that still fits the liquid drain capacity of the production separator.



The flow field and flow-induced stress in a subsea T-junction caused by two-phase flow that includes small quantities of produced sand.



Cool-down of a subsea field joint under shut-in conditions.

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