

Engineering Services Portfolio

Drilling Design and Analysis Inc.

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SCAN ME

Services



Well Engineering



Digital
Transformation



Geothermal

Well Engineering



Process Review



Field
Development



Engineering
Calculations



Well Design

Process Review

Reduce Well Construction cost

Surface costs

- no. of pads
- Pad positions
- Longer laterals

Activities/ Durations

- ROP Enhancement
- Flat Time Reduction
- Activity Elimination
- Casing Elimination

NPT

- RCA

Quality

- RCA

Strategies

Field Development
Planner

Trajectories, cost
and time estimates

Rules, rates, KPIs,
surf and sub-surf
maps

T&D and
Hydraulics
Modeling

Tubular/BHA/Bit

Rig

RSS/New Tech

Casing/ Liner
Deployment

Benchmarking/ Data
Analysis

Pason/ Wellview

Surveys/Slidesheets

Lithology

Bit Record/ BHA List

MPD/UBD Screening

MEM

RTOC

Trajectory Design

Survey Management

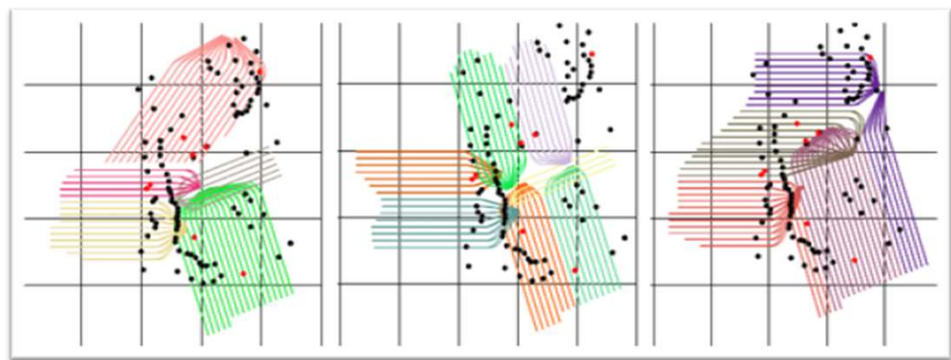
Casing Design

Cement Design

Wellhead Design

Tactics

Field Development



Surface Features Save Scenario Database

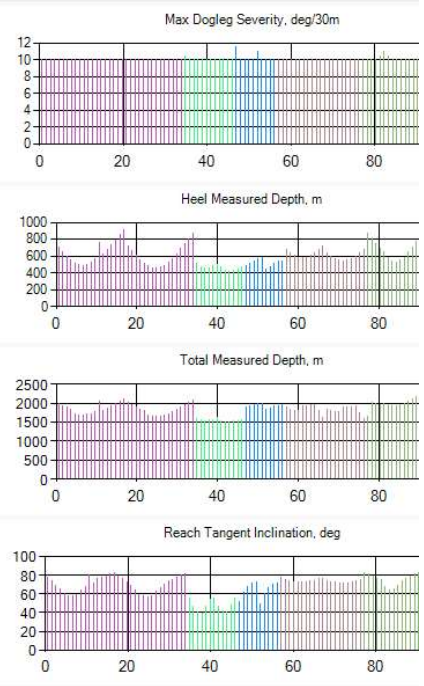
Calculator Pad Planning Rules Rate Sheet

Calculations Proximity Analysis Time and Cost

Distance, m	Direction, deg from North	TVD, r	Pad Name	Display
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60	170	0	8_3	<input checked="" type="checkbox"/>
			8_2n	<input checked="" type="checkbox"/>

