智能井下工具及装备研发制造
Intelligent Downhole Tools and Equipment R&D and Manufacturing

地质工程一体化
Geo-Engineering IPM

海洋油气装备再制造
Offshore Equipment Remanufacture

合力（天津）能源科技股份有限公司
Heli Tech Energy Co., Ltd.

合力（天津）能源科技股份有限公司是一家为客户解决痛点问题的科技型油服企业，主营业务包括：智能井下工具及装备研发制造；地质工程一体化；海洋油气装备再制造。业务遍及国内各大油气田以及中东、中亚、东南亚等地区。

Heli Tech Energy Co., ltd. is a technology-based oil and gas service company focusing on solving pain points for clients. The main business includes: Intelligent Downhole Tools and Equipment R&D and Manufacturing, Geo-Engineering IPM Service, Offshore Equipment Remanufacture, covering nearly all oil and gas fields in China, Middle-east, Middle Asia and South-east Asia.

智能井下工具及装备研发制造
Intelligent Downhole Tools and Equipment R&D and Manufacturing

- 钻井综合提速 Comprehensive ROP Enhancement
- 井筒干预 Well Intervention
- 剩余油挖潜 Potential Tapping of Remaining Oil

地质工程一体化服务
Geo-Engineering IPM Service

- 非常规油气开发一体化 Unconventional Reservoir PM
- 修井及增产一体化 Workover & Stimulation IPM
- 地热开发一体化 Geo-Thermal Development IPM

海洋油气装备再制造
Offshore Equipment Remanufacture

- 常规井控系统再制造 Well Control System Remanufacture
- 水下井控系统修再制造 Subsea BOP Remanufacture
- 海洋钻井系统修再制造 Offshore Drilling System Remanufacture

QUALIFICATION

企业资质

API 6A

API Q1

API 7-1

API 5CT

API Q2

API 16A

ENTERPRISE HONOR

企业荣誉

国家级高新技术企业
State-level High-tech Enterprise

国家科技型企业
National S&T Enterprise

天津市专精特新企业
Tianjin SRDI Enterprise

天津市科技领军企业
Tianjin Leading S&T Enterprise

天津市企业技术中心
Tianjin Enterprise Technology Center

天津市战略性新兴产业领军企业
Tianjin Leading Enterprise of Strategic & New Industry

智能井下工具及设备研发制造

Intelligent Downhole Tools and Equipment R&D and Manufacturing

合力坚持核心技术自主研发和进口替代，为客户痛点问题提供一站式综合解决方案，包括：

HELI devotes to the independent R&D and import-substitution of core technology, delivering one-stop integrated solution for solving clients' pain points, including:

钻井提速 ROP Enhancement

随钻堵漏 LCM Treatment While Drilling

随钻扩眼 Hole Enlargement While Drilling

套管开窗侧钻 Casing Exit

连油作业 Coiled Tubing Operation

复杂打捞 Complex Fishing

剩余油挖潜 Potential Tapping of Remaining Oil

智能钻井工具系列 Intelligent Drilling Tools Series

智能完井工具系列 Intelligent Completion Tools Series

智能装备及机器人 Intelligent Equipment & Robot

三维建模/仿真模拟
3D Modeling / Analogue Simulation

- 资深研发团队，覆盖机械、液压、电气及通信等学科

Senior R&D team covering mechanical, hydraulic, electric and communication

- 优化仿真边界条件以更接近真实井况

The optimized boundary conditions to provide a more realistic environment

精密制造/集成总装
Precision Manufacturing / Assembly

- 成熟的高精度加工及复杂曲面加工工艺体系

  Matured manufacturing system of precision and complex surface
- 完善的质量控制体系确保总装阶段尺寸链

  Dimension chain guaranteed by the completed quality control system

现场服务/返厂检修
Onsite Service/ Workshop Maintenance

- 经验丰富的应用工程师指导现场技术服务

  Experienced application engineers deliver onsite instruction
- 返厂后全面拆解、检测、探伤、回装，测试合格后待命

  Dismantle, inspection & detection, assembly, test in workshop

地质工程一体化服务

Geology-Engineering IPM

合力地质工程一体化服务是地质分析与工程作业的有机结合。

地质分析以提高单井产能为目标，在油气藏开发的不同阶段开展具有针对性和预测性的动态研究，对钻井压裂方案不断调整完善，在区块、平台和单井3种尺度动态优化开发方案。

工程作业并非简单的产品线累加，而是在传统一体化项目集成式服务的基础上，将合力井下工具产品矩阵的优势与项目精细化管理的优势结合，根据地质及工程条件量身打造提速方案，使得项目在安全环保的前提下大幅缩短建井周期，使客户获得更大的项目收益。

Heli Geology-Engineering IPM Service is an organic combination of Geology Analysis & Engineering Operation.

Focusing on single well production enhancement, the Geology Analysis provides targeted & predictive research to constantly optimize the program of drilling and fracturing on different stage of reservoir development.

The Engineering Operation is not simple accumulation of different product lines, but a integration of Heli downhole tools matrix and delicacy management of project. Based on the specific geology and engineering condition, a customized ROP improving program is proposed for each single project, maximizing the profit of client by reducing well construction period.

复杂井况处理
Complex Troubleshooting

自产全系列打捞工具以及国际背景的井筒干预团队可在第一时间处理井下复杂情况并恢复钻进。The normal drilling can be recovered quickly when complex condition happened utilizing independent developed fishing tools.

通过应用自主研制的井下工具产品矩阵实现钻井提速、精准导向、提升固井质量等。To improve ROP, precise steering & cementing quality by applying Heli downhole tools matrix.

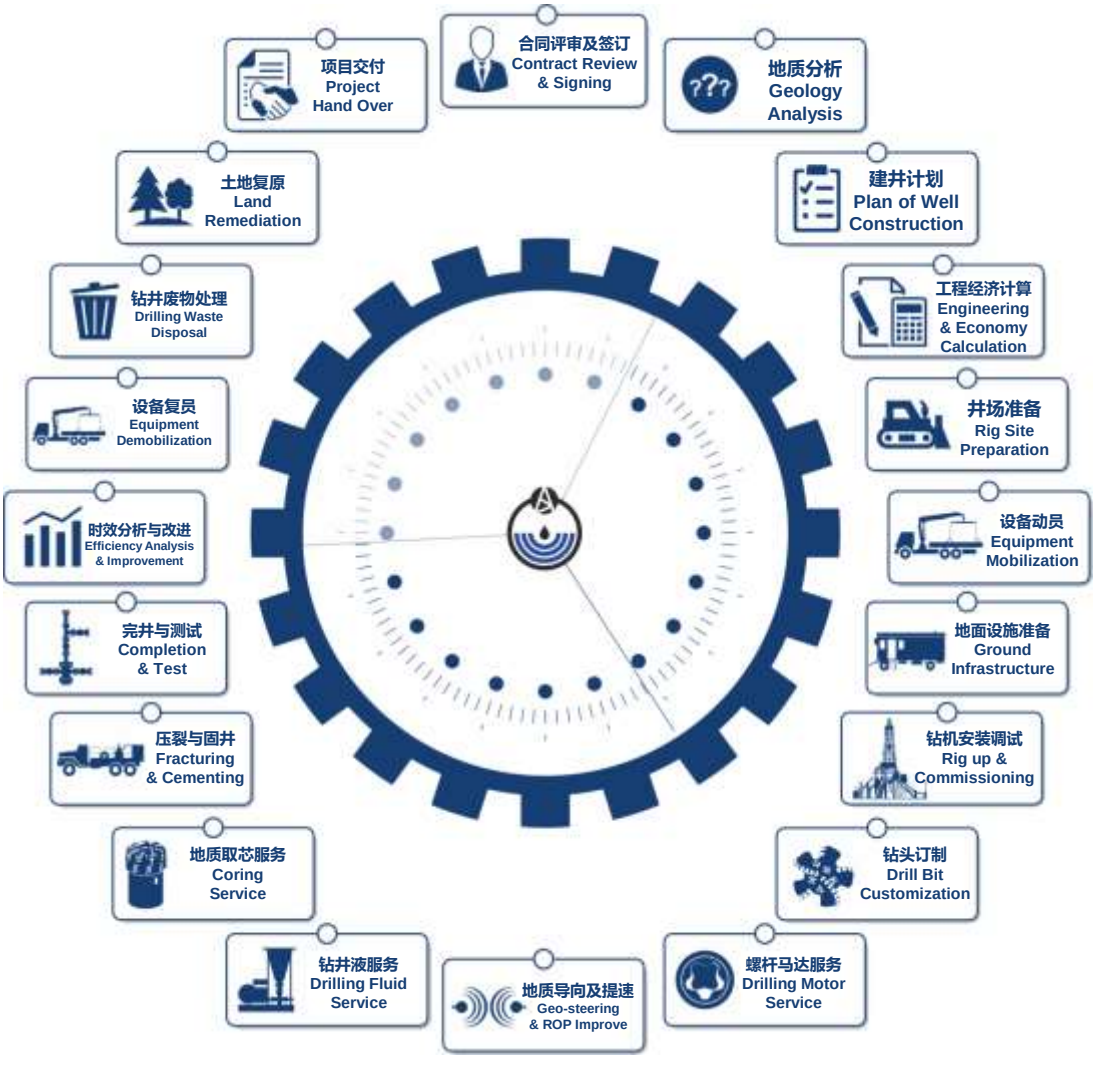
技术革新
Technology Innovation

成本管理
Cost Management

国际油服大型一体化项目原班人马，综合控制项目成本及项目时效。
To control project cost by former international IPM team.

最严格的钻井设备维护的体系认证确保钻机稳定运行。
The most strictly certified system of drilling device maintenance guarantee the stable running of drilling rig.

设备管理
Equipment Management



二氧化碳利用

Carbon Dioxide Utilization

CCUS

合力二氧化碳利用业务以油气增产为经济目标，以二氧化碳埋存为环保目标，实现经济价值和环保价值的双赢，是CCUS的重要环节。

HELI takes oil and gas stimulation as the economic goal, and carbon dioxide storage as the environmental goal, to achieve a win-win of both value, which is an important link of CCUS.

二氧化碳前置压裂 Carbon Dioxide Pre-fracturing

对于低压、致密、强水锁砂岩储层具有良好效果，不但能达到地层能量补充、降低储层敏感性伤害及提高油气藏最终可采储量的目的，提高产量的同时实现二氧化碳埋存，减少环境污染。

It has a good effect on low pressure, tight and strong water-locked sandstone reservoir, which can not only replenish formation energy, reduce reservoir sensitivity damage and improve the final recoverable reserves of reservoirs, but also realize carbon dioxide storage and reduce environmental pollution while improving production.

二氧化碳驱油 Carbon Dioxide Flooding

可使原油体积膨胀、降低原油粘度、改善油气流度比； 对轻烃的萃取作用提高单井产量，提高采收率的同时实现二氧化碳埋存，减少环境污染。

It can expand the volume of crude oil, reduce the viscosity of crude oil and improve the oil flow ratio. The extraction effect of light hydrocarbon can improve the production of single well, enhance oil recovery, and meanwhile realize carbon dioxide storage and reduce environmental pollution.

装备管理软件 / Equipment Management Software

利用自主开发的装备管理软件系统管对海洋装备进行终身追踪和预判性维护，已经成功完成大量井控系统及钻井系统设备修复项目，包括海洋石油981、中石化勘探四号、俄气北极星和北极光等多个深水平台，设备管理系统积累了丰富的深水设备数据。Heli performs full life-cycle tracking and preventive maintenance with independent-developed software system. A series of projects have been completed including HYSY981, SINOPEC KT-4, Gazprom North Star & North Light, and a large number of data has been collected.

质量管理体系 / Quality Control System

合力拥有业界最严格的质量管理体系API Q2，该体系经美国石油学会认证，确保设备从入场、拆解、检测、修复、回装、测试直至交付的全部环节都严格遵从OEM及相关行业标准，从而完成原厂级修复。Heli has the most strict quality management system certified by API, making sure the whole process strictly in accordance with standard, including tearing down, inspection, remanufacture, assemble & test.

保税维修 / Bonded Maintenance

合力拥有保税维修资质，并与船厂达成战略合作协议，既能充分发挥天津港的区位优势，又能大幅缩减设备进出口成本及周期，将成为国际客户深水装备维护提供更佳的解决方案。Heli has the permit of bonded maintenance and the strategic cooperation agreement with shipyard. Heli will offer better solution to international deep-sea equipment, taking full advantage of geographical location of Tianjin port, reducing the cost of import and export.

海洋油气装备再制造

Offshore Petroleum Equipment Remanufacture

合力深水装备全生命周期管理业务为客户的海上平台，特别是深水钻井平台的井控系统装备及钻井系统装备提供原厂级修复及再制造。Heli provides OEM-level remanufacturing service for well control system and drilling system of offshore drilling platform, especially deep-sea platform.

1. 拆解 / Tearing Down

设备入场后全面拆解，所有部件在合力设备管理系统内生成终身识别代码。
A customer ID is applied in our system when receiving BOP. After tearing down, all parts are marked with a job number.

2. 清洁及检测 / Clean & Inspection

全部零部件去油、清洁、喷砂并在系统内更新状态，并做尺寸检查、硬度测试及无损探伤。All parts are degreased, cleaned, and sandblasted. Dimensional inspection, hardness test, NDT are performed.

3. 粗加工 / Rough Machining

与客户沟通并制定修复方案，对需要修复的部位进行粗加工，为下一步的焊接修复做准备。Once the plan determined, parts that are to be welded are programmed into the rough machining phase.

4. 焊接修复 / Welding Remanufacturing

以钨极气体保护焊等技术进行修复，电脑控制焊接温度及轨迹，并进行热处理消除应力。The parts is processed with GTAW by computerized temperature & track control, and will be post heat treated.

5. 精加工 / Precise Machining

利用高精度数控设备对设备关键位置进行再制造，以使其尽可能恢复至原厂状态。The remanufacture process is performed for key position with CNC equipment to make sure OEM level quality.

6. 再次检测 / Second Inspection

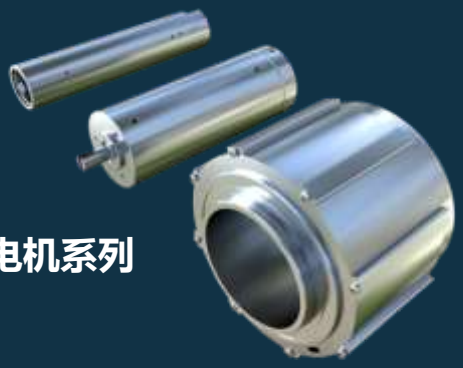
经过精密加工的部位重新进行尺寸检查及无损探伤，确保其完全符合原厂标准。NDT and dimensional inspection is performed on components that were finish machined per OEM standard.

