ROSNEFT

HIGH-TECH UPSTREAM ENGINEERING SOFTWARE

HIGH-TECH SOFTWARE LINE OF ROSNEFT OIL COMPANY

HIGH-TECH UPSTREAM ENGINEERING SOFTWARE

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APPLICATION

GEOLOGICAL MODELING
3D-modeling and analysis of hydrocarbon deposits

GEOMECHANICAL MODELING
Geomechanical modeling and stability analysis while drilling

GEOSTEERING
Geological drilling support for horizontal wells and sidetracks

REAL-TIME DATA VISUALIZATION
Data acquisition, processing and visualization on the control station of coiled tubing/hydraulic fracturing fleet

HYDRODYNAMIC MODELING
3D digital modeling of development processes for all types of fields

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TECHNOLOGICAL PROCESS MODELING
Modeling of technological process of transportation, preparation and product primary processing

MODELING COILED TUBING OPERATIONS
Modeling and analysis of coiled tubing operations

HYDRAULIC FRACTURING MODELING
Engineering calculations for hydraulic fracturing modeling

DOWNHOLE EQUIPMENT MODELING
Pump selection, modeling and analysis of production wells

MANAGEMENT OF FIELD DEVELOPMENT
Modeling and development of oil and gas fields

GEOLOGICAL MODELING

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RN GEOSIM

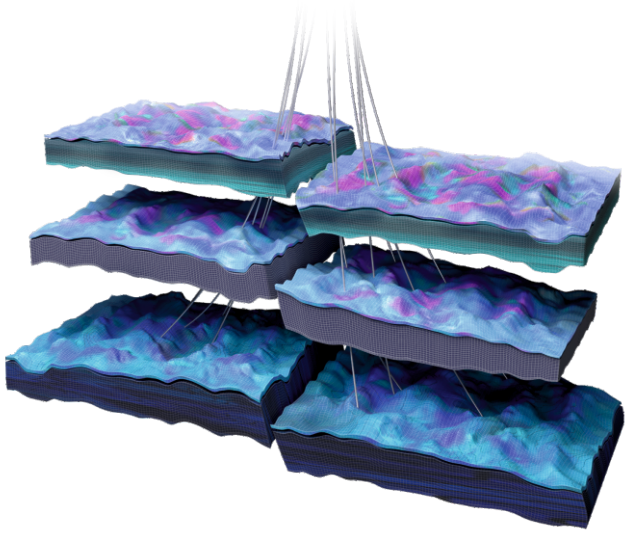
1 bln
CELLS IN GRID

500+ km²
SIMULATION AREA

DESCRIPTION

RN–GEOSIM is a modern software product for 3D geological modeling and analysis of hydrocarbon deposits. It provides a wide range of functionalities to solve the most complex geological modeling tasks.

RN–GEOSIM offers a full range of geomodeling tools: interactive visualization, data import and data management, well section correlation, structural and fault modeling, facies and petrophysical 3D modeling, reserves calculation, reporting



3D RESERVOIR MODEL

BENEFITS

RN–GEOSIM is an integrated multi–user platform for geological modeling, which allows creating full–sized geological models based on high–performance computing.

- High–performance computing
- Modeling of giant fields
- Unified database and multi–user mode
- Multi–well log automatic correlation
- Repeatable and fully traceable workflow management
- Fast and flexible data access
- Universal any–fault modeling
- Corner point s–grids up to 10^9 elements
- All–known and custom geostatistics algorithms
- Automatic workflow creation
- Seamless all product line integration

PLANS

- Complex tectonics modeling
- Modeling templates
- MPS Images templates
- Stratigraphic associations
- RN–GEOSIM as IT Service
- Modeling algorithms list expansion
- Full–featured reporting