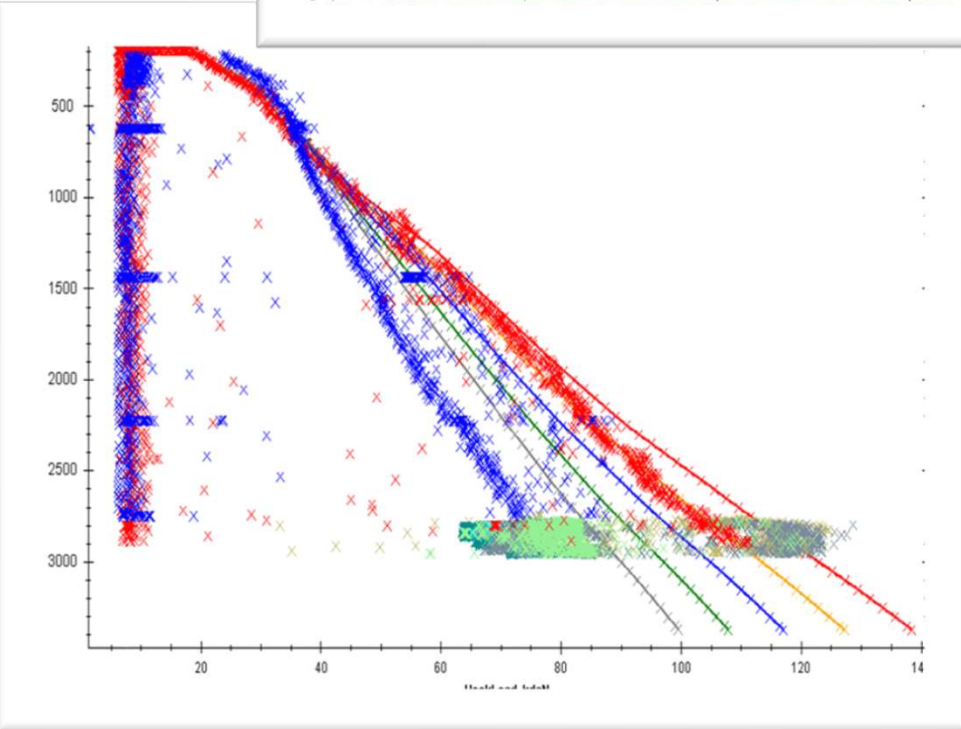
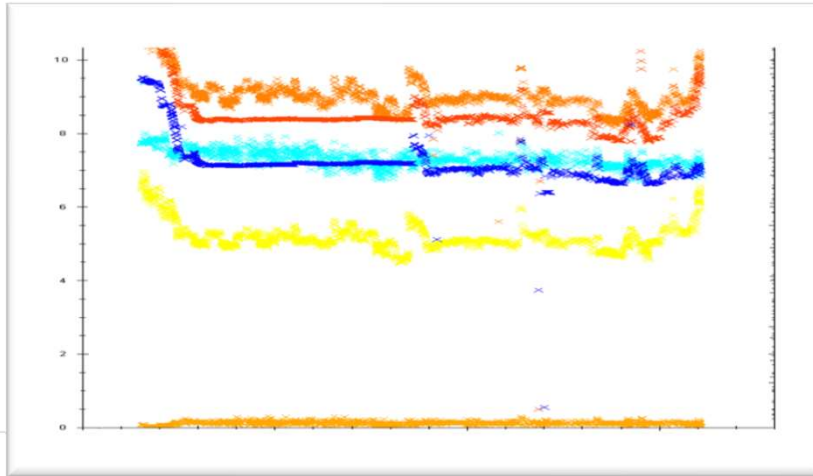
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00/09-14-084-07...	<input checked="" type="checkbox"/>

Plan View



- Evaluate multiple field development scenarios
- Generate directional profiles, cost and time estimates for multiple scenarios
- Benchmark cost and time estimates
- Sensitize for various design rules and surface/ downhole coordinate positions
- Handle 100s of well profiles from any number of pads

Engineering Calculations



- Torque, Drag and Hydraulics
- Casing and liner selection
- Drilling string design
- BHA design
- Rig selection
- Technology screening

Well Design

Kick Tolerance Calculator

Dry Gas Kick
 Water or Oil Kick
 800 kg/m³

Gas Composition

Molar Fraction, %

CO₂ 0
 H₂S 0
 N₂ 0
 C₂ 4
 C₃ 3
 C₄ 2
 nC₄ 1

Methane % 90
 Mixture SG 0.6430
 Mixture MW 18.63
 Mixture Tc 372.98 deg R
 Mixture Pc 668.47 psia