7. 回装测试发运 / Acceptance

当所有部件都达到标准后对设备进行回装及功能测试和压力测试，并做好包装准备发运。After all components have met acceptance criteria, they are assembled and tested, and prepared for shipping.

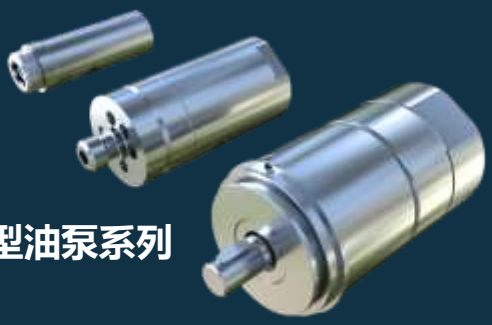
高温微型伺服电液控制系统

微型化是液压技术研究的重要目标之一，该系统是微型伺服液压技术的重要成果,具有体积小、质量轻及动力密度大等显著优点，可实现传统技术无法实现的简单高效液压系统方案，广泛应用于航天、深潜设备、飞机制造、石油钻探工具、机器人、便携水下作业工具、便携液压动力站等领域，具有十分光明的应用前景。



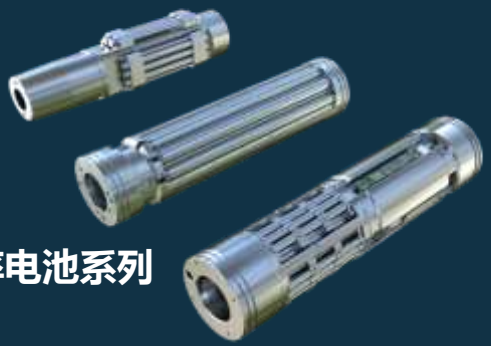
高温微型电机系列

额定功率：29-280W
额定电压：28-340V
额定转速：900-4700RPM
额定转矩：0.06-0.74Nm
耐温：200 ℃



高温微型油泵系列

外径：20-105mm
排量：0.012-0.3cm3/r
额定转速：5000RPM
额定效率：>80%
耐温： 200 ℃

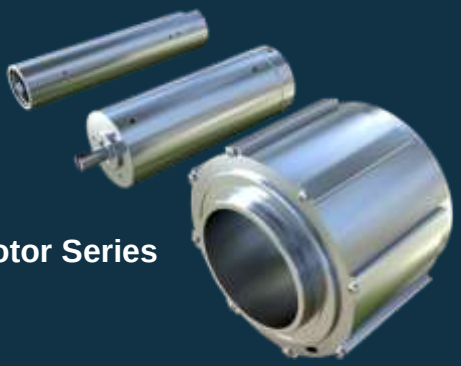


高温大功率电池系列

容量：6-28 Ah
持续工作电流：0-5A
开路电压：5-48V
峰值电流：<10A
耐温：200 ℃

High-temp Micro Servo Electro-hydraulic Control System

Miniaturization is one of the important goals of hydraulic technology research. This system is an important achievement of micro servo-hydraulic technology, with the significant advantages of small size, light weight and high power density, which can realize the simple and efficient hydraulic system solution that cannot be realized by traditional technology, and it is widely used in aerospace, deep diving equipment, aircraft manufacturing, oil drilling tools, robotics, portable underwater tools, portable hydraulic power station and other fields, with very bright application prospects.



Hi-temp Micro Motor Series

Rated Power：29-280W
Rated Voltage：28-340V
Rated RPM：900-4700
Rated Torque：0.06-0.74Nm
Temperature：200 ℃

Hi-temp Micro Oil Pump Series

OD：20-105mm
Flow Rate：0.012-0.3cm3/r
Rated RPM：5000RPM
Rated Efficiency：>80%
Temperature： 200 ℃

Hi-temp Battery Series

Capacity：6-28 Ah
Continuous Current：0-5A
Open-circuit Voltage：5-48V
Peak Current：<10A
Temperature：200 ℃

合力(天津)能源科技股份有限公司
Heli Tech Energy Co.,Ltd.

抗高温随钻测量工具

整体参数

最高温度: 150℃-215 ℃
最高承压: 120MPa
外径: φ47.6mm
长度: ≤5.7m; ≤7m (带自然伽马)
电池寿命:
250 ~ 300 小时 / 200 小时 (带自然伽马)
排量: 10 ~ 55 l/s (取决于钻铤尺寸)
压耗: 50 ~ 200psi (取决于钻铤尺寸及排量)
泥浆脉冲信号强度: 75 ~ 220psi
泥浆粘度: ≤140s (漏斗粘度)
泥浆含砂: < 1.2%
泥浆比重: ≤1.7 g/cm3

定向模块

井斜精度: ±0.1°
方位精度: ±1.0°
工具面精度: ±1.0°
存储能力: 28000 组
抗冲击: 1000g, 1ms, 1/2sin
耐震: 20g / 10 ~ 200Hz rms

自然伽马

测量范围: 0 ~ 500API
测量精度: ±5%
存储能力: 100000组
敏感度: 优于 1 单位 / API
垂向分辨率: 优于 130mm
推荐速度: ≤30m/h
推荐取样时间: 8 ~ 12s
抗冲击: 1000g, 1ms, 1/2sin
耐震: 10g / 50 ~ 250Hz rms

方位伽马

测量范围: 0 ~ 500API
敏感度: 优于 0.5 单位 / API
测量精度: ±3%
聚焦分辨率: 72°/360°
薄层分辨率: 200mm
存储能力: 100000组
I输入电压:18 ~ 40V
输入电流: 30 ~ 40mA, 15mA@28V
抗冲击 (X 或 Y轴): 1000g, 1ms, 1/2sin
抗冲击(Z轴): 500G, 1ms, 1/2sin
耐震: 10g / 50 ~ 250Hz rms

Hi-Temp Resistant MWD

Overall

Max Temp.: 150℃-215 ℃

Max pressure bearing: 120MPa

OD: φ47.6mm

Length: ≤5.7m; ≤7m (with GR)

Battery lifespan:

250 ~ 300 hrs / 200 hrs (with GR)

Flow rate: 10 ~ 55 l/s (upon DC size)

Pressure drop: 50 ~ 200psi (upon DC size and flowrate)

Mud Signal strength: 75 ~ 220psi

Mud Viscosity: ≤140s (funnel)

Sand: < 1.2%

Mud Weight: ≤1.7 g/cm3

Directional

Inclination accuracy: ±0.1°

Azimuth accuracy: ±1.0°

Tool face accuracy: ±1.0°

Storage Capacity: 28000 sets

Shock resistance: 1000g, 1ms, 1/2sin

Vibration resistance: 20g / 10 ~ 200Hz rms

GR

Range: 0 ~ 500API

Accuracy: ±5%

Storage Capacity: 100 thousand sets

Sensitivity: better than 1 Unit / API

Vertical Resolution: better than 130mm

Recommended speed: ≤30m/h

Recommended sampling time: 8 ~ 12s

Shock resistance: 1000g, 1ms, 1/2sin

Vibration resistance: 10g / 50 ~ 250Hz rms

Azimuthal GR

Range: 0 ~ 500API

Sensitivity: better than 0.5 unit / API

Accuracy: ±3%

Focused Resolution: 72°/360°

Thin formation resolution: 200mm

Storage Capacity: 100 thousand sets

Input voltage:18 ~ 40V

Input current: 30 ~ 40mA, 15mA@28V

Shock resistance (X or Y): 1000g, 1ms, 1/2sin

Shock resistance (Z): 500G, 1ms, 1/2sin

Vibration resistance: 10g / 50 ~ 250Hz rms

可重复式电控封隔器

针对机械式封隔器阀座压力控制和阀座密封筒反复损坏严重降低封隔器稳定性的问题，研制了水平井电控封隔器，该封隔器可以定时或实时进行封隔和开封，可实现任意层段的密封。封隔器的设计考虑了水平段的重复坐封次数和密封的承压性能，特别是微型电机和微型泵之间的配合，以确保在允许的套管空间内获得最大的输出扭矩和封隔器筒体的压缩坐封。通过室内试验对电控封隔器的耐温耐压性能、输出扭矩和阀座推力等性能进行了评价，各项性能指标均达到设计要求。

