DRIVING INNOVATIONS IN THE OIL & GAS INDUSTRY
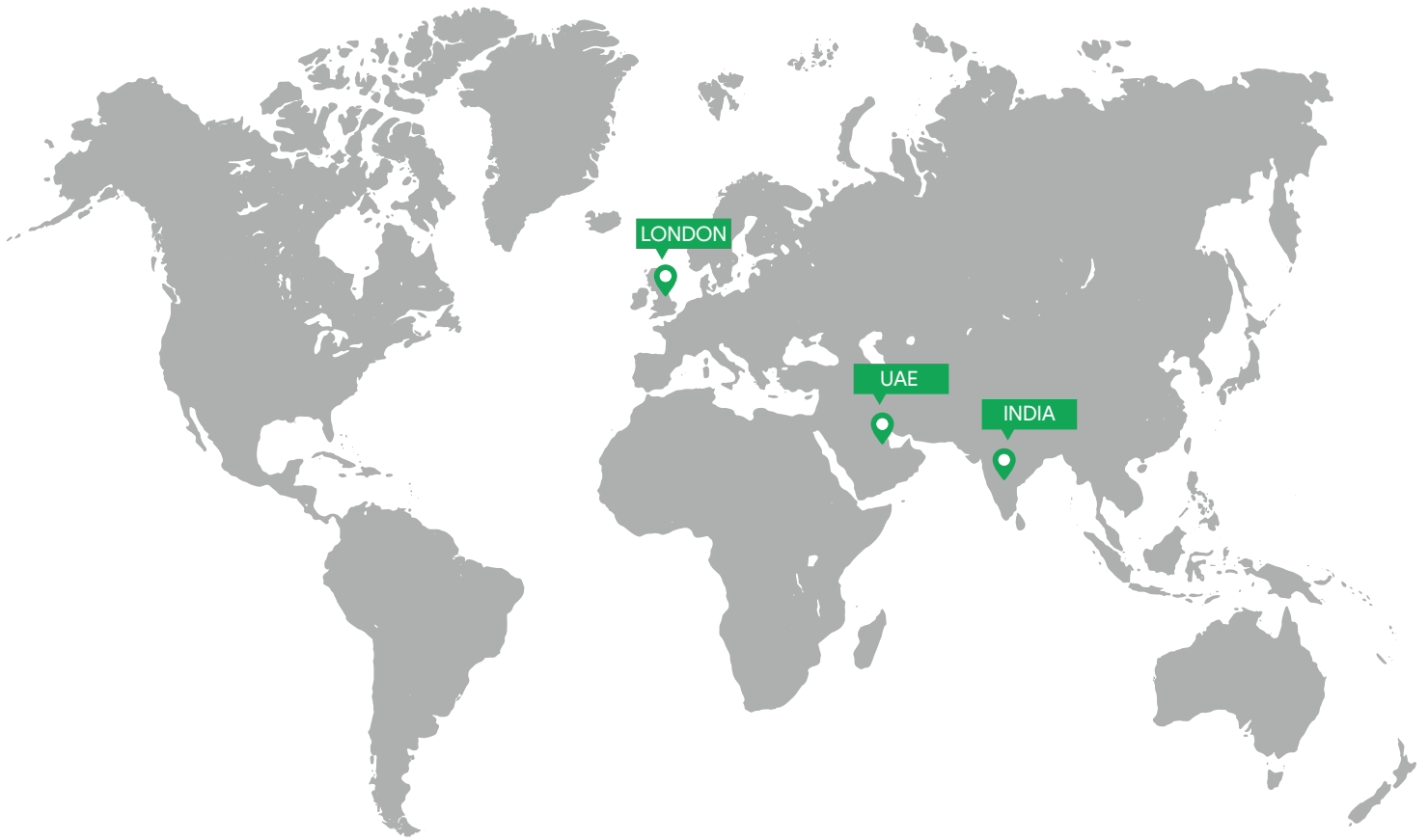
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Engineering Consultancy

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Nova Technologies Oil & Gas Engineering Consultancy
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INTRODUCTION

The Nova Technologies Oil & Gas Engineering Consultancy is Headquartered in Abu Dhabi. The Company has been established by experts, who have been recognized worldwide, having patents, SPE Distinguished Lecturers and having worldwide unique identity in terms of subject matter expertise.

In view of this both the Companies are carrying extensive services track records for the proposed technology, software and consultancy services.

The main philosophy of the companies are to provide customized solutions for the ongoing outstanding challenges in Oil & GAS Fields including Reservoir and Petroleum Engineering domain by the utilization of Advanced Technologies, Artificial intelligence, Big Data Handling and also the by utilizing our software mounted on POAS Platform.