GEOMECHANICAL MODELING

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RN SIGMA

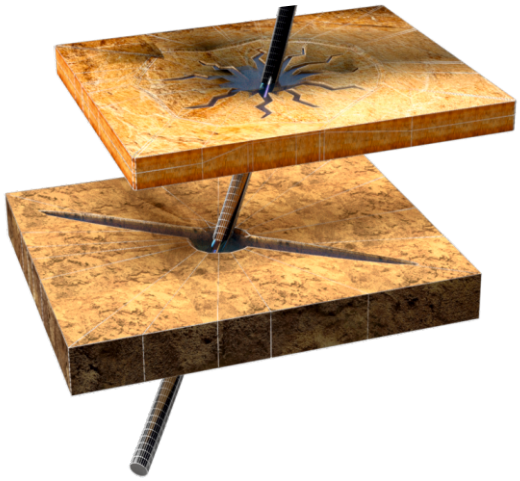
100+
DATA ANALYSIS METHODS

150+
USERS

DESCRIPTION

RN–SIGMA is a geomechanical modeling software for inclined and horizontal wellbore stability analysis.

RN–SIGMA offers a full–set of geomechanical modeling tools for data collection, analysis and pre–processing, 1D geomechanical models construction and data exchange, prediction of geologi–cal drilling complications, trajectory and well design optimiza–tion, safe mud density window calculation.



WELL DRILLING RISKS

BENEFITS

Every algorithm in RN–SIGMA is based on world's best prac–tices.

RN–SIGMA includes all necessary algorithms and interface solutions for complex geomechanical wellbore stability model–ing. It also includes some actual non–standard function– ality (elastic anisotropy, temperature etc).

- Full cycle of wellbore stability geomechanical modeling
- Custom templates for typical multiple well processing routines
- Customized user algorithms in Python
- User defined processing routines
- Additional non–standard extensions
- Easy to use and learn interface
- Seamless product line integration

PLANS

- Geomechanical 3D well modeling
- Geomechanical 4D field modeling
- Assessment of reservoir compaction and day surface subsidence
- Drilling hydraulics

HYDRODYNAMIC MODELING

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RN KIM

500+
USERS

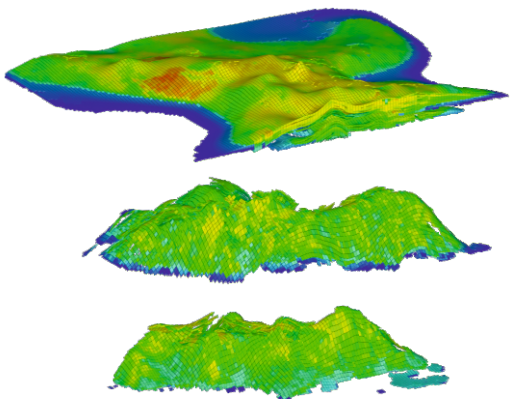
1 500+
MODELS PER YEAR

DESCRIPTION

RN–KIM is a high performance solution for 3D hydrodynamic modeling of green and brown field development.

RN–KIM provides a full modeling cycle from creating a hydrodynamic model to auto–adaptation to actual data and multivariate calculations of predictive options in full–scale and sector modeling.

The simulator implements a number of highly–demanded options for simulating "complex" well intervention and waterflooding optimization (WAG, polymer flooding, tracer studies), solution for BlackOil/VaporOil models.



HYDRODYNAMIC MODEL OF PRIOBSKOYE FIELD

BENEFITS

- Formats compatibility: Eclipse, Tempest, tNavigator
- SPE tests compliance
- Certificate of Conformity
- Acceleration up to 24 times on 32 cluster nodes
- Fully–implicit model
- Crossflows
- High performance and scalable linear solver (CPR + AMG)
- Dual porosity/dual permeability
- Well and group control, economic limits, automatic operations
- Aquifers (Fetkovich, Carter–Tracy and others)
- Python–scripts for simulation control
- GPU acceleration (NVIDIA CUDA)

PLANS

- Compositional version development (combination with Network option, version for cluster systems)
- Accounting for secondary fracturing with PEBI grids
- Geomechanics with RN–GRID
- Integration with PLT and well test results