Mixture Properties computed using molar fractions and individual gas physical properties
 Mixture Critical Pressures and Temperature corrected for non-Hydrocarbon using Carr-Kabayashi-Burrow method
 Z computed using Papay correlation

Shoe Data

Shoe TVD Depth, m 800
 Shoe Strength, kg/m³ 1730
 Shoe Temperature, deg C 30
 Hole Size, mm 216
 Drill Pipe, mm 139.7
 Annular Capacity, m³/m .0213
 Gas Compressibility 0.7707
 Gas Density, kg/m³ 130.269

Kick Data

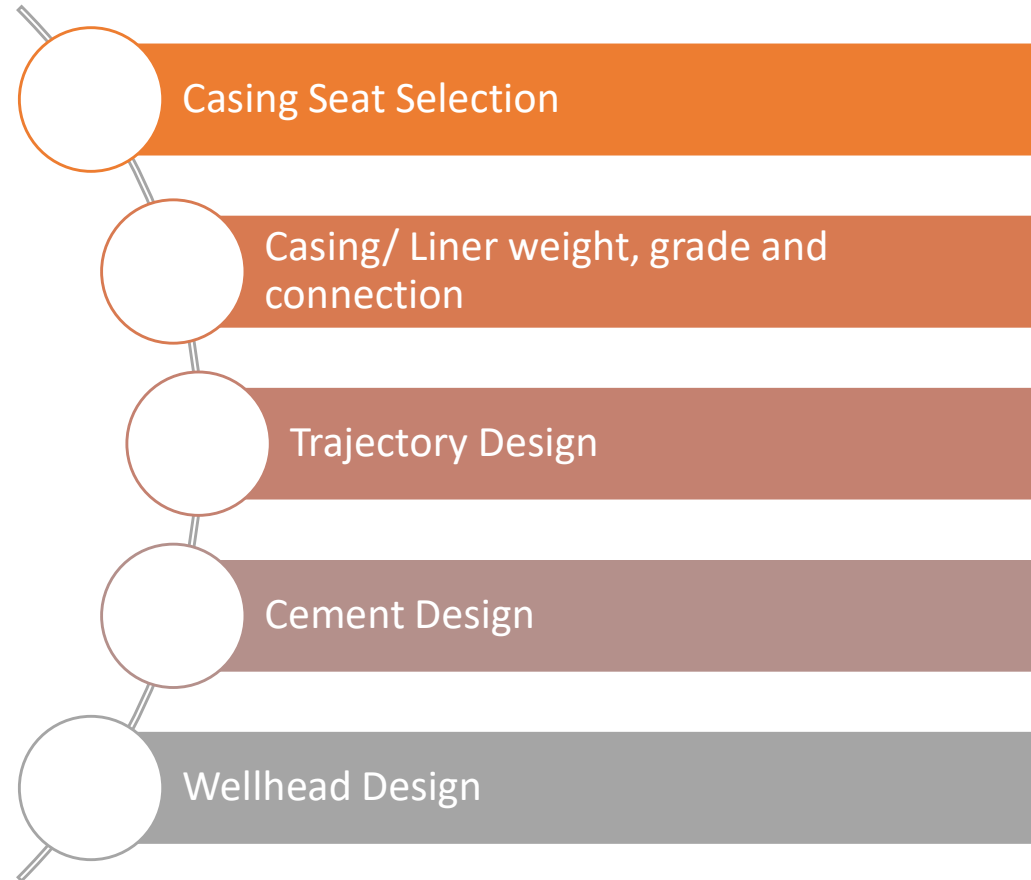
TVD Depth, m 3300
 Mud Weight, kg/m³ 1320
 Temperature, deg C 140
 Kick Intensity, kg/m³ 0
 Pore Pressure, kg/m³ 1320.00
 Gas Compressibility 1.1970
 Gas Density, kg/m³ 193.669