We are a leading Upstream & Downstream Oil & Gas Consultancy and Software Provider Company. The main motto of the Company is to Provide "Fit to Purpose Customized Solutions, Software & Proven Tools" to Optimize Production, Optimum Reservoir Management and minimize Operating Cost as well as Capital Investment. Main activity area of the Company is to provide well proven technologies & solutions includes,

Reservoir Management driven Production Enhancement Solutions, Advance Well Completions Design & Implementation, ICD-Inflow Control Device, Smart Completions, Reservoir & Production Monitoring Technologies, various Multilateral Wells Design & Implementation, including Smart / Intelligent Multilateral), Downhole Gauges, Pressure-Temperature-Flow Measurement Technologies, Well-wise & Field wide Production Metering (Oil Rate, Water Rate, Gas Rate) on real time, Immediate Well Integrity Detection & Management (Casing Leaks, Cement Channels, Water Production behind Casing, Well completion Leaks) with Production Data, Real time Diagnosis & Remedial Recommendation of increasing Water & Gas Productions, Real Time Flow Assurance Detection & Managements (Emulsion, Asphaltene Deposition, Wax Deposition, Scale Deposition), Sand Control & Sand Production Management, Well Workover Management, Rig & Drilling Activity Management, Real-time Water Injection Monitoring & Management.

MESSAGE FROM FOUNDERS

Scientific and Technological progress by including, Advanced Workflows, Machine Learning, Artificial Intelligence and Automation in our modern days has become one of the most important factor that govern the prosperity and sound economic development of Oil & Gas Fields, which is proven to increase Reserves, Fieldwide Production, Enhancing Asset Performance, Minimizing Uncertainties and Close Monitoring of Reservoirs, Wells, Pipelines & other facilities.

During our professional practice as engineers, we became aware of the scarcity of technologies, software and consulting engineering firms that measure up to high international standards, and having reliable technologies & software that includes advanced Oil & Gas Field development workflows, Big Data handling, Machine Learning, Artificial Intelligence including automation, and can undertake the much needed technical solutions in the fields of Reservoir
Modeling & Field Development, Reservoir Management; Well design & Well Completions, Production Optimization, Corrosion, Well Integrity, Pipeline Integrity, Flowline & Pipeline Network Modeling, Flow Assurance, and Subsea Developments.

In order to effectively address the growing challenges in Oil & Gas fields, and to serve the industry even in lower Oil Prices scenarios, a Consolidated Engineering Company is founded to provide these highly qualified and advanced technical solutions, specialists and consultants with the adequate opportunity to apply their know-how in the area of their specialties.

Based on the principles we have adopted, and on the support and appreciation we have achieved so far, we are full of confidence that our organization will continue to develop and grow enabling us to achieve E&P companies' ultimate goals & targets by successfully addressing their outstanding challenges.

> **"** Advanced Workflows, Machine Learning, Artificial Intelligence and Automation in our modern days has become one of the most important factor

PROFICIENCY OF NOVA TECHNOLOGY

We have extensive experience and expertise in both Subsurface and Surface Production Technology including, 3D Static & Dynamic Modeling, Reservoir Management driven Advance Production Technology Solutions, we provide customized fit to purpose solutions for enhancing sustained crude production and improve the economic performance of the reservoir.

We help the client to design and implement Advance Well Completions, Reservoir Monitoring and Management Solutions by utilizing our proprietary technologies to get more oil and minimize investments.

GLOBALLY, WE ARE SPECIALIZED IN PROVIDING TWO MAJOR TYPES OF SERVICES

1 Consultancy Services related to Oil & Gas Fields

2 Major Software Solutions in mainly Upstream Oil & Gas Fields and some Mid-Stream Oil & Gas Fields Equipped with Artificial Intelligence & Machine Learning for AccurateModeling of Production & Reservoir Management Challenges.

" Big Data handling, Machine Learning, Artificial Intelligence including automation, and can undertake the much needed technical solutions in the fields of Reservoir & Production Technoogy

CONSULTANCY SERVICES & SOFTWARE PORTFOLIO

NOVA | NOVA TECHNOLOGY

GOALS EXPERT KNOWLEDGE ADVICE EXPERIENCE SUPPORT POTENTIAL SUCCESS
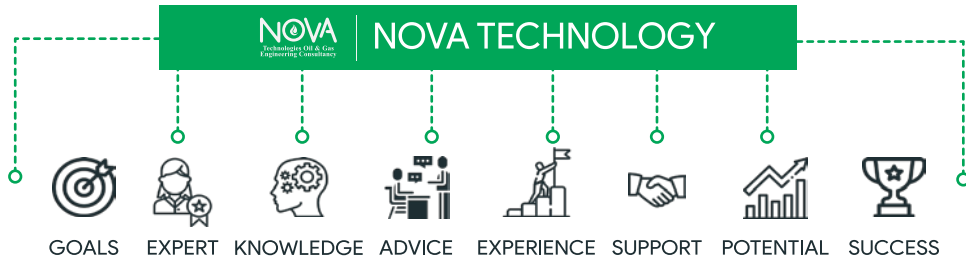
WE PROVIDE CONSULTANCY SERVICES & SUPPORT TO INCREASE OIL AND GAS FIELD TECHNO-ECONOMIC PERFOMANCE

Life-Cycle Depletion Strategy

MOT, MOP, NPD, 3DMEM Maps

Drainage & Injection Points Selection

Reservoir Sector Drive Mechanism & Force Balance

Capillary Transition Zone Saturation

Oil and Gas Distribution, Connectivity & Productivity

Well Type, Reservoir Contact, Well Count Optimization

Optimized Pressure Drawdown & Production Management Plan

Multilaterals

Creaming Curve

Optimized Well PI & EUR

PLT & Tracers

Insitu Gas-Lift ICV

Drawdown Control ICD

Flow Control Required

Well & Reservoir Performance Continuous Monitoring & Evaluation (Well Productivity & Reservoir Pressure Change, Simulation Model History Match & Prediction)

Optimized Smart Well Completion (PDG/DTS, passive ICD, active ICV) Multilaterals to Improve Drainage & Further Drawdown Control

Optimized Well Completion (Optimal Tubing Size, Cost Effective Material, Zonal Isolation Packers, Sand Control Screen & Method)

CONSULTANCY SERVICES

ENHANCE & OPTIMIZE WELL PRODUCTION PERFORMANCE

Our proprietary modeling technology & software allows client to enhance and optimize well production perfomance

- Liquid loading
- Maximize downhole Lifting Mechanism
- Maximize Gas Condensate & Oil Production
- Eliminate any downhole emulsions
- Eliminate other flow assurance issues

We provide customized services for all types of wells, including :

- Production wells with Artificial Lift
- Self-flow Wells
- Water, Gas & Plolymer Injection Wells

" WE ALSO PROVIDE SERVICES TO OPTIMIZE VARIOUS DISPOSAL WELLS & DISPOSAL FACILITIES.

DYNAMIC AND TRANSIENT PRODUCTION DATA ANALYSIS

Our Production Star Platform allows us to recommend :

- ❯ In-fill well drilling locations
- ❯ Sidetrack Plan for existing wells
- ❯ Perforation change
- ❯ Production contibution from faults, fracture, Bugs & Major Linieaments

And many other innovative solutions to assure production increase and maximize Reservoir Performance. We analyze the historical production data from all type of wells "vertical, deviated, horizontal and well's completed with ICD completions, including smart completions". We utilize our simulation platform "Production Star" to demonstrate the Source of Water Movement inside reservoir, i.e water movement through Faults, fractures and major lineaments connected to aquifer.

We verify the interpreted geological features by Seismic Data and 3D Geo-Logical Models. We perform the Reservoir Simulation History Match by considering the interpreted Geological Features to confirm the Water Movement results specifically the water movement through injectors as well as water movement through high permeability layers.

In addition, the "Production Star" multiphase transient model accurately determines 'communication Flow Path" from reservoir to wellbore.

The communication path could be through fractures, micro-fractures, faults and largescale lineaments in the Reservoir. The "Production Star" analyses the historical transient Production Data (Oil Rate, WC & GOR) in combination with Well Test data (Portable Test, Pressure Buildup, Drawdown & PTA (Pressure Transient analysis) and clearly demonstrate the Reservoir Connectivity from wellbore through Fractures, Micro fractures or Fault or Large-Scale Lineament. It demonstrates the cause of higher water production through well's mechanical integrity issues.

The detailed analysis of communication path assist us in proper design of Well Stimulation Technique (Fracking Technology – Hydraulic Frack, Acid Frack, Normal Stimulation & other advanced Well Stimulation Techniques).

Further the communication analysis in combination with Geological Model, Seismic Model, and Reservoir Simulation Model helps us in locating the best Subsurface Area for Sidetracking of existing well and re-complete them as Horizontal, Multilateral, or Fishbone or Stacked Multilateral with short lateral.
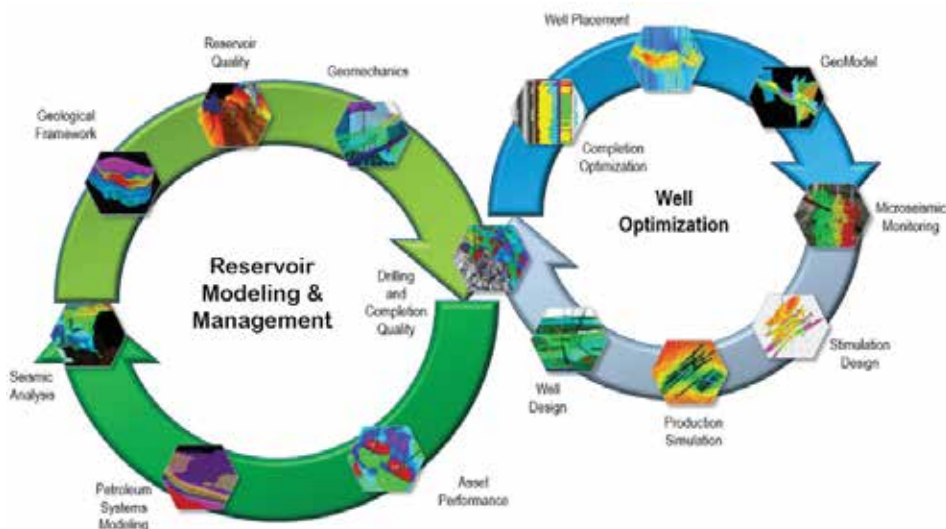
PRODUCTION INCREASE FROM CLOSED OR TEMPORARILY ABANDONED AND SUSPENDED WELLS

