



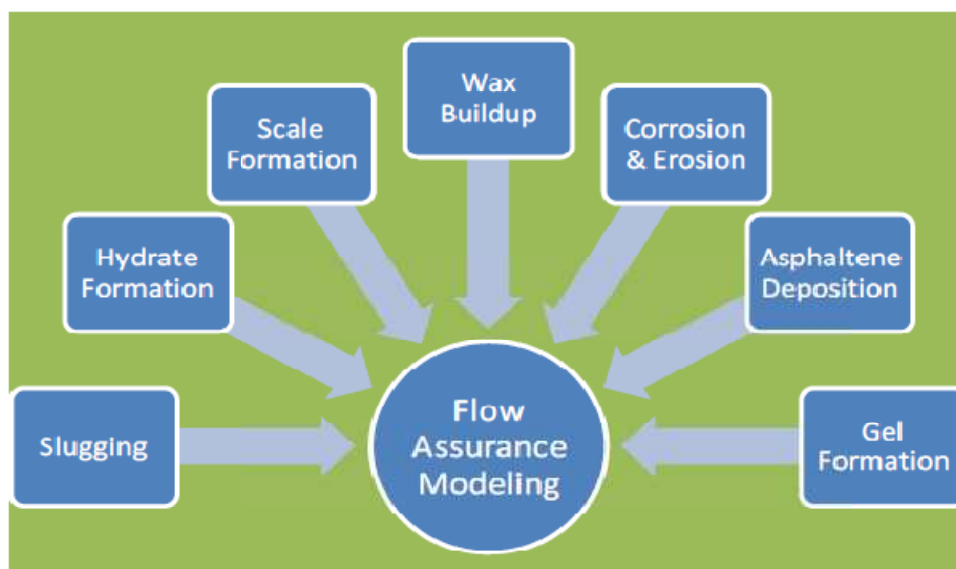
Flow Assurance Engineering

GATE, LLC's fundamental approach to work of all types is to apply a Systems Engineering approach. With deeper waters come more challenges, and hence more specialists and fewer people that see the 'big picture'. One of the major challenges in deepwater projects is Flow Assurance. A term readily used in our industry which means many different things to many different people. Although a major part of Flow Assurance is flow modeling, GATE, LLC strongly feels Flow Assurance Engineering is not limited to only that.

The **GATE Flow Assurance Engineering (G-FLOW™)** Method incorporates the following areas and disciplines:

- Production and Reservoir Engineering (Production Profiles, Reservoir Pressure Behavior, Well Configurations and Optimization)
- Fluid Characterization (Oil, Gas, and Water)
- Flow Modeling (Steady-state, Transient, and Rigorous Choke Modeling)
- Chemical Systems (Chemical Injection Systems, Chemical Qualifications and Screening, Umbilical Requirements)
- Materials Engineering (Materials Selection and Requirements)
- Production Chemistry (Compatibilities, Emulsion, Foaming, Produced Water Treatment)
- Integrity Assurance (Corrosion Modeling, Erosion Modeling, Scale Modeling, Souring Modeling)
- Process Design (Topsides Requirements based on Transient Flow Modeling)
- Operations and Procedure Development (Operating Guidelines and Specialized Procedures based on Steady-state & Transient Flow Modeling)

Flow Assurance Modeling is a key aspect of design work, especially in deepwater oil and gas developments. Several issues impact the flow of oil and gas from the sandface (near wellbore area) to the platform and through the export systems including:





Flow Assurance Modeling should be guided by seasoned professionals that understand the needs of the client and project and will maximize the use of powerful programs such as OLGA®. In particular, all modeling work should be designed to assist in project decision-making.

Flow Assurance Engineering input to Design Teams include:

