

DIRECTIONAL DRILLING SERVICE

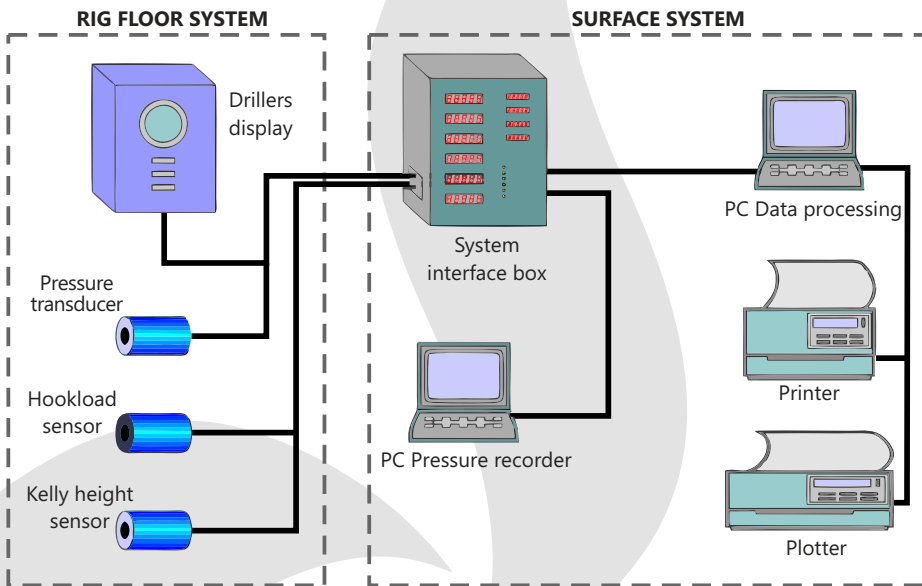
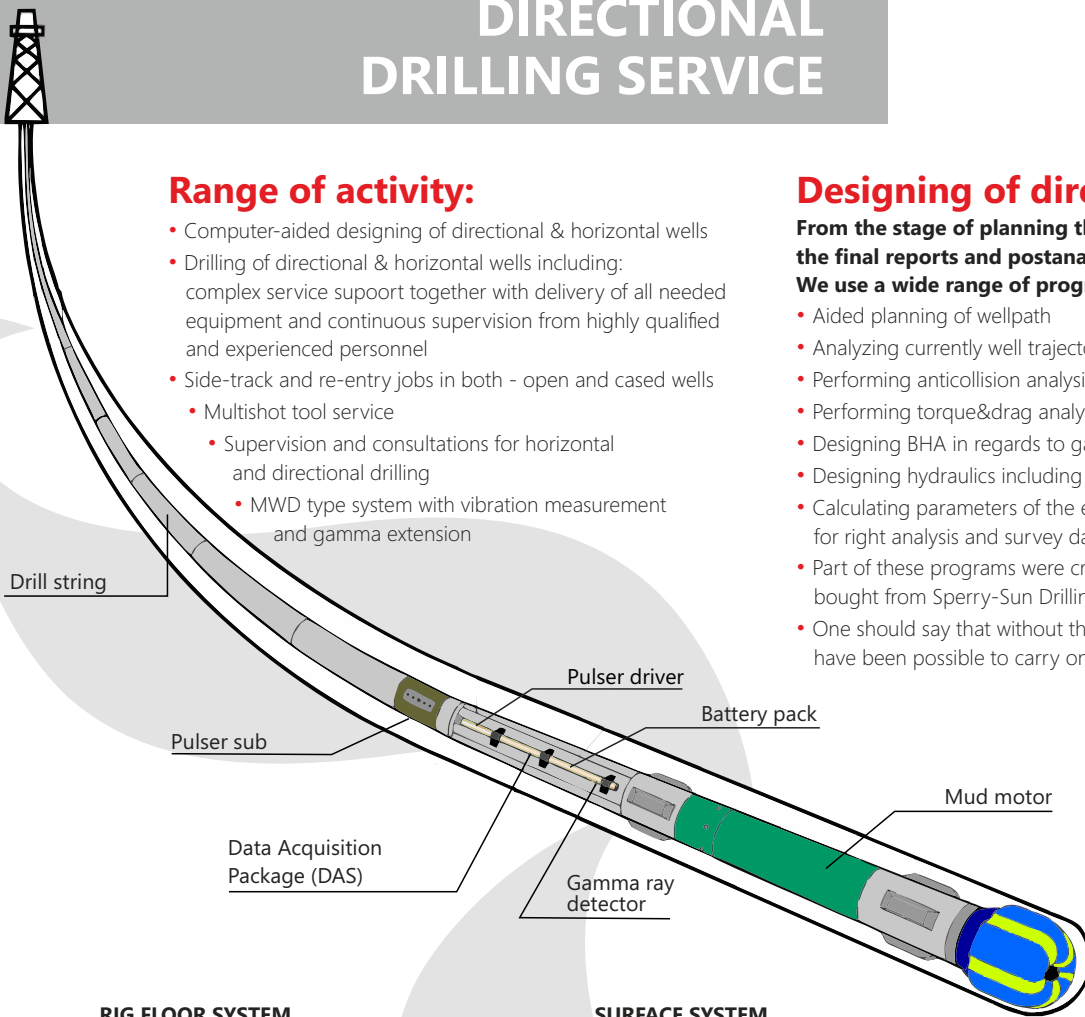
Range of activity:

- Computer-aided designing of directional & horizontal wells
- Drilling of directional & horizontal wells including: complex service support together with delivery of all needed equipment and continuous supervision from highly qualified and experienced personnel
- Side-track and re-entry jobs in both - open and cased wells
 - Multishot tool service
 - Supervision and consultations for horizontal and directional drilling
 - MWD type system with vibration measurement and gamma extension

Designing of directional drilling

From the stage of planning throughout drilling the well until the final reports and postanalysis computers are used in Service work. We use a wide range of programs:

- Aided planning of wellpath
- Analyzing currently well trajectory and anticipating its further course
- Performing anticollision analysis including accuracy of used survey instruments
- Performing torque&drag analysis
- Designing BHA in regards to gained wellbore geometry
- Designing hydraulics including mud motors and survey systems
- Calculating parameters of the earth magnetic field indispensable for right analysis and survey data control
- Part of these programs were created in our company, others were bought from Sperry-Sun Drilling Service and Landmark
- One should say that without the help of computer technology would not have been possible to carry on directional drilling safely and effective



- The X-treme motor uses the INTEQ in-house developed pre-contoured stator in a 5/6 lobe configuration. X-treme motors are designed to cover high torque performance applications.
- They maximize effective ROP in any high WOB or high torque on bit (TOB) application by making use of optimized PDC bits. The use of performance PDC bits, is recommended to take full advantage of the delivery of the extreme power from these motors.
- The X-treme power section is generally applicable in the same operations as the Ultra XL—straight hole and tangent sections, extended reach drilling, or horizontal extension applications that may require demanding PDC bits.
- The X-treme LS motor also uses the pre-contoured stator with the 5/6 lobe configuration. By using larger chamber volumes with the same efficient configuration, the low-speed variant of the X-treme, the X-treme LS, provides high torque output with lower bit speeds.

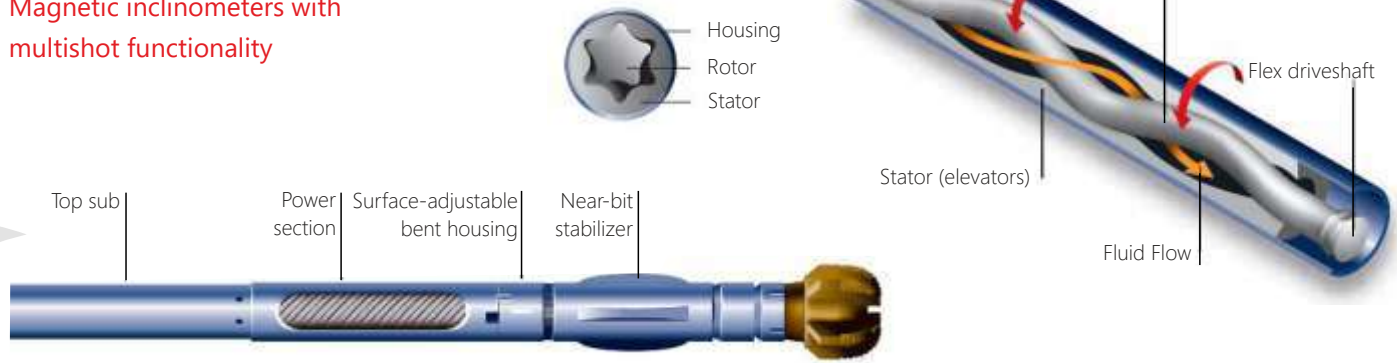
The manufacturer of the MWD systems used by us is General Electric Tensor from USA (retrievable/reinsertable positive pulse system). This system consists of two parts - an electronic probe placed in nonmagnetic drill collar and the surface system decoding sequences of pulses coming from the probe.