Our extensive experience, our new advanced software, we analysis each well to understand, accurate reason for Seize of Well Production, well's closed due to extensive and other issues. Also, we recommend the solutions for Increasing Production from these wells.

ADVANCE WELL COMPLETIONS

We conduct feasibility studies, customized design and assist during implementation of

- MRC wells
- Various Multilateral Wells
- Intelligent Wells

- ICD completions
- Intelligent Field

to increase wells' and field productions. Also, to conduct Economic evaluations for optimization of Field Development Plans. Our Multiphase Transient Well Model having modules for modeling all kinds of Advance Wells, Dynamically and Transient Modeling including Flow Assurance Prediction for Designing & Performance Evaluation of Advance Wells.

WELL INTEGRITY MANAGEMENT SOLUTIONS AND IMPLEMENTATIONS

We have specific corrosion analysis module, which is based upon continuous & discrete wavelet analysis including other artificial intelligence program to process, digital data of Cement Evaluation Logs, Corrosion Logs Historically and confirms the accurate location of corrosion area, hot spots and identifies the Causes of Well's Integrity.

Further the advanced software analysis allows us to process high resolution temperature data, Production Log Data, Noise Log Data, Downhole Pressure & emperature data processing to identify fluid communication accurately both behind the casing and inside wellbore.

Further we have the capability process data up to three casings including tubing in case the advanced deep ultrasonic corrosion logs are ran inside wellbore.
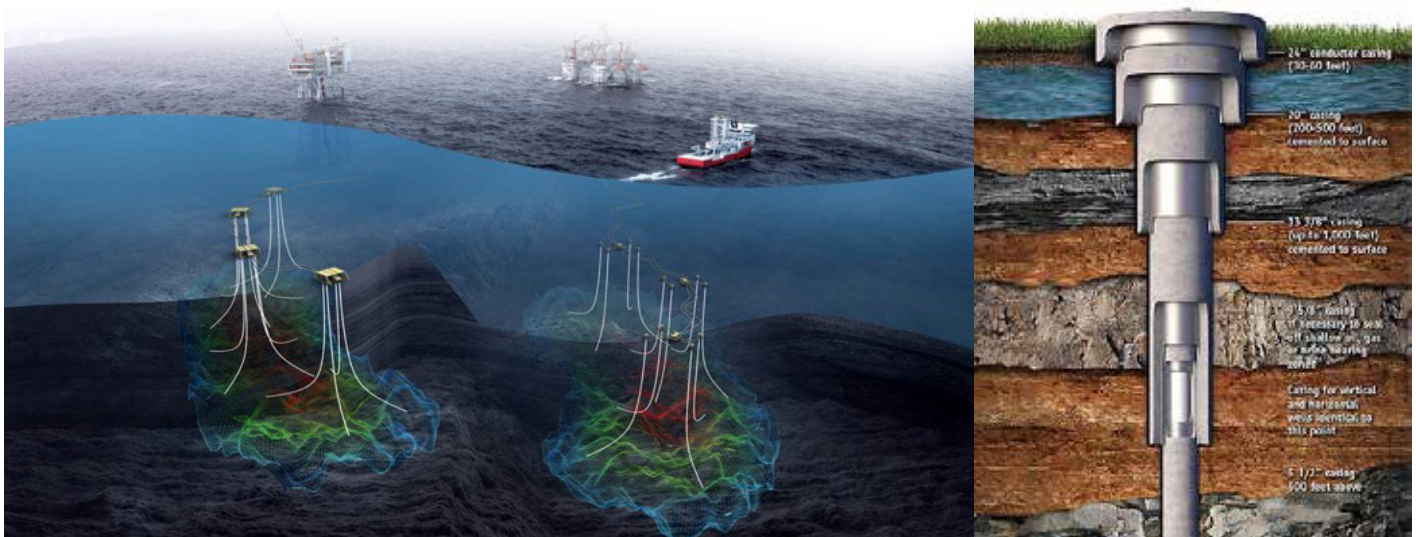
PRODUCTION NETWORK MODELING