MANAGEMENT OF FIELD DEVELOPMENT

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RN KIN

3 000+ USERS

100+ MODULES

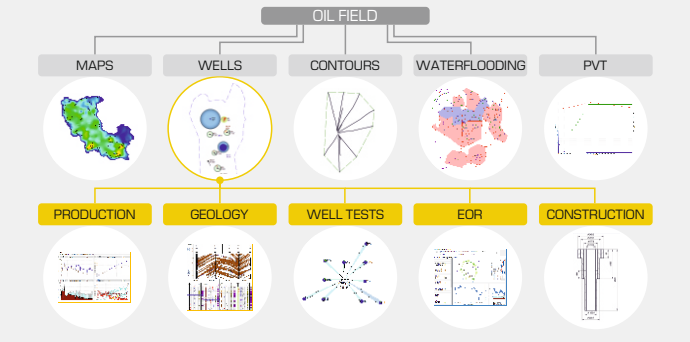
DESCRIPTION

RN–KIN has a wide range of functionality required by petroleum engineers and uses advanced technologies to manage field development and modeling.

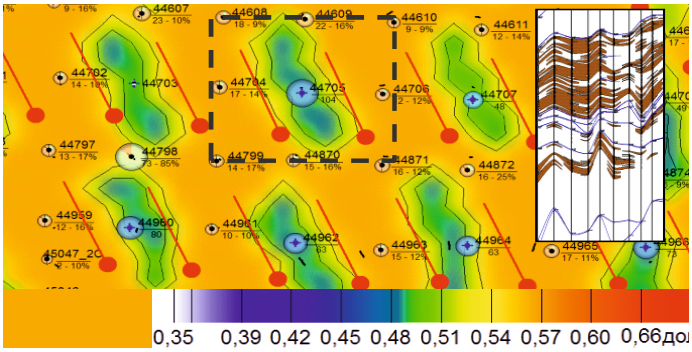
This software package allows analyzing the recovery of reserves, selecting interventions and workover, planning well surveys, optimizing the reservoir pressure maintenance system, reducing capital costs and designing development systems.

BENEFITS

- All–in–one database for G&G and production data, workover operations, well tests and logs
- High–speed software
- 5 minute analysis of base production by the field
- Automatic selection of candidates for intervention and workover
- Express assessment of reserve recovery
- Analysis of RPM system efficiency



RN–KIN DATABASE



OIL SATURATION MAP IN RN–KIN

PLANS

- Well survey digital service
- Field development management based on machine learning

GEOSTEERING

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RN HORIZON+

120+
USERS

2 000+
COMPLEX WELLS PER YEAR

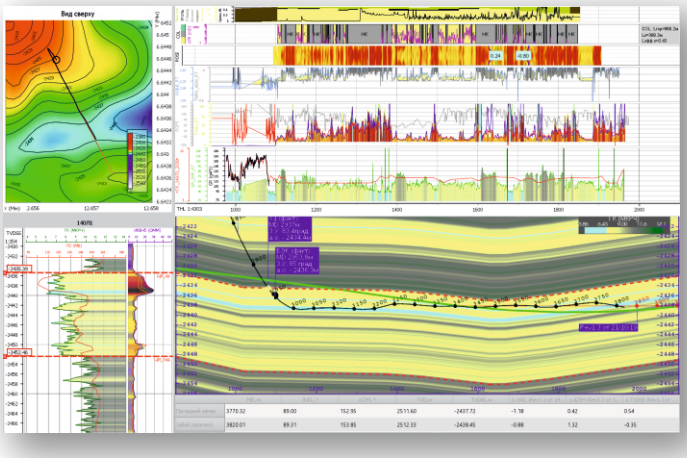
DESCRIPTION

RN–HORIZON+ is a top–performing software for horizontal well geosteering. It implements state–of–the–art techniques for rapid importing of initial project data from various sources, building 3D geosteering model, updating the model in real time using WITSML, identifying structural grid angles and predicting drilling direction at any time followed by automatic formatting and sending reports.

As a comprehensive solution, RN–HORIZON+ contains tools for geosteering complementary tasks, such as interactive well correlation, image and mud logging interpretation, advanced well log calculator, structural surfaces manager, etc.