长度	1445mm
外径	145mm
重量	100kg
额定电流	3.5A
额定电压	28V
活塞泵	
最大压力	30 MPa
输出	0.016 cm3/转
额定转速	3000
最大转速	6000
温度	200 ℃
橡胶部分	
座封压力	8-10 吨
温度	120-240 ℃
压力	45-90 MPa
永久形变	<2%

Reusable Electrical Downhole Packer

In response to the problems of mechanical packer seating pressure control and repeated seating seal cylinder damage, which significantly reduces the stability of the packer, the horizontal well electronically controlled packer has been developed, which can be seated and unsealed at regular intervals or in real time, and can realize the sealing of any layer section. The design of the packer takes into account the repeated seating times of the horizontal section and the pressure-bearing performance of the seal, especially the cooperation between the micro-motor and the micro-pump to ensure the maximum output torque and the compression seating of the packer cartridge in the permitted casing space. The performance of the electronically controlled packer in terms of temperature and pressure resistance, output torque and seating thrust was evaluated through indoor tests, and the relevant performance indexes all met the design requirements.

Length	1445mm
OD	145mm
Weight	100kg
Rated Current	3.5A
Rated Voltage	28V
Piston Pump	
Max. Pressure	30 MPa
Output	0.016 cm3/round
Rated RPM	3000
Max. RPM	6000
Temp.	200 ℃
Rubber Element	
Seal Pressure	8-10 T
Temp.	120-240 ℃
Pressure	45-90 MPa
Permanent Deformation	<2%

电控配水工具

工具介绍

水驱是油田最常规的补充地层能量的方式，水驱效果直接关系到油田的生产能力。在不改变原有封隔器结构的前提下，增加分层注水自动控制装置，由专用电机和减速装置逐级控制多套电子配水装置。每组电子配水器可根据地面控制指令，调节本层配水器不同流量喷水口的开闭，直至达到该层注水要求。该技术的应用可应用于地面注水井的重复配置，提高注水井的科学管理，实现高效、合理、准确的注水目的。

重量	110kg
长度	1800mm
外径	114mm
内径	60mm
扭矩	350N.M
压力	70MPa

Electrical Water Flow Regulator

Introduction

Water flooding is the most conventional way to supplement formation energy in oil fields, and the effect of water flooding is directly related to the production capacity of oil fields. Under the premise of not changing the original packer structure, automatic control device of layered water flooding is added, and multiple sets of electronic water distribution devices are controlled step by step by special motor and deceleration device. Each set of electronic water distributor can adjust the opening and closing of different flow water spout of the water distributor at this level according to the control instructions on the ground, until it meets the requirements of water injection at the level. The application of this technology can be applied to the surface repeated allocation of water injection well, improve the scientific management of water injection well, and realize the efficient, reasonable and accurate water flooding purpose.

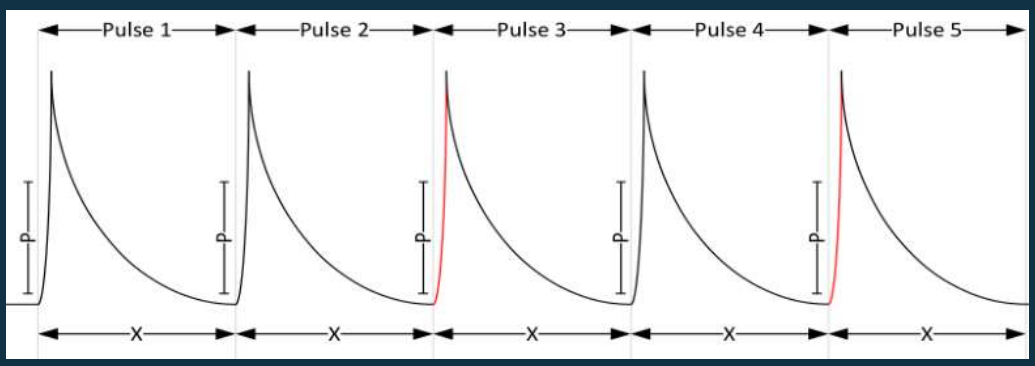
Weight	110kg
Length	1800mm
OD	114mm
ID	60mm
Torque	350N.M
Pressure	70MPa

电控滑套

工具介绍

基于泵的多开关技术，通过FSK压力脉冲或输入磁球两种方式向滑套发送指令，由内置压力传感器检测信号，通过井下逻辑终端控制微电机和微液压系统，实现滑套的开关动作。

重量	120kg
长度	1800mm
外径	143mm
内径	48mm
电池	14.4V, 3.6A
电机	120N.M
压力	70MPa



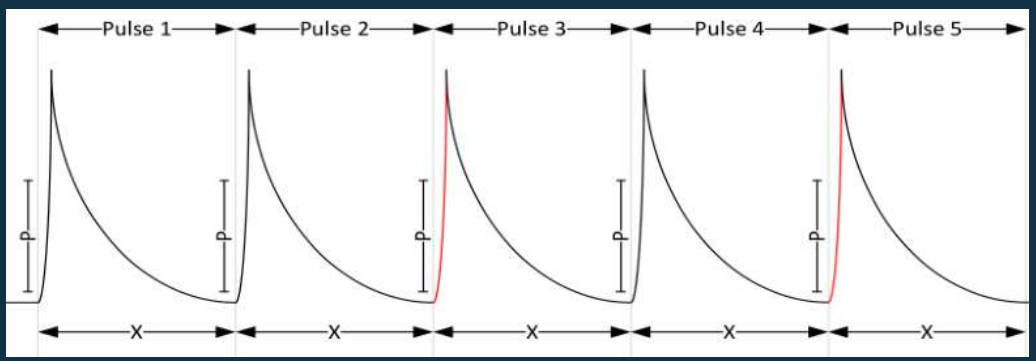
FSK 压力脉冲发送

Electrical Sliding Sleeve

Introduction

Pump-based technology, multiple switching, sends commands to the slip sleeve by two methods, FSK pressure pulse or input magnetic ball, and the signal is detected by the built-in pressure sensor to control the micro-motor and micro-hydraulic system through the downhole logic terminal to realize the switching action of the slip sleeve.