We have extensive experience in modeling of entire

- Flow lines
- Well's Manifolds
- Subsea Production Network
- Headers and Separators

accurately by utilizing our transient modeling platform. Further we provide solutions for De-Bottlenecking of Pipeline /Flow Line Network systems, Identify highest pressure drop areas, Pressure fluctuations due to emulsions and other hydraulic factors to eliminate any flow assurance issues for increasing overall field's production
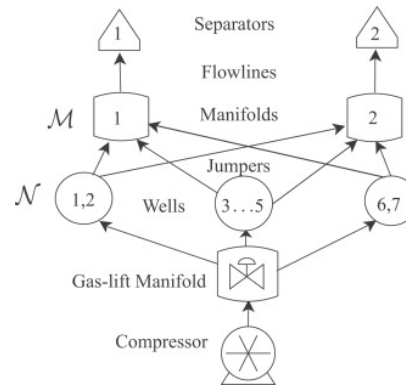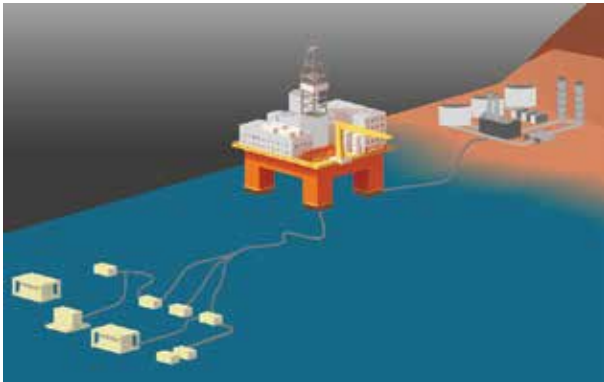
TIGHT CARBONATE AND OTHER UNCONVENTIONAL RESERVOIR DEVELOPMENT

We have the extensive experience in diagnosing the cause of production decline in tight carbonate and other unconventional reservoirs by conducting the Historical Production Data Analysis utilizing our Unique Software "Production Star".

In addition, the Acid Frac & other Hydraulic Frac data analysis to confirm its production behavior and capture opportunities for enhancements.

Also, we have unique software feature to optimize Fracture Geometry and Stimulation Volume for ensuring sustained well production for longer period of time.

## 3D STATIC & DYNAMIC RESERVOIR SIMULATION MODELING

Preparation of Static Model and 3D Dynamics Model and also the Field Development Plan. We are integrating the results of our proprietary software,

- PVT
- Production Star
- Corrosion Module
- PLT
- TDT

and other Saturation Logs, and other Well & Reservoir Surveillance data to match the Model performance by tuning the accurate relevant parameters. In addition, we improve the existing reservoir Simulation Model by integrating our Software Platform. Also, these software are entirely developed by our team and hence we provide flexibility to include our software in to their Reservoir Simulation Models. We provide all the Computer Science and Petroleum Domain Experts for any software integration seamlessly.

RESERVOIR & WELL MONITORING

We have developed our Production Monitoring, Reservoir Monitoring and Well Monitoring Platform to monitor entire production network and is detailed in the attached "Production Monitoring" Proposal Brochure.
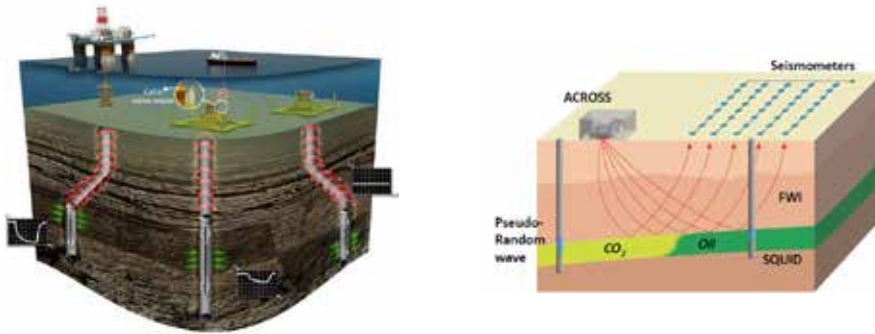
WELL TEST, RATE TRANSIENT & PRODUCTION TRANSIENT ANALYSIS & MODELING

The "Production Star"has the unique feature to accurately model Well Test and conducts long term production transient analysis, drawdown and buildup analysis for all kinds of well profile and completions, including Horizontal Wells, Multilateral Wells, Fishbone Wells, Intelligent Wells and the Wells' with ICD and other Advance Completions.

