GASMOD IS A FULLY INTEGRATED GAS RESERVOIR/MULTI-PHASE GATHERING SYSTEM SIMULATOR, BUILT TO ALLOW YOU TO QUICKLY OPTIMIZE YOUR TOTAL FIELD, NO MATTER WHAT THE SIZE.

In one stand-alone model, it is possible to simulate complex gathering systems (including items such as flow splitting and line looping) with or without liquids, vertical/horizontal wells, 3D gridded reservoirs and/or simple tanks.

Features like drag-and-drop pipeline design and the on-screen UTM coordinate system speed model creation and allow the user to focus their time evaluating development options rather than model building.

Key model applications include:

- Built in dry gas reservoir simulator (with assigned WGR per well):
  - Pipeline Integrity Management System (PIMS)
  - Gas (shallow, tight, shale, conventional) exploitation
  - Lean gas condensates
  - Gas storage (cyclic injection and production)
  - Combination exploitation with gas storage
- Network only or linked to Gcomp:
  - Pipeline Integrity Management System (PIMS)
  - Coal bed methane
  - Gas condensate, volatile oil, black oil
**OVERVIEW**

- Quickly build fully integrated gridded 3D reservoir, complex gathering system, and facility models in one package
- Predict nodal pressures, temperatures, fluid compositions and water born species concentrations in the network
- User friendly input/output interface
- Computationally very efficient – built for large fields with high well counts
- More than 20 years of successful usage
- Currently features VMGThermo, Pipeline Integrity Management System, hydrate calculations with many more developments planned

**CALIBRATION SYSTEM**

- Rigorous calibration of the reservoir and gathering system is achieved by reservoir history match and surface network tuning until the calculated simulator performance agrees with observed performance
- Each update of calibration improves the reliability of the model to accurately forecast the performance of alternative exploitation strategies
- Time saving calibration features such as automatic inflow coefficient calculation, ability to select multiple pipe segments and modify parameters en masse

**USER FRIENDLY INTERFACE**

**Gathering System**
- UTM coordinate system
- Large gathering system display
- Drag and drop gathering system creation
- On screen well and gathering system component additions
- Pipeline color coding
- Create as built network systems

**Exploitation Plan**
- Add and connect infill wells
- Re-direct and loop pipelines
- Insert/modify compression
- Calculate pipeline lengths on the screen
- Automatically calculate inflow coefficients
- Time stepping (input and output)

**Reservoir Model**
- Reservoir properties from spreadsheet arrays or shape files
- Evaluate grid properties from shape files
- Import GRDECL files
- Access commercial databases
- Cut, paste, and scale properties
- View well locations and transmissibility restrictions on spreadsheet arrays
- Cross-sectional displays of reservoir data
  - Corrosion based pipeline risk of failure assessment
  - Energy balance for flowing temperature calculation
  - Hydrate calculation

**INTEGRATED RESERVOIR, WELLOBRE AND SURFACE NETWORK MODELS**

**Reservoir Model**
- Dry gas (pseudo pressure formulation)
- Gridded or tank reservoirs (1D, 2D, or 3D)
- Fully defined reservoir properties
- Multi-layer/multi-zone/multi-reservoir
- Multiple completions
- Dual porosity, local grid refinement capability

**Wellbore Model**
- Multi-phase flow
- Commingling, turbulent inflow
- Vertical/horizontal wells
- Gas lift

**Surface Network Model**
- Multi-phase, multi-component pipeline flow
- Multiple delivery points
- Compression (parallel and booster configurations)
- Chokes, valves, regulators, separators, line heaters
- In-line separators with products remaining in network

**RESULTS ANALYSIS**

- Easy to objectively quantify the benefits of changes to the exploitation plan such as infill drilling, addition of compression (field or plant) and de-bottlenecking of the gathering system
- Compare results (graphically or tabular) on a well, group, and segment basis (i.e. pipe, compressor)
- View results directly on the network system display at any point in time
- Export performance data in Excel® compatible format for further analysis and post processing (i.e. economic analysis)
- Export reservoir results such as grid block pressure and gas-in-place for further analysis and post processing to third party software including Petrel®

*Image created by 3DVAS*
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**CORROSION BASED PIPELINE RISK OF FAILURE ASSESSMENT**

- Corrosion based pipeline risk of failure assessment
- Energy balance for flowing temperature calculation
- Hydrate calculation

**EASY TO OBJECTIVELY QUANTIFY BENEFITS OF CHANGES TO THE EXPLOITATION PLAN SUCH AS INFILL DRILLING, ADDITION OF COMPRESSION (FIELD OR PLANT) AND DE-BOTTLENECKING OF THE GATHERING SYSTEM**

**COMPARE RESULTS (GRAPHICALLY OR TABULAR) ON A WELL, GROUP, AND SEGMENT BASIS (I.E. PIPE, COMPRESSOR)**

**VIEW RESULTS DIRECTLY ON THE NETWORK SYSTEM DISPLAY AT ANY POINT IN TIME**

**EXPORT PERFORMANCE DATA IN EXCEL® COMPATIBLE FORMAT FOR FURTHER ANALYSIS AND POST PROCESSING (I.E. ECONOMIC ANALYSIS)**

**EXPORT RESERVOIR RESULTS SUCH AS GRID BLOCK PRESSURE AND GAS-IN-PLACE FOR FURTHER ANALYSIS AND POST PROCESSING TO THIRD PARTY SOFTWARE INCLUDING PETREL®**
ENHANCED CAPABILITIES

Pipeline Integrity Management System (PIMS)
• PIMS has been added as an integral component of Gasmod to allow the user to perform pipeline integrity calculations. Such calculations include corrosion rate and likelihood of failure. These calculations can be coupled with the users’ corporate Risk Matrix which can be viewed directly within Gasmod or exported as a .pdf report for regulatory submission. This streamlines the evaluation process and ensures a consistent method of satisfying internal and regulatory requirements.

Heat Transfer and Hydrates
• Integration with our world class VMGThermo thermodynamic engine allows for heat transfer, temperature, and hydrate calculations to be performed when required. Such capabilities further enhance Gasmod’s accuracy and power for performing network modeling and evaluating critically important flow assurance issues.

GCOMP
Gcomp is a multi-phase reservoir simulator module that provides a robust and flexible phase behaviour treatment along with component and species tracking capabilities. It is computationally fast, stable and memory efficient. It uses a user interface and data base structure that is analogous to Gasmod, significantly reducing training times and software maintenance efforts.

Four simulators in one: Black Oil, Fully Compositional, Pseudo Miscible, and Chemical Flood.

Gcomp can be linked with Gasmod gathering system simulations whenever multi-phase, multi-component reservoir simulations are needed.

FUTURE DEVELOPMENT
VMG’s acquisition of PHH Engineering Software Ltd.
provides a truly integrated modeling platform from the reservoir to distribution.

PHH’s talented development group is now part of VMG, combining their proven track record with VMG’s leading development team.

There are many exciting developments planned for Gasmod including additional integration with VMGThermo and VMGSim.

In addition, there are opportunities for many new developments to provide unprecedented modeling capabilities for total asset optimization.

FULLY INTEGRATED GAS RESERVOIR & GATHERING SYSTEM SIMULATION SOFTWARE

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