Weight	120kg
Length	1800mm
OD	143mm
ID	48mm
Battery	14.4V, 3.6A
Motor	120N.M
Pressure	70MPa



FSK pressure pulse sending

电控随钻旁通循环工具

工具介绍

电控旁通循环工具是一款采用压力波的控制方式远程激活及关闭的随钻工具，该产品内部集成多款微型电机、柱塞泵、液压阀组及温度压力传感器，采用高温电池组对其进行供电，由压力传感器感知微量的压力脉冲信号变化，通过嵌入式软硬件系统及特定算法识别、处理、分析压力信号并给出控制指令，对动力元件进行驱动，可以实现远程无限次激活及关闭。

优势与特点

- 无线压力脉冲控制方式，可以进行远程无限次激活及关闭；
- 微型液压系统实现小体积大输出，给工具提供更高的可靠性；
- 高温电池组供电，工作时间可达到200小时，无需井下发电机、电缆，操作更方便；
- 工具内置存储单元，可以记录井下压力、温度及工具内部各参数工作状态；

工具参数

工具外径	8"
工具内径	2-7/8"
抗拉强度	1500 klbs
抗扭强度	120 kft.lbs
旁通孔数量	3
旁通孔尺寸	
温度等级	180
压力等级	15000 psi

Electrical Bypass Circulation Tool

Introduction

The electrical bypass circulation tool is a remote activated drilling tool using pressure wave control. The tool integrates a variety of micro motors, piston pumps, hydraulic valve sets and temperature and pressure sensors, and uses a high-temperature battery pack to supply power. The pressure sensor detects slight pressure pulse signal changes, identifies, processes and analyzes the pressure signal through an embedded software and hardware system and specific algorithms, and gives control commands to drive the power components, achieving infinite remote activation and deactivation.

Features & Benefits

- Infinite remote activation and deactivation by pressure pulse;
- Micro hydraulic system guarantees higher reliability;
- High-temperature battery pack delivers working time of 200 hours;
- Downhole pressure and temperature can be measured by sensor and be recorded by the storage unit of the tool.

Specification

OD	8"
ID	2-7/8"
Tensile Strength	1500 klbs
Torsional Strength	120 kft.lbs
Quantity of Bypass Hole	3
Size of Bypass Hole	42mm
Temperature Rate	180℃
Pressure Rate	15000 psi

电控内割刀

工具介绍

电控内割刀是一款使用单芯/多芯电缆进行供电，通过上位机系统全程精确监控的井下管柱切割工具，可以用于井下油套管、钻杆、钻完井工具的切割工作，具有切割点准确、平稳快速的优点。该割刀系统集成3个微型电机、1个液压泵及阀组、多种传感器，可以实时监测深度、电压、电流、转速、扭矩、进给距离及液压系统压力等多种参数。入井至指定深度后，通过上位机系统进行控制，依次张开锚定卡瓦，开始主轴旋转，运行割刀进给动作，执行管柱切割工作。

优势与特点

- 电缆供电，无需水动力，减少施工设备需求；
- 液压锚定可靠，切割动作平稳可控，降低振动，切割口平整；
- 一趟入井可执行多次切割操作；
- 上位机系统使整个切割过程完全参数“可视化”；
- 可以适用于全部钢级的油套管、钻完井工具、钻杆切割；

工具参数

工具外径	2-1/8"
切割范围	2-7/8" - 5"
压力等级	25000psi
温度等级	180℃
电源要求	600～1000VDC/2A

Electric Internal Cutter

Introduction

This is a downhole internal cutting tool using single/multi-core cable for power supply, which can be used for cutting downhole all types of downhole string with the advantages of accurate cutting point, smoothness and speed through the whole process of monitoring by the upper computer system. The system integrates 3 micro motors, 1 hydraulic pump and valve set, and multiple sensors, which can monitor various parameters such as depth, voltage, current, speed, torque, feed distance and hydraulic system pressure in real time. When run to the specified depth, the system is controlled by the upper computer system, which opens the anchors in turn, starts the main shaft rotating and to execute the cutting operation.

Features & Benefits

- 100% electric power supply, and no circulation is needed;
- Hydraulic anchor to reduce vibration and to smooth the cutting;
- Multi-cutting in one trip;
- Visible parameters provided by upper computer;
- Used for casing, tubing and DP of all rates.

Specification

OD	2-1/8"
Cutting Range	2-7/8" - 5"
Pressure Rate	25000psi
Temperature Rate	180℃
Power Supply	600～1000VDC/2A

电控随钻安全丢手工具

工具介绍

电子钻井安全丢手集成转速、振动及压力三种测量模块，通过检测钻具转速及振动信号判断是否进行丢手模式，再由地面向井底发送压力脉冲信号，激活工具，完成丢手。采用微型电机转动驱动换向阀组切换油路，利用静液柱压力完成丢手动作。

优势与特点

- 三种命令流集成检测，可靠性高，工具内部全通径，可接入钻具组合任意位置，不会对其他随钻仪器及定向工具产生影响。
- 可多位置同时接入钻具，采用不同命令流，分梯次多段激活，特别适合应对长距离卡钻，分段分离井底钻具，极大提高卡钻事故处理能力。
- 激活方式简单，命令发送时间在5分钟内，丢手激活迅速，可在1分钟内完成丢手动作，提高了事故处理时效。

工具参数

螺纹连接	NC50 BOX*PIN
工具总长	3356mm
工具外径	171.45mm
工具内径	59mm
抗压等级	70MPa
环境温度	150℃
工作时间	220～250h
抗拉强度	110t
抗扭强度	110000N.m

Electrical Drilling Safety Releasing Tool

Introduction

The Tool integrates the measurement modules of rotational speed, vibration and pressure to determine whether to release by detecting the rotational speed and vibration signal of the drilling tool, and then sending the pressure pulse signal from the surface to the bottom of the well to activate the tool. It adopts micro-motor rotation to drive the reversing valve set to switch the oil circuit and use the liquid column pressure to perform the releasing.

Features & Benefits

- The three command streams are integrated and detected with high reliability, and the tool has a full internal through-hole, which can be accessed to any position of the drilling tool combination and will not affect other instruments and directional tools.
- The tool adopts different command flows and is activated in multiple stages in a ladder, which is especially suitable for dealing with long distance stuck drilling and separating bottom hole drilling tools in sections, greatly improving the ability to deal with stuck drilling accidents.
- The releasing instruction can be sent within 5mins and the releasing action can be completed within 1 min.

Specification

Connection	NC50 BOX*PIN
Length	3356mm
OD	171.45mm
ID	59mm
Pressure Rate	70MPa
Temp.	150℃
Working Duration	220 ~ 250h
Tensile	110t
Torsional Strength	110000N.m

旋转冲击马达

工具介绍

旋转冲击马达利用最新设计的动能分布系统为客户提高机械钻速。工具将螺杆马达的周向旋转的速度及扭矩转换为底部钻具组合的周向冲击。工具可根据不同的钻井工况进行模块化配置，冲击力对牙轮钻头及PDC钻头都具有很好的兼容性。工具通过纯机械结构保持钻头对地层的持续攻击并减小钻具的托压现象，同时提升钻头的综合性能。

优势与特点

- 提高机械钻速，结合轴向运动和周向扭矩提升钻头破岩效率。
- 降低钻具与井壁的摩阻，根据不同工况订制冲击频率。
- 改善钻压传递，每秒钟对底部钻具组合冲击12次左右。
- 防止钻头损伤。有钻压施加时工具开始冲击，钻具提离井底后工具停止冲击。
- 创新的密封设计保证工具稳定工作无泄漏。
- 可配合常规螺杆马达使用。

工具参数

外径 (in)	5	6-3/4	8	9-5/8
最大钻压 (lbs)	30000	44000	55000	80000
总重量 (lbs)	1350	2400	3900	6900
井眼尺寸 (in)	6~6-7/8	8-3/8~9-7/8	9-7/8~12-1/4	12-1/4~16

Hydraulic Impacting PDM

Introduction

The Hydraulic Impacting PDM uses a newly designed energy distribution system to increase drilling performance in areas where it is a challenge to maintain ROP. The tool combines the torque and rotational speed from a mud motor power section with a high-frequency axial oscillation directly in the BHA. The Hydraulic Impacting PDM allows for application-specific setups and is compatible with both fixed cutter and roller cone bits. This 100% mechanical system maintains contact with the formation and reduces weight stacking from friction on the BHA, all while amplifying the cutting interaction of the bit, enhancing its rock-failing properties.

