OVERVIEW

Production challenges are increasingly being handled through advanced completion strings. Modeling fluid flow through these complex completions is beyond traditional reservoir simulation and nodal capabilities. The models should combine an accurate reservoir inflow with a highly detailed wellbore model. As completion complexity grows, the need to model flow through the tool string grows as well. NETool™ software offers unrivaled steady-state numerical simulation for the modeling of multiphase fluid flow inside the wellbore and in the near-wellbore region. NETool simulator fills the gap between reservoir simulators and lift design software. It combines reservoir deliverability with completion flow performance to enable rapid modeling of complex well hydraulics.

NETool software is a unique, standalone application. The vast majority of software used for simulating flow in pipes uses nodal analysis, a technique that simulates flow along the pipe in a 1D topology. Any inflow (e.g. valve) is simulated as a joint between two 1D strings. In contrast, NETool software covers wellbore and near-wellbore regions with a 2D mesh of nodes (similar to what reservoir simulators do) taking into account radial symmetry. By using this approach, a continuous, highly-detailed flow map between the reservoir, tubing, and up to four concentric annuli is possible. Instead of relying on tank or PI models as it’s typically done in nodal applications, NETool simulator imports reservoir grid files to simulate inflow. As a result, users can import reservoir and survey information, build the well completion by selecting from a component library, and get a detailed well analysis in minutes. NETool software’s powerful numerical solver generates pressures, flow directions, rates, void fractions, fluid properties, temperature, IPR, PI and more. Overlaying plots (e.g. inflow vs. measured depth) from different runs gives users a comprehensive understanding of flow, going well beyond comparing rates at the wellhead.

NETool software targets well planning and completion design processes, helps troubleshoot production problems, and aids in choosing corrective actions – making it invaluable for production engineers operating complex wells. Reservoir engineers benefit from the ability to export completion design into Nexus™ or Eclipse™ keywords.

• When is NETool simulator an appropriate tool?
  - Long reservoir contact wells
  - Advanced and multi-lateral wells
  - Wells through multiple zones or thin pay intervals

• What can NETool software help with?
  - Perform accurate nodal analysis for complex wells
  - Cope with reservoir properties uncertainty
  - Perform as a completion design interface for reservoir simulators
  - Hinder gas or water breakthrough
  - Well placement inside reservoir
  - Selection and design of advanced completion components
**BENEFITS**

**More time for analysis**
Engineers are relieved of the tedious process of creating nodes and choosing flow correlations for every completion as the software does this automatically based on completion type and parameters chosen.

**Multi-disciplinary solutions**
NETool’s simulator is designed to overcome the barriers between engineers who are responsible for well hardware design and reservoir engineers who are in charge of an accurate inflow picture in order to correctly estimate production rates. However, reservoir engineers often do not have the tools and the time to extend their analysis beyond the sandface. NETool software’s integrated approach solves this challenge by exporting completion design created by a completion/production engineer into Nexus™ or Eclipse™ model.

**Increased production from improved completion designs**
As reservoirs get deeper, hotter and harder to produce, the importance of advanced completions — mostly Inflow Control Valves (ICVs) and Inflow Control Devices (ICDs) — increases. Studies show that ICD/ICVs, when designed and applied properly, typically increase oil recovery from 3% to 7%. Factors to consider include:

- Accurately simulating complex flow patterns in the production part of the well
- Improving well design and actions based on production performance
- Tailoring the completion to properties found while drilling

**Production optimization**
- Assess production impact of new completion and drilling technology
- Understand poorly performing production wells
- PLT (Production Logging Tool) interpretation

*NETool reads reservoir grid to calculate inflow into the well.*
- Stimulation or re-completion design
- Stochastic analysis.
- ESP (Electric Submersible Pump) design

**Predict recompletion performance**

Mature wells can often be revived by a recompletion (e.g. blocking break-through zones). Many times the original or existing completion cannot be removed and an inner string must be run creating a gap. A detailed NETool simulation performed to validate the recompletion design can predict if fluids will permeate through the gaps and cause problems. NETool software can simulate production from possible recompletion scenarios quickly to provide timely decision support.

**Hardware selection and validation based on production response**

The selection of any downhole hardware must be supported by modern engineering software capable of accurately modeling well performance when the hardware is run in the well. NETool software allows any engineer to model any completion equipment inside any well. It has a database of electric submersible pumps and inflow control devices. NETool software is the industry’s first choice for ICD/ICV and advanced well completion design. NETool software is used to evaluate the effects of advanced completion components, pumps, well position, well length, and multi-laterals.

**FEATURES**

**Wellbore hydraulics in completions**

- Oil-gas-water flow, non-Newtonian fluids
- Extended black oil pressure/volume/temperature (PVT) model, passing through bubble point, condensate
- Simultaneous tubing and up to four annuli flow
- Completion-specific flow correlations
- ESP database
- Ability to use Vertical Lift Performance tables from other software
- Specification of bottomhole pressure/tubing head pressure (BHP/THP) or flow rate as simulation target
**System and Software**

**SOFTWARE REQUIREMENTS**
*Oracle Java® 8.1 or higher*

**OPERATING SYSTEMS**
*Microsoft® Windows® Vista, 7 or 8.*

**HARDWARE**
*Memory (RAM) 2+ Gb*
*Hard Disk 100Gb (3-5Gb required space for work)*

- Calibration of the model to well tests
- Productivity models honoring: local heterogeneities, local skin variations, relative permeability and PVT effects
- Interactive definition of well trajectory and completion details

**Field applications**
- Completion design
- ICD optimization
- Zonal isolation design
- Perforation strategy
- Multilateral design
- Understanding PLTs and problematic wells

- Well injection and production profiles
- IPR and PI optimization
- Acidization planning
- Optimal well length
- Uncertainty analysis

**Fast Execution, Easy Data Input**
- Easy and intuitive interface, “smart menus” hiding unnecessary inputs
- Straightforward and easy data input
- Fast simulations are performed in a matter of seconds rather than hours. This allows design revisions during the drilling of the well, when time is critical.
- Solution for flow in tubing, annulus, sandface and in-between: automatic solving of flow directions
- Facility to import the industry’s most common reservoir and log data sets are fully supported
- Advanced ability to compare results from multiple runs
- NETool is a standalone application that is very easy to install and maintain

Intelligent completions are rapidly expanding as wells become more complex. Maximizing production, controlling water breakthrough and optimizing well configurations in these types of wells lead to maximum returns. NETool software is the most advanced analysis tool for the design and evaluation of complex well performance.

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