RESERVOIR MANAGEMENT TECHNOLOGIES & SOLUTIONS

By including our experts know how and their extensive experience and including our software, we correctly model

- Water Injections
- Gas Injection
- Downhole Asphaltene
- Technology Selection
- Wax
- Sulfur Deposition due to Gas Injections
- EOR & IOR
- Implementations and their Monitoring.

Further our experts are assisting client in to explore various development scenarios, which can lead to adequate "Reservoir Management" including end of field life conditions.

WORKOVER OPTIMIZATIONS

We help client by involving our experts in optimizing the existing well's workover optimization and provide services for various

- Water Shut-Off Technology Design & Implementations
- Well Integrity Repair
- Cement Bond Repair
- Perforations
- Stimulations (Horizontal, Multilateral & fishbone, Advance Wells & recommend production enhancement Solutions)

Also, we conduct long term production modeling supported with detailed Economic Analysis to justify the proper Workover Methodology.

DOWNHOLE GAUGES AND PRESSURE TEMPERATURE-FLOW MEASUREMENT TECHNOLOGIES

During the Design of Advance Completions and Also during workovers, we design the

- Downhole P&T Gauges
- Distributed Temperature Sensors
- Temperature Array Sensors
  (Both Electronic & Fiber Optic)
- Flow Meters & their monitoring
- GOR

- Data interpretation and Flow Modeling to achieve
- Total well's
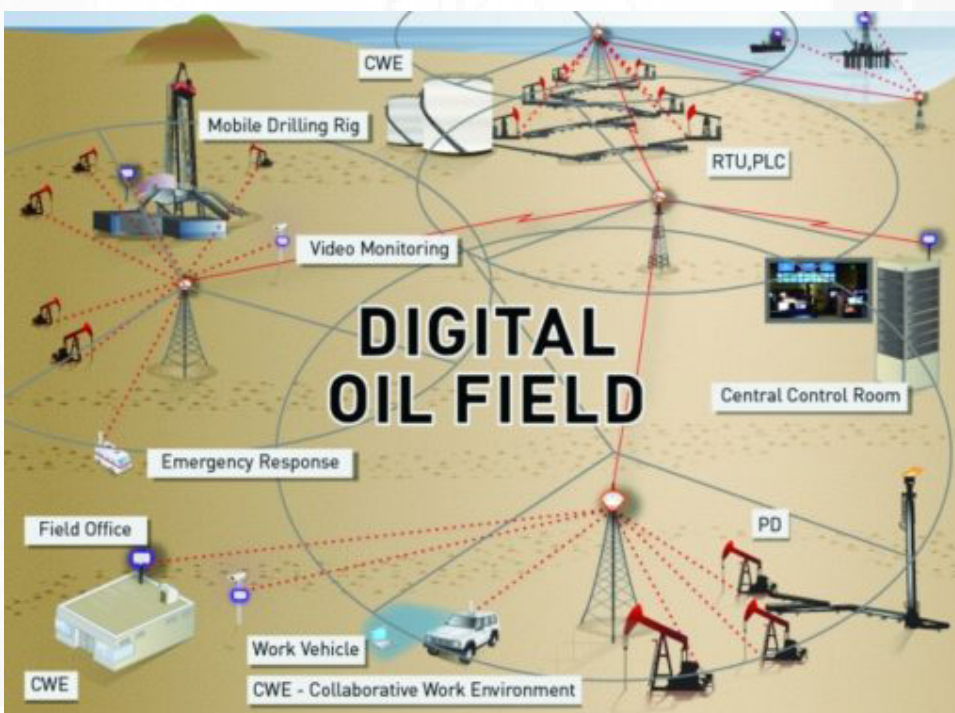- Liquid production
- Water Cut

and many other well completion, geological & Reservoir Information.

DIGITAL OIL FIELD SOLUTIONS

We have expert's peoples & knowhow for design of Intelligent Wells & Intelligent Fields. Our platform can process the data of more than 5000 wells at one time and provide well wise, reservoir wide and field wide and Production Metering (Oil Rate, Water Rate, Gas Rate) on real time by having our Customized Digital Field Solutions.

Also, we are highly experts in making Digital Platform Workflows and Technical Solutions for Automation Technologies. Also, the system is equipped with Immediate Well Integrity Detection & Management (Casing Leaks, Cement Channels, Water Production behind Casing, Well completion Leaks) with Production Data

In addition, we provide the services of Flow Assurance Detection & Managements (Emulsion, Asphaltene Deposition, Wax Deposition, Scale Deposition) inside wellbore, in flow lines and in entire production network.


> we are highly experts in making Digital Platform Workflows and Technical Solutions for Automation Technologies.