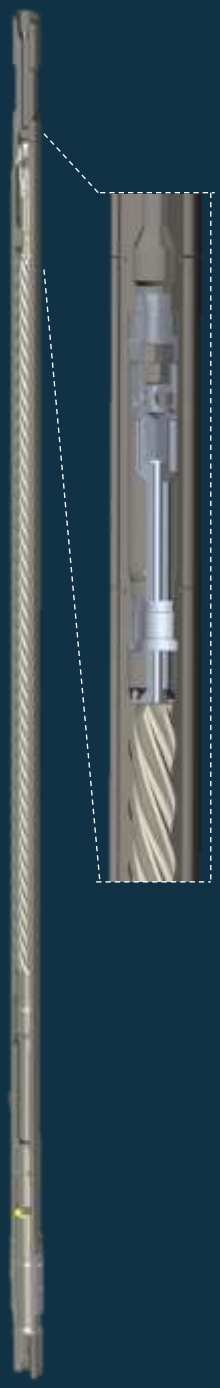
Features & Benefits

- Increases ROP - Combines axial movement with rotational torque and speed to improve bit efficiency.
- Reduces friction - High-frequency axial motion configured specifically for specific application.
- Improves weight transfer - Oscillates the BHA up to 12 times/s
- Prevents bit damage - Activated with weight on bit, and disengages when off bottom.
- Innovative engineering - Oil-seal allows for 100% flow to bit.
- Compatible with most common power section configurations

Specification

OD (in)	5	6-3/4	8	9-5/8
Max WOB (lbs)	30000	44000	55000	80000
Total Weight (lbs)	1350	2400	3900	6900
Hole Sizes (in)	6 to 6-7/8	8-3/8 to 9-7/8	9-7/8 to 12-1/4	12-1/4 to 16

振荡螺杆钻具



工具介绍

振荡螺杆由高效螺杆钻具与脉冲发生短节组成。脉冲发生短节利用螺杆转子的旋转作为动力产生压力脉冲，该脉冲作用于钻具内部从而产生径向和轴向的高频振荡，进而提升钻井时效。

优势与特点

- 由螺杆钻具直接提供供动力，无须再安装额外的动力短节，缩短工具总长度，减小压耗与维护成本。
- 同时产生径向与轴向振动，多维度减阻。
- 在近钻头处产生振荡，同时减小摩阻及辅助破岩。
- 工作频率不影响MWD信号。
- PDC钻头及牙轮钻头均可配合使用，冲击力不损伤钻头切削齿或轴承，且通过改善钻压传递延长钻头使用寿命。

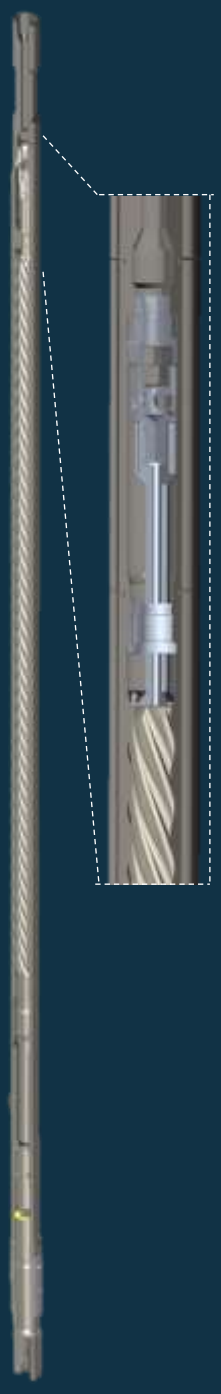
工具参数

工具外径	5"	6-7/8"	9-1/2"
震击力	900-1800 lbs	1120-3370 lbs	2700-4000 lbs
工作频率	10-25 Hz	10-25 Hz	15-25 Hz
最高工作温度	180	180	180
钻头尺寸	5-7/8" - 7-7/8"	8-3/8" - 9-7/8"	12-1/4" - 17"
工作排量	200-400 gpm	300-600 gpm	570-1200 gpm
最大扭矩	2500 ft.lbs	14000 ft.lbs	22000 ft.lbs
工作压降	580 psi	700 psi	650 psi

Oscillating PDM

Introduction

Oscillating PDM incorporates high-efficiency PDM and pulse generating sub. The pulse generating sub converts the rotational movement of rotor into mud pulse. The pulse act inside the tool, creating radial and axial high-frequency oscillation, improving ROP and reducing the risk of pipe stuck.



Features & Benefits

- The PDM directly provides power to pulse generating sub. In this way the total length of tool can be shorten, the pressure drop can be reduced, and the maintenance cost can be better controlled.
- Multi-dimensional drag reduction.
- The near-bit oscillation helps to improve the efficiency of rock breaking.
- No impact to MWD signal.
- Compatible with both PDC drill bit and tri-cone bit.

Specification

OD	5"	6-7/8"	9-1/2"
Oscillating Force	900-1800 lbs	1120-3370 lbs	2700-4000 lbs
Frequency	10-25 Hz	10-25 Hz	15-25 Hz
Max. Temp.	180	180	180
Bit Size	5-7/8" - 7-7/8"	8-3/8" - 9-7/8"	12-1/4" - 17"
Flow Rate	200-400 gpm	300-600 gpm	570-1200 gpm
Max Torque	2500 ft.lbs	14000 ft.lbs	22000 ft.lbs
Pressure Drop	580 psi	700 psi	650 psi

减震器

工具介绍

减震器在钻具组合中位于靠近钻头的位置，该工具可以减小跳钻、延长钻头寿命，减小钻头切削齿部位的冲击负荷，并提高机械钻速。

减震器也可以放置于LWD或MWD工具之后，以减小周期性负荷波动对井下仪器产生的损伤。在钻具组合中接入减震器可以减小由钻井产生的应力集中，并全面提升钻井作业时效。

优势及特点

- 吸收并减小能够引起钻具疲劳的震动
- 碟簧组合能够最小化钻头受到的冲击并提高钻速
- 压力补偿系统以降低泵压带来的影响

工具参数

外径	12	9-1/2"	8"	6-3/4"
内径	2-13/15"	2-13/15"	2-3/4"	2-1/4"
抗拉强度 (kN)	5950	5370	3870	2640
抗扭强度 (kN.m)	330	148	100	73
最大压缩量的轴向负荷 (kN)	445	445	556	445
弹簧系数 (N/mm)	2600	4300	5400	6100
上行位移 (mm)	64	84	44	44
下行位移 (mm)	178	102	102	76
长度 (m)	3.7	3.3	3.8	2.9
重量 (kg)	1600	1000	730	390

Shock Tool

Introduction

Shock Tools are typically placed in close proximity to the drill bit. This will extend the functional life of the bit by reducing bit bounce and minimizing the dynamic impact loads on the bearings and/or cutters, in turn increasing the rate of penetration (ROP).