BENEFITS

- All geosteering related tools incorporated into single software
- Real–time well data and model update using WITSML
- Solving related tasks: analyzing images, mud logs, building wells correlation scheme, etc
- Automated all reports generation and delivery
- Multi–well 3D algorithms for modeling stratum structure and properties
- Parallel multi–user geosteering projects access
- Advanced analytics with embedded Python interpreter
- Seamless all product line integration



GEOSTEERING MODEL IN RN–HORIZON+

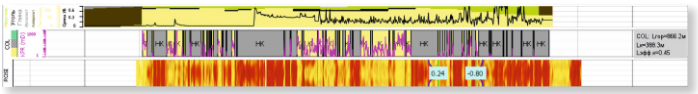


IMAGE LOG INTERPRETATION IN RN–HORIZON+

PLANS

- New geosteering methods
- Fast trajectory calculation
- Automated well completion placement
- Distributed platform for storage and managing geosteering projects
- Light version of RN–HORIZON+ for displaying and administering geosteering projects on the go
- Visualization of 3D geosteering models
- Smart geosteering assistant based on machine learning technologies

REAL-TIME DATA VISUALIZATION

ROSNEFT

RN VISOR

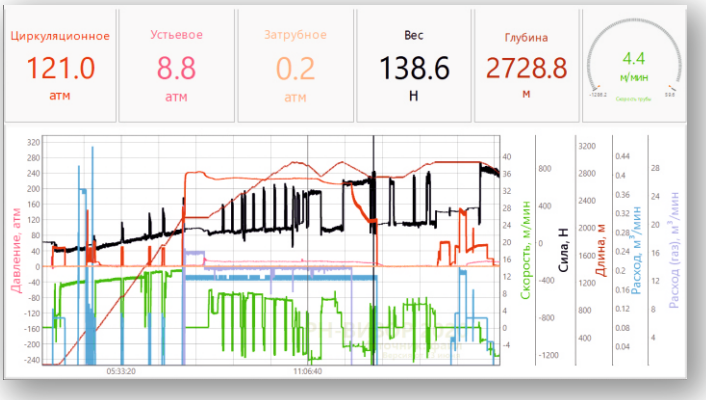
50+
SETTING METHODS OF DATA VISUALIZATION

1 500+
PERFORMED OPERATIONS

DESCRIPTION

RN–VISOR is a real–time data acquisition, processing and visualization software installed on the control station of coiled tubing/hydraulic fracturing fleet.

RN–VISOR provides collection of the combined data flow from COM and TCP ports on the control station, its initial filtering, correction and processing according to user–defined formulas and scripts, data storage, visualization of coiled tubing or hydraulic fracturing operations and data transmission in a user–friendly mode.



DATA VISUALIZATION IN RN–VISOR

BENEFITS

- Convenient user settings for text input data flow parsing to adapt to various control data flow protocols
- Unlimited input data channels
- Various customizable graphs and scales visualization templates
- Custom Python–based calculated channels
- Original input text data storage for instant reparsing
- Customizable channels threshold warnings
- Min–max channel data memorizing
- Convenient data and visualization export to various graphical formats

PLANS

- OPC support for equipment data acquisition
- Protection of ports configuration from unintended changes
- Automatic data stitching after shutdown
- Injection stages visualization in coiled tubing and wellbore
- CT/ fracturing verification by measured parameters, situation forecast

TECHNOLOGICAL PROCESS MODELING

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RN SIMTEP

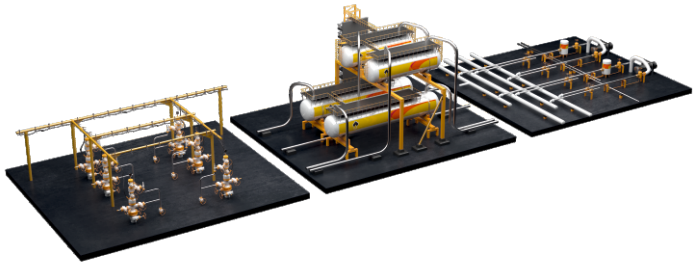
500+
OF PROCESSING AREAS

100 000 km
OF PIPELINES

DESCRIPTION

RN–SIMTEP is a software package for modeling technological processes of transportation, treatment and primary processing of well products. It is designed to solve problems at the stage of oil fields design and operation.