SAND CONTROL & SAND PRODUCTION MANAGEMENT

We have extensive technical expertise in designing, and implementing Sand Control Completions including,

- Openhole Gravel Packs
- Highrate Water Packs
- Optipack

- Multizone Frack Completions
- Cased hole & Opehole Frac completions

with & without downhole Monitoring Technology

Casing
Cement
Gravel pack
Screen
Perforation
Formation sand
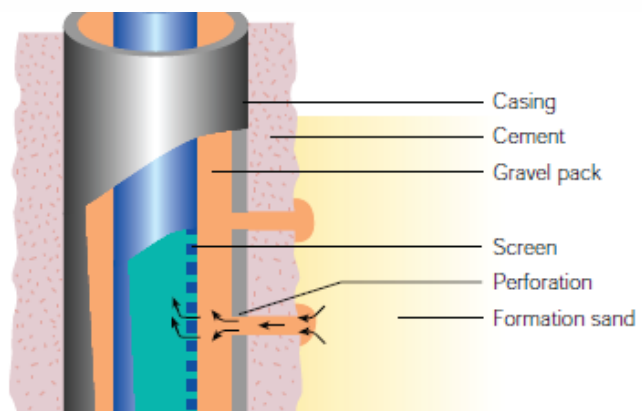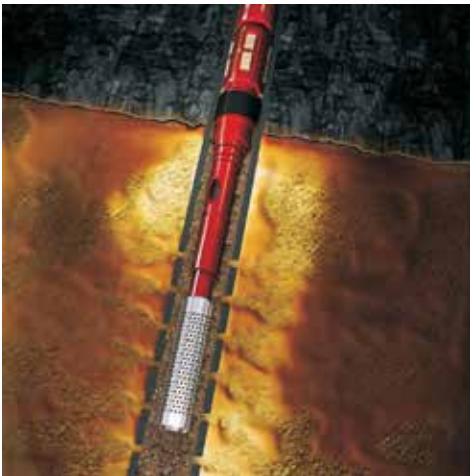
INTEGRATION WITH 4D SEISMIC

We completely integrate the results of 4D Seismic & 3D Seismic with our "Production Star" to monitor Fluid Flow Movement inside Reservoir.

The Production Star correctly captures and determines :

- Flow conduits
- Fractures

- Fault Conductions
- Lineament conductions

and also the directional permeability and layer wise Reservoir Communications.

In addition, the Chemometric Analysis of our PVT allows us to prepare chemical Foot Print of Oil & Gas correctly capture the Fluid Movement phenomenon inside reservoir. This technology saves operator in Millions of USD and increases the net recoverable reserves.

Nova Technologies Oil & GAS Engineering Software Portfolio

In addition, the Company is Developing Software and some of them are already developed detailed as follows. Major Software Solutions in mainly Upstream Oil & Gas Fields and some Mid-Stream Oil & Gas Fields Equipped with Artificial Intelligence & Machine Learning for Accurate Modeling of Production & Reservoir Management Challenges. The Company has POAS Software Platform and is very extensive having 8 Modules as follows

PVT PLATFORM

The PVT Platform just provides the all PVT related analysis & Flow Assurance Analysis to Mutiphase Transient Well Model, ICD Completion & Intelligent Completion Analysis Platform, Production Star, 3D Dynamic Model, Horizontal / Multilateral Well Modeling, ESP System & Production Analysis, Frac Design & Simulation and many more.

MULTIPHASE TRANSIENT WELL MODEL

The Multiphase Transient Well Model, is Highly advanced well model to perform, Nodal Analysis, Production History Analysis, Flow Assurance, Well Corrosion assessment, Horizontal & Multilateral Well Design including optimum horizontal length, optimum well completions and other transient production simulations to have highest level of confidence for the proposed completions.

PRODUCTION STAR

The Production Star in combination with PVT and Multiphase Transient Well Model performs, Historical Transient Production Decline Analysis for each well, Reservoir & Well Surveillance Data Analysis, Well Integrity Analysis, Identifying the Source of Water & Gas Production,
the contributions from faults, fractures (micro / macro) and also, it uses the advanced 3D finite elemental grid analysis for a sector of the reservoir to demonstrate each of the phenomenon / features.

ICD /INTELLIGENT COMPLETION DESIGN & PRODUCTION PERFORMANCE

We have highly advanced transient simulation based upon 3D finite elemental gridding scheme to correctly model the well performance of the wells completed with ICD/Intelligent Completions including Smart Multilateral Wells.

ESP & PRODUCTION MONITORING

We have highly advanced module equipped with AI (Artificial Intelligent & Machine Learning) for the Monitoring of various events of ESP system and Production Monitoring and provides guidelines for increasing well's production.

TOTAL FIELD PRODUCTION ANALYSIS

The output from all the above five simulation models and results / data is seamlessly integrated with Reservoir Simulation / Dynamic Model to predict / evaluate the long-term Production Performance.