Shock Tools can also be placed directly below the LWD and MWD directional drilling tools to prevent the severe cyclic loads from damaging the equipment. Including a Shock Tool in the BHA will reduce the stresses created in drilling and dramatically improve overall operational success.

Features & Benefits

- Absorbs and reduces vibration induced drill string failures.
- Disk springs greatly minimize impact on drill bit and increase ROP
- Pressure compensated to effectively decrease excessive pump open effect.

Specification

OD	12	9-1/2"	8"	6-3/4"
ID	2-13/15"	2-13/15"	2-3/4"	2-1/4"
Tensile Yield Strength (kN)	5950	5370	3870	2640
Torsional Yield Strength (kN.m)	330	148	100	73
Axial Load to Fully Compress (kN)	445	445	556	445
Spring Rate (N/mm)	2600	4300	5400	6100
Travel Up (mm)	64	84	44	44
Travel Down (mm)	178	102	102	76
Length (m)	3.7	3.3	3.8	2.9
Weight (kg)	1600	1000	730	390

UltraShaker减摩减阻工具

工具介绍

Ultrashaker减摩减阻工具利用钻井液的液力能转换为轴向振动的机械能，从而将钻具与井壁之间的静摩擦转换为动摩擦，以起到大幅提高机械钻速的效果。这种摩擦力的转换在轴向和周向上都带来益处，分别体现为减小托压和减小粘滑，进而对钻井作业时效带来一些列的提升：改善钻压传递，更加稳定的工具面，保护钻头，减少起下钻次数，缓解钻具疲劳情况，降低卡钻风险，减小扭矩波动等。

优势及特点

- 提高机械钻速，特别是滑动钻进模式的机械钻速。
- 保护螺杆马达和钻头。
- 获得更稳定的工具面。
- 减小粘卡发生的可能性。
- 对MWD信号无任何影响。
- 经优化的活塞总成设计产生更小的压耗。
- 经优化的弹簧总成产生更加稳定的振动。

工具参数

外径 (in)	排量 (gpm)	振动频率 (Hz)	压耗 (psi)	抗拉 (klbs)	温度 (℃)	循环时间 (Hrs)
8	500-1000	9-18	400-550	670	≤180	400
6-3/4	400-600	13-19	300-550	570	≤180	400
4-3/4	150-300	11-20	300-550	260	≤180	400
3-3/4	80-160	11-20	300-550	190	≤180	400

UltraShaker

Introduction

Ultrashaker creates axial oscillation using hydraulic energy while drilling to reduce the static friction between wellbore and drill string, thus the ROP can be increased dramatically. Such reduction of static friction produces two direct results: to reduce weight stacking, and to reduce stick-slip. All benefits brought by Ultrashaker are based on these two results: reduction of weight stacking helps to improve WOB delivery, to control tool face, to protect bit, to save runs, to reduce compression of drilling string, and to reduce the risk of getting stuck; reduction of stick-slip helps to protect bit and drill string, to reduce torque fluctuation.

Features & Benefits

- To enhance ROP especially in sliding mode.
- To protect motor and drill bit.
- To better control tool face.
- To reduce the risk of pipe stuck.
- No interference to MWD signal.
- Optimized piston assembly design to decrease the pressure drop.
- Optimized spring configuration to create more stable oscillation.

Specification

OD (in)	Flow Rate (gpm)	Frequency (Hz)	Pressure Drop (psi)	Max Pull (klbs)	Temp. (℃)	Circ. Hrs (Hrs)
8	500-1000	9-18	400-550	670	≤180	400
6-3/4	400-600	13-19	300-550	570	≤180	400
4-3/4	150-300	11-20	300-550	260	≤180	400
3-3/4	80-160	11-20	300-550	190	≤180	400

三维稳定工具

工具介绍

三维稳定工具位于钻具组合下部，由一套机械液压结构组成。在稳定钻进的正常工况下，三维稳定工具作为钻具组合的一部分，将钻压与扭矩传递给下部钻具。当钻进工况不稳定的情况下，三维稳定器开始干预钻压、扭矩及钻头的切削深度。在实际作业中，这种干预会在瞬间启动并迅速完成，以防止局部的钻具不稳定扩大为具有破坏性的震动。这种调节持续进行，且无需重置工具。

优势及特点

- 通过消除具有破坏性的扭矩波动使钻柱具有更好的动力学状态，该扭矩波动来自钻头或随钻扩眼工具。
- 提高钻井效率，减小进尺成本。该工具可以动态的调节钻头切削齿吃入地层的深度从而使钻头保持恒定扭矩。这样的钻头姿态控制可以保证钻头具有最大程度的攻击性和最高的机械钻速。
- 保护钻具组合免受轴向冲击损伤。
- 减小井下作业的风险，特别是高成本钻井环境。

工具参数

最大外径 (in)	4-3/4	6-3/4	8-1/4
最小内径 (in)	1-3/8	2-7/16	2-7/8
最大钻压 (klbs)	33	66	100
最大扭矩 (kftlbs)	9	30	35
最大排量 (gpm)	400	925	1500
最大狗腿 (deg/100ft)	25	20	14

Torque Buffer

Introduction

The Torque Buffer consists of a set of mechanical-hydraulic structure placed in the lower part of the drill string. Under normal, stable conditions, the tool will transfer torque and weight to the bit as a passive part of the Bottom Hole Assembly. However, if the bit becomes unstable, the torque buffer will intervene to regulate the forces and the depth of cut. In practical terms, this means that the momentary response / closed-loop function of the torque buffer prevents the escalation of local instabilities into destructive vibrations. The tool functions continuously, and no reset is required.

Features & Benefits

- Control drilling dynamics by eliminating damaging torsional oscillations generated from the bit and/or an under-reamer.
- Improve drilling efficiency, increase ROP and reduce cost per foot. The tool adjusts the depth of cut dynamically to maintain a constant torque on the bit. This permits the use of sharper more aggressive cutting structures to maximize ROP.
- Protects BHA components & bits from shock related failures
- To reduce operation risk, particularly in high cost operations.

Specification

Max OD (in)	4-3/4	6-3/4	8-1/4
Min ID (in)	1-3/8	2-7/16	2-7/8
Max WOB (klbs)	33	66	100
Max Torque (kftlbs)	9	30	35
Max Flow Rate (gpm)	400	925	1500
Max DLS (deg/100ft)	25	20	14

岩屑床清洁工具

工具介绍

岩屑床清洁工具利用经过优化的水力学设计及井眼清洁技术，使钻井阶段的岩屑清洁效率最大化，节省钻机时间及减少钻井成本。岩屑床清洁工具在井下会产生一系列的水力-机械原理的效应，这些效应保障了钻井作业可以更快更安全地进行。

工具本体尺寸与钻杆相同，主要用于大斜度井中。可以将本工具理解为新一代的钻杆，该钻杆主要用以解决水平井和大位移井中的钻井循环压力过高、当量密度过大等问题。该工具能够在不破坏井壁的前提下，持续迫使岩屑从井眼低边进入钻井液的高速流动区。主要的物理效应包括以下几方面：

挖掘效应：沉积在低边的岩屑床通过机械挖掘和携带的方式离开底部。

再循环：岩屑一旦被提升，将进入井筒中心部分，此处钻井液流速最快。

运移效应：无论在再循环阶段中岩屑怎样运移，都会由于重力作用再次沉积到低边。运移效应使得岩屑能够持续上返。

优势与特点

- 减少循环时间和短起次数。
- 减少划眼时间。
- 减小扭矩与摩阻，提高机械钻速。
- 降低钻井风险，使得下套管作业更加顺利。
- 延长钻具使用寿命。

Cutting Bed Cleaner

Introduction

The Cutting Bed Cleaner has developed patented hole cleaning technology to maximize hole cleaning efficiencies while drilling, safe rig time and reduce drilling costs. The structure of Cutting Bed Cleaner produces a number of hydro-mechanical effects resulting in safer and faster drilling with less time spent on cleanups.