RN–SIMTEP allows calculating the phase state and PVT properties of hydrocarbon systems, performing hydraulic calculations of multi–phase flows in pipelines, analyzing the risks of complications, and modeling processes and equipment for oil, water and gas treatment.



JOINT SIMULATION OF PROCESSES IN OIL GATHERING, PROCESSING AND TRANSPORTATION SYSTEM

BENEFITS

Mathematical models of RN–SIMTEP are based on advanced and most accurate methods. They include:

- Determination of PVT properties based on compositional and black oil models
- Models of phase equilibrium "oil–gas–water" to take into account gas solubility in water and liquid in gas
- Calculation of multiphase flow parameters in pipeline networks
- Modeling of oil and gas treatment facilities (separation, heat transfer, transportation equipment)
- Joint simulation of processes in oil gathering, processing and transportation system
- Modeling in steady–state and quasi–dynamic modes
- Risk analysis for surface facilities: corrosion, ARPD, hydrating, scale
- Optimization of surface facilities operation modes

PLANS

- Modeling absorbtion/adsorbtion, amine treatment
- Modeling settling equipment, FWKO
- Inhibition modeling

MODELING COILED TUBING OPERATIONS

ROSNEFT

RN VECTOR

50+
ALGORITHMS
OF CT CALCULATIONS

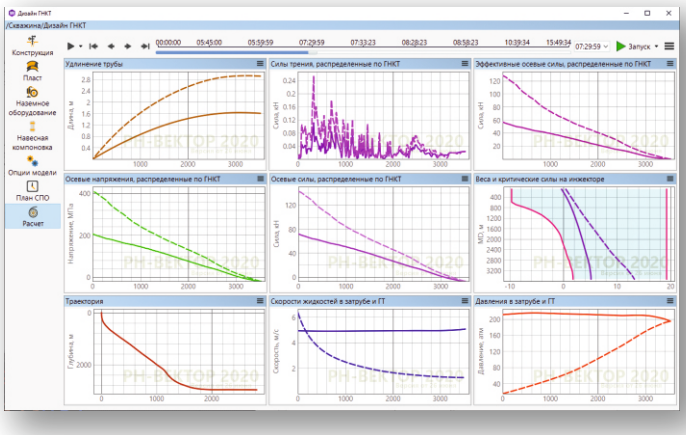
100+
USERS

DESCRIPTION

RN–VECTOR is an industrial software for mathematical modeling and analysis of coiled tubing (CT) technological operations.

Coiled tubing is used in oil and gas wells to perform a variety of technological operations: borehole flushing and bottomhole normalization, inflow induction and well development, milling of restrictions to restore the flow area, fishing operations, installation and drilling of cement bridges and packer plugs, acid treatments, geophysical surveys, hydro–sandblasting perforation and others.

Coiled tubing simulator is used in oil and gas industry for planning, managing and analysis of the CT technology application.



RIH/POOH SIMULATION IN RN–VECTOR

BENEFITS

- CT load and buckling calculations
- CT stresses are affected by CT and wellbore hydraulics
- CT critical stress calculation
- Multiphase hydraulics and solids transport
- Calculation of CT metal fatigue wear
- Visual representation and editing of all the equipment input parameters and the RIH/POOH plan
- Hydraulics calculation for attachments
- Accounting for the reservoir inflow or fluid loss

PLANS

- Calculation of the optimal wellbore flushing mode
- Influence of temperature effects on CT
- Unsteady fluid flow

HYDRAULIC FRACTURING MODELING

ROSNEFT

RN GRID

400+ USERS

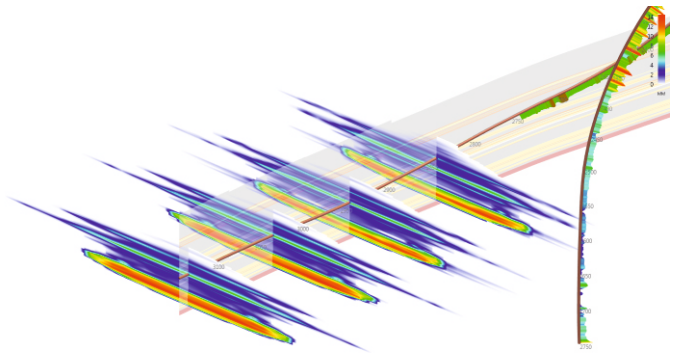
33 000+ SUCCESSFUL JOBS

DESCRIPTION

RN–GRID is a new–generation hydraulic fracturing modeling software, created to be convenient, accurate and prompt. We have incorporated experience of hundreds of hydraulic fracturing engineers.