THE RESULTS OF PRODUCTION STAR

The results of Production Star is integrated with 3D / 4D Seismic and Geological Model to interpret the features / contributions from faults / fractures and re confirm the interpretation from "Production Star"

ADVANCED SEISMIC DATA INTERPRETATION

This is a very Big Module and has highly advanced AI, Machine Learning and other advanced technology. This is clearly identifying all the geological features, seismic attributes, sand channels, seismic bodies and others.

"Major Software Solutions in mainly Upstream Oil & Gas Fields and some Mid-Stream Oil & Gas Fields Equipped with Artificial Intelligence & Machine Learning for Accurate Modeling of Production & Reservoir Management Challenges

MAJOR EXPERIENCE & TRACK RECORD

A brief experience of the Company's experts, which accumulates company's experience
is Tabulated as follows:

☑ Candidate Selection, Customized Well Design and Implementation of Multilateral Wells

☑ Successful Design and Implementation of ICD (Inflow Control Device) Completion over 100 wells in various reservoirs

☑ Identification of Communication Paths, and preferential fluid flow paths for unwanted water & gas production in the Reservoir utilizing long term Production Profile, Production Transient Analysis and Well Test Analysis

☑ Candidate Selection, Customized Well Design and Implementation of Multilateral Wells

☑ Cluster Drilling Technology & Platform Slot Design & Implementation.

☑ We have provided Integrated Solutions of Platform Slot Selection (48 wells from one one Platform), Well Design (Casing, Tubing, Cement, Drilling & Workover Operations) and Subsurface Well Trajectory optimization

☑ Metallurgy Selections for Tubing, Well Completion, Casing, Wellheads & X-MAS Tree for higher H2S, CO2, High Salinity Water for HPHT wells.

☑ Water Shut-off Technologies Implementation at Large Scale in Matured Reservoir

☑ Multizone Smart Completion Design & Implementation to Boost Oil Production from Matured Fields

☑ Integrated Well Modeling, Production Network Modeling and Flow Assurance Modeling of more than 1000 wells

☑ Shale Oil Reservoir Development Plan and Well Design to boost production

☑ Deep Water, Big bore Sand Control well completion.

☑ Deep water subsea Production Network Simulation and Modeling.

☑ Conducted reservoir simulation for CO2 miscible pilot flood design on existing waterflood

☑ Deepwater Subsea Well Sand Control Completion Technology Screening, Design & Implementation of (Open Hole Gravel Pack for 12 wells (Deviated) and Cased Hole Frac Pack for 5 wells) and achieved above 90% Gravel Packing Efficiency

☑ Designed and Implemented big bore (9 5/8" , 7" & 5 ½" tubing) completions with sand control (Mostly Open Hole Gravel Pack & Single Trip Multizone Cased Hole Frac Pack) for deep water high rate gas wells with 150 mmscfd to 350 mmscfd

☑ reservoir characterization and history match simulation for the fractured oil reservoir

☑ Experimental Program and Full Field EOS dynamic model development using Eclipse / Sensor.

☑ Subsea Production Network Modeling, Well ramp up schedule / Flow back modeling by dynamic software OLGA and static modeling software, REO for High rate big bore Oil & Gas wells & Subsea Architecture

☑ Flow assurance studies, Production network optimization and subsea tiebacks for deepwater

☑ Reservoir Monitoring System & DTS completions.

☑ Design & Implemented world's first time installation of Temperature Array Sensors across sand face in Open Hole Gravel Pack completions for deepwater sub sea wells

☑ implemented a very successful process to better describe the porosity-permeability and water saturation distribution utilizing 20,000 feet of core data

☑ Technology Screening, Design & Implementation of Reservoir Monitoring System for Matured & New reservoirs.

☑ ESP system Design, Monitoring, Diagnosis, Performance Analysis and recommending actions for increasing run life and well-wise production.

☑ Drilling Fluid Design for Openhole Gravel Pack

☑ Mono bore Completions & Split XMAS Tree design

☑ Developed an optimized water injection development plan as well as considered alternatives (immiscible gas injection) for an onshore field

☑ Performed reservoir engineering tasks (well test planning and interpretation) for a field development

☑ Optimized current producing wells (over 750 wells) Constructed geostatistical model and an upscaled model to simulate primary depletion and water injection scenarios

☑ Involved in reservoir studies to increase ultimate recovery in mature fields. These studies were based on EOR (water injection), and compression addition

☑ Well Integrity (Casing Leaks, Corrosion, Cement channel) identification repair and production increase

☑ Deep water Sub-Sea & Platform Field Development

☑ Field wide Chemical Injection Network design capable of adjusting chemical injection volumes as per requirement to address corrosion, flow assurance, emulsions and Asphaltene deposition

☑ Mono bore Completions & Split X-MAS Tree design

NOVA
Technologies Oil & Gas
Engineering Consultancy

RHC
Ray-Haven Consultants Limited

POAS
PRODUCTION OPTIMIZATION
ADVISOR SOLUTION

novaogc