The tool is designed in the form of a joint of pipe to drill large and highly deviated holes. It is a new generation drill pipe designed to address ECD and annular pressure issues in horizontal and ERD wells. The tool provides full and immediate degradation of cutting beds while keeping more cuttings moving on the high side of hole where fluid velocities are highest. The hole cleaning functions are achieved through three effects:

Scooping: Cutting deposited on the low side of the hole are mechanically eroded and lifted from the bottom of hole.

Recirculation: Once lifted, cuttings are circulated on the high side of the hole, where fluid velocities are the highest.

Transportation: Regardless of energy input on the cuttings during the recirculation stage and cuttings will eventually resettle to the low side of the hole due to gravity. The conveyor belt effect is established to continuously transport of cuttings to the surface.

Features & Benefits

- Reduce total circulating time and wiper trips.
- Reduce or eliminate reaming and sweeps.
- Reduce torque and drag and increase ROP.
- Mitigate drilling risks and smooth casing runs.
- Extend service life of the drill string.

多次激活旁通循环工具

工具介绍

多次激活旁通循环工具是一套可以通过多次投球实现打开和关闭旁通的随钻工具，可根据井下工况随时切换模式以进行随钻堵漏或井筒清洗等作业。

优势及特点

- 实现不起钻堵漏等特殊作业，允许各类堵漏材料通过。
- 可实现多次井下开关作业。
- 通过配置不同长度的承托环以实现不同上限的开关次数。

钻进模式

投入激活球
旁通模式

投入关闭球

打压落球
恢复钻进模式

工具外径	4-3/4"	6-1/2"	8"
工具内径	40mm	50mm	60mm
耐温	200℃	200℃	200℃
循环孔直径	20mm	28mm	34mm
循环孔数量	2	2	2
激活球直径	45mm	57mm	65mm
关闭球直径	23mm	31mm	37mm
激活球剪切压力	5-7Mpa	7-10Mpa	9-12Mpa

Multi-activation Bypass Tool

Introduction

Multi-activation Bypass Tool is a drilling tool for pumping LCM material and hole cleaning. Multiple times of activation and de-activation can be realized by dropping multiple groups of balls.

Features & Benefits

- To enable the aggressive pumping of different types of LCM material.
- Multiple times of activation and de-activation.
- length of ball catcher can be adjusted for more times of mode switch.

Drilling Mode

Drop Act. Ball
Bypass Mode

Drop
De-act. Ball

Shear Ball
Drilling Mode

OD	4-3/4"	6-1/2"	8"
ID	40mm	50mm	60mm
Temp.	200℃	200℃	200℃
Circ. Hole size	20mm	28mm	34mm
No. of Circ. Hole	2	2	2
Activation Ball OD	45mm	57mm	65mm
De-activation Ball OD	23mm	31mm	37mm
Shear Pressure for Act. Ball	5-7Mpa	7-10Mpa	9-12Mpa

双向液压随钻震击器

工具介绍

在大位移井及大斜度井中，双向液压随钻震击器对比传统机械式震击器的优势越来越明显，它的延时震击和稳定的液压结构能在更加恶劣的井况和使用场景下起到稳定高效的震击效果。双向液压随钻震击器能够对受卡钻具施加安全范围内的最大冲击力从而完成解卡。震击器的长度和外径可与钻台上的其他钻具完全兼容并立在钻台。在钻进模式下，震击器处于中位，不受任何钻压和扭矩的影响。

优势与特点

- 具有更大的过提承受能力、更长的自由形成和更大的冲击力。
- 工具具有更高的强度以应对高强度震击。
- 震击操作简易。
- 内径较大，允许其他井下工具通过。
- 压耗极低。
- 优化过的工具结构和材质保证工具单次入井的工作时间。
- 通过专业软件计算震击器的最佳安放位置。

工具参数

外径 (in)	内径 (in)	抗拉 (klbs)	抗扭(kft.lbs)	上击行程 (in)	下击行程 (in)
3-3/8	1-1/2	236	6.8	7	7
4-3/4	2-1/4	492	19	8	7
6-1/2	2-3/4	964	55	8	7
8	3	1621	98	8	7

Dual-way Hydraulic Drilling Jars

Introduction

The Dual-way Hydraulic Drilling Jars are capable of delivering (an extra heavy) with (the maximum Impact/ Impulse values) when a BHA becomes stuck. The Jars can easily be racked as part of a stand of drill collars because it is similar in length and diameter, and has compatible connections and slip setting areas. In the drilling mode, the jarring mechanism is disengaged and is not affected by normal drilling conditions or torque.

Features & Benefits

- High over-pull capability, long free stroke and high impact capability.
- High tensile strength for higher impact service capability.
- Straight push and pull operation for easy jar operation.
- Large through bore for passage of instruments.
- Negligible pressure drop through Jar.
- Redundant dynamic packing to prevent washouts and provide long down-hole service.
- Jar can be placed in the BHA per customer request using a Jar
- placement program.

Specification

OD (in)	ID (in)	Tensile yield strength (klbs)	Torsional yield Strength (kft.lbs)	UP stroke (in)	Down stroke (in)
3-3/8	1-1/2	236	6.8	7	7
4-3/4	2-1/4	492	19	8	7
6-1/2	2-3/4	964	55	8	7
8	3	1621	98	8	7

液压随钻扩眼器

工具介绍

随钻液压扩眼器广泛应用于各种类型的钻井工况。Z型驱动的切削刀翼与可靠的液力激发装置组成了工具的核心结构。当地面投球至工具球座时，钻井液推动刀翼向上推出并迅速达到全开尺寸，确保高效完成扩眼作业的同时保证工具居中。停泵后，刀翼在弹簧作用下收回，降低了卡钻风险。整体式水眼及流道有助于扩眼作业时的排屑，刀翼几何形状可使钻井液充分上返。

优势与特点

- Z型驱动保证刀翼保持张开。
- 在任何需要的时间进行扩眼作业。
- 保证工具居中满眼。
- 在任何井斜下都可以激活刀翼。
- 无论在钻进模式或扩眼模式下，均可以正常排量循环。
- 水眼及流道一体化设计，可对切削高效清洁。

工具参数

扩眼尺寸 (in)	14-1/2	12-1/4	11-3/8	9-7/8	7	3-1/4
井眼尺寸 (in)	12-1/4	10-5/8	9-1/2	8-1/2	5-7/8	3-3/4
工具外径 (in)	12.19	10.56	9.44	8.44	5.84	4-1/2
工具内径 (in)	2	1-3/4	1-5/8	1-1/2	1.06	0.875
最大排量 (gpm)	1200	950	900	700	400	160

Hydraulic Drilling Reamer

Introduction

The Hydraulic Drilling Reamer is widely used in different types of drilling condition. Reliable hydraulic actuation is provided by the Z-Drive reamer cutter block deployment system. When activated from an activation ball dropped at surface, the Z-Drive system pushes the cutter blocks upward and radially outward to the fully open position, facilitating rapid cutout and ensuring a full-