- The probe takes surveys and drives the pulser placed beneath it
- Closing and opening of the pulser valve creates pressure alterations which are decoded afterwards by surface system
- The power supply for the probe is provided by the set of lithium batteries
- The same probe can be used for different BHA diameters, only nonmagnetic drill collars have to be changed
- The system has ability to measure downhole vibrations.
- Also the gamma detector can be added

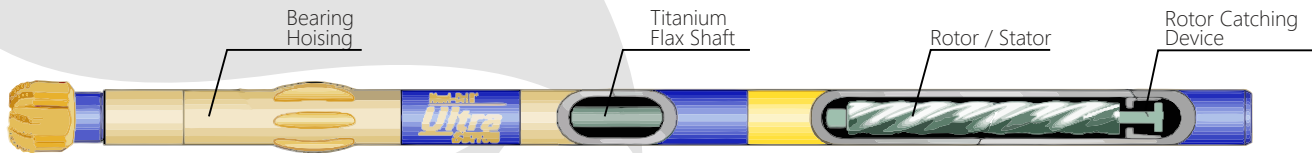
Our equipment is inspected and repaired at a fully equipped specialist workshop, supervised by qualified personnel, and subject to non-destructive examination NDT

EQUIPMENT

Magnetic inclinometers with multishot functionality



- High- and medium-torque downhole motors 4 3/4", 6 3/4" oraz 8" Baker Hughes Inteq, Griffith
- Drilling jars 4 3/4", 6 1/2" oraz 8": Griffith
- Non-magnetic drill collars 4 3/4", 6 1/2" and 8": SMF, Reamco
- MWD system with gamma ray logging-while-drilling: GE Tensor



Baker Hughes Inteq and NOV Vector mud motors

Tool Size	8"	6 3/4"	8"	6 3/4"	6 3/4"	8"	6 3/4"	4 3/4"
Type	M1XL	M1XL	UltraXL	Ultra X-Treme LS	Ultra X-Treme	5/6 ML 5,0°	5/6 ML 5,0°	5/6 ML 8,3°
Lenght [m]	10.65	9.65	10.65	7,0	7.0	7.32	6.68	8.72
Lobe configuration	5/6	5/6	5/6	5/6	5/6	5/6	5/6	5/6
Weight [kg]	1850	1250	1850	850	800	1220	840	550
Adjustable bend setting [°]	0 – 2,5	0 – 2,75	0 – 2,5	0 – 2,75	0 – 2,75	0 – 3,0	0 – 3,0	0 – 3,0
Max. Differential pressure [bar]	60	60	60	40	60	45	45	74
Nominal torque [Nm]	10400	6850	10400	8450	7840	7331	5935	3916
RPM [1/min]	85 – 195	90 – 220	85 – 195	55 – 135	90 – 220	150 – 260	90 – 280	160 – 330
Power [kW]	213	158	213	119	180	180	170	130
Pump rate [l/min]	1500 – 3400	1000 – 2500	1500 – 3400	1000 – 2500	1000 – 2500	1930 – 3410	790 – 2270	570 – 1140

Griffith hydraulic drilling jars

Type	Hydraulic up mechanical down	Hydraulic up and down	Hydraulic up and down	Hydraulic up and down
Series	336	411	428	431
Outside diameter [cal]	8	8	6 1/2	4 3/4
Inside diameter [cal]	2 13/16	2 13/16	2 1/4	2 1/4
Length [m]	4,60	6,90	6,70	5,50
Weight [kg]	910	1410	845	325
Max. recommended jarring force [kN]	978	1330	711	338

www.exalo.pl

Headquarters
Exalo Drilling S.A.
Pl. Staszica 9
64-920 Piła
Poland
phone: +48 67 215 13 00

Sales Department
ul. Naftowa 3
65-705 Zielona Góra
phone: +48 68 329 55 55
fax: +48 68 325 64 42
e-mail: sales@exalo.pl

Czech Republic
phone: +48 134372194
e-mail: czechy@exalo.pl

Kazakhstan
phone/fax: +77272279688
e-mail: kazachstan@exalo.pl

Libya
phone/fax: +218913234151
e-mail: libia@exalo.pl

Pakistan
phone: +922135874136
e-mail: pakistan.branch@exalo.pl