Results

Height of Influx, Shoe, m 275.69
 Volume of Influx, Shoe, m³ 5.87
 KT, m³ 3.95

Compute

Type	Hole_Size, mm	Pipe, mm	Influx Density, kg/m ³	Shoe TVD, m	Shoe Strength, kg/m ³	Shoe Temp, deg C
Gas	216	139.7	130.2695	800	1730	30



Digital Transformation

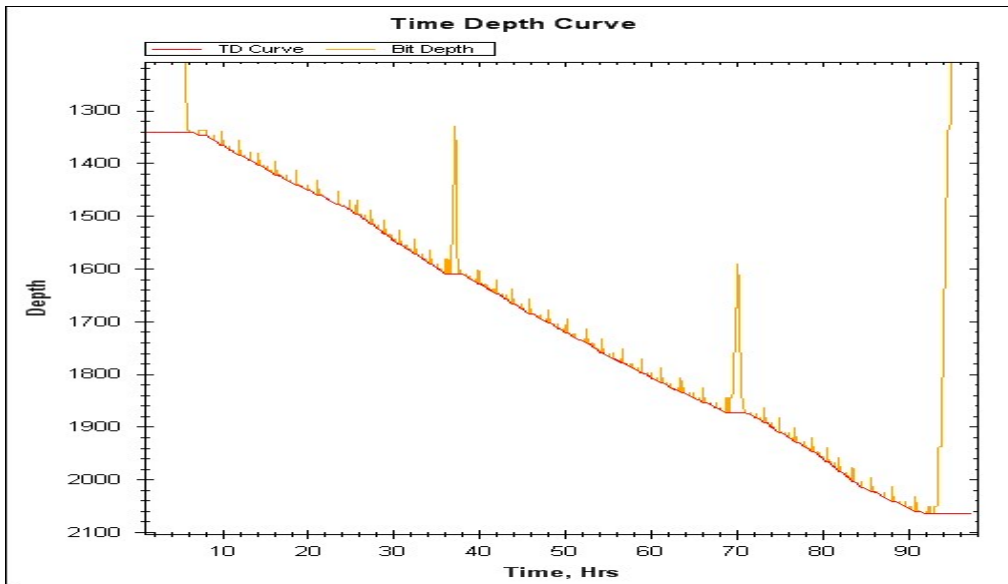
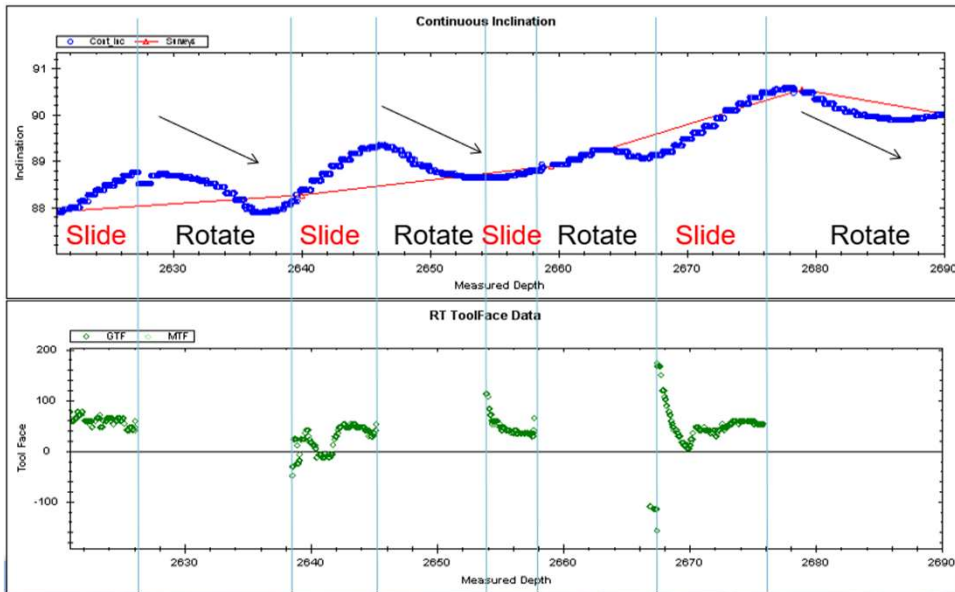


Drilling Data
Analysis



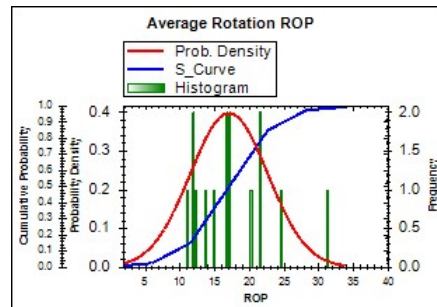
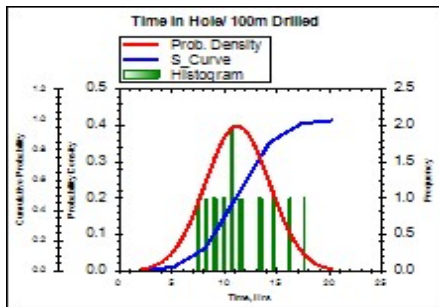
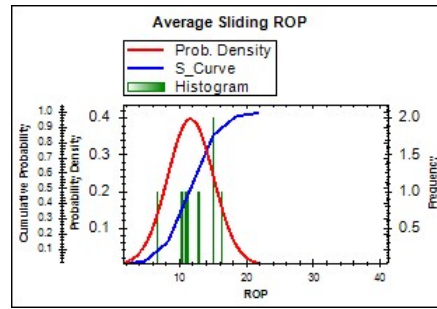
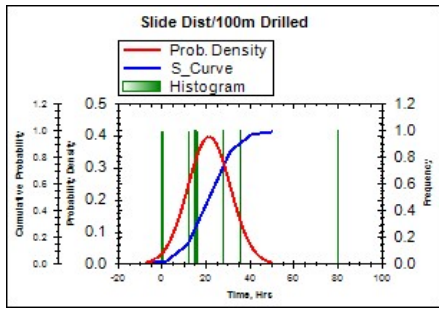
Benchmarking

HD Data Analysis

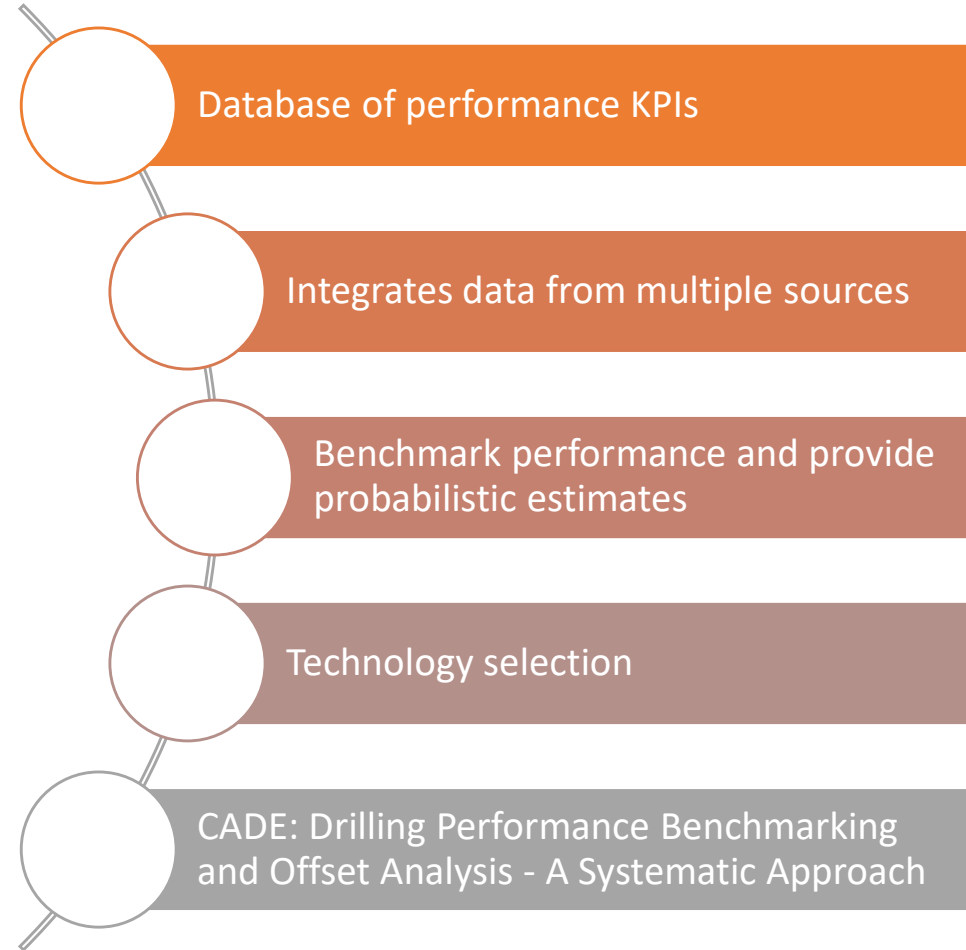
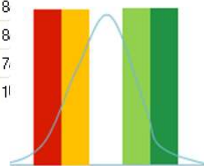


- Analyze high density drilling data (Pason or similar ascii data)
- Recommendations on technology selection- Drill string BHA, Bit, RSS, operating parameters ...
- Model calibrations
- AADE-07-NTCE-50, 2009 NTCE 05-04

Performance Benchmarking



ROP_Flag	Run_Length_F	Job_No	Date_In	Date_Out	Depth_In	Depth_Out	Hole_Size
		08CGT0362	9/20/2008 12:01 AM	9/23/2008 1:23 AM	1792	2817	156
		08CGT0363	10/3/2008 2:26 AM	10/6/2008 12:12 PM	1582	2817	156
		08CGT0266	7/2/2008 12:22 PM	7/3/2008 12:10 PM	1607	1758	156
		08CGT0266	7/3/2008 12:10 PM	7/5/2008 11:56 PM	1758	2978	156
		08CGT0268	7/14/2008 10:02 PM	7/17/2008 4:08 PM	1598	3023	156
		08CGT0205	5/29/2008 8:52 PM	6/1/2008 6:11 PM	2173	3355	156
		08CGT0452	11/30/2008 5:49 AM	12/4/2008 5:21 PM	2462	3664	156
		08CGT0175	6/9/2008 11:26 AM	6/12/2008 9:07 PM	2446.65	3580	156
		08CGT0454	1/5/2009 3:24 PM	1/7/2009 11:59 PM	2522	3121	156
		08CGT0454	1/7/2009 11:59 PM	1/10/2009 9:59 AM	3121	3336	156
		08CGT0454	1/10/2009 9:59 AM	1/11/2009 9:05 PM	3336	3391	156
		09CGT0271 ST1	12/2/2009 7:39 AM	12/3/2009 10:28 PM	2478	2926	156
		09CGT0271 ST1	12/4/2009 12:00 AM	12/6/2009 11:59 PM	2926	3880	156
		08CGT0440	9/16/2008 5:18 AM	9/19/2008 3:04 PM	2474	3510	156
		08CGT0348	8/17/2008 10:58 PM	8		3152	156
		08CGT0348	8/20/2008 1:15 AM	8		3655	156
		09CGT0192	7/1/2009 3:26 PM	7		4008	156
		09CGT0197	10/1/2009 12:00 AM	11		2456	156



About Drilling Design and Analysis

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Proven track record of innovation

- ✓ SPE 128194: Successful application of RSS in nitrified drilling fluids
- ✓ SPE 14UNCV-167725: Numerous technological improvements slash drilling times in HRB
- ✓ AADE-07-NTCE-50: Screening tool for rotary steerable
- ✓ AADE 2009NTCE 05-04: RSS technology creates value in Western Canadian drilling environment
- ✓ AADE 2009NTCE-07-04: KPIs Benchmarking- Systematic Approach
- ✓ Patent number 8199166: Visualization technique for Oilfield operations