RN–GRID covers the whole process of designing, performing and analyzing hydraulic fracturing operation, offers limitless treatment data import and visualization, convenient engineering analysis tools, smart geomechanic modeling, test injection analyses, treatment data matching, fracture geometry and production prediction, databases of fracturing fluids, proppants, casing and tubing.

RN–GRID single project file stores multiple wells, well logs, fracturing design variants, historical treatment data and fracture analyses.



MULTI–STAGE HYDRAULIC FRACTURING ON A HORIZONTAL WELL

BENEFITS

State–of–the–art RN–GRID Planar3D model most accurately describes complex hydraulic fracture geometry. It makes RN–GRID significantly superior to foreign analogues, most of which use simplified approaches.

- Fully–implicit geomechanic and hydrodynamic solution
- Stratified geomechanic model
- Multiple fluids and proppants
- Proppant settling, bridging and mobilization
- Time and pressure–dependent fluid rheology
- Acid and acid–proppant fracturing
- Poroelasticity and fracture interference
- Rich leakoff models
- Optimization for recent multi–core CPU hardware (AVX2)
- Full software product line integration

PLANS

- Advanced interactive editing and 3D visualization of well geomechanics and construction
- Improved simulation speed
- Integration with the hydrodynamic simulator to calculate the initial production rate

DOWNHOLE EQUIPMENT MODELING

ROSNEFT

RN ROSPUMP

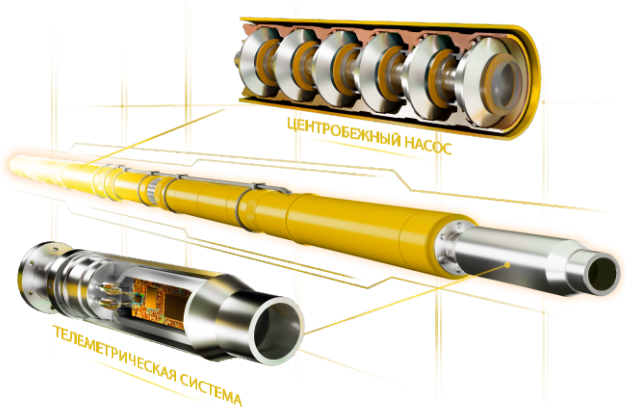
120 000+ DESIGNS

15 000+ MODELS OF EQUIPMENT

DESCRIPTION

RN–ROSPUMP is a complex software product designed to calculate and analyze the parameters of producing wells. RN–ROSPUMP can help to create designs for wells equipped by electric submersible pumps (ESPs) or sucker rod pumps (SRPs), or even for natural flow wells.

RN–ROSPUMP allows analyzing well operation, as well as carrying out a node–wise analysis of energy costs



OPTIMAL INSTALLATION DESIGN

BENEFITS

RN–ROSPUMP offers wide adjustment possibilities to tailor the tool for the needs of virtually any company/field of application. The application settings embrace PVT correlation sets, MS Excel data importing, the user–accessible part of the equip–ment catalog and report forms, etc.

RN–ROSPUMP helps to provide the energy–efficient operation of the mechanized well stock.

- Designs automation
- Using the latest hydrodynamic models
- PVT correlations for any oil
- Wellbore curvature control in the pump setting interval and equipment running–in section
- Assessment of design energy efficiency
- ESP assembly design
- Periodic well modeling
- Accounting for complications

PLANS

- Modeling of progressive cavity pumps with submersible and surface drive
- Multi–level recovery modeling
- Packaging strength calculation
- Modeling of SRP with submersible straight drive
- Accounting for additional equipment

HIGH-TECH SOFTWARE LINE OF ROSNEFT OIL COMPANY

QUESTIONS?
VISIT OUR WEBSITE:

www.rn.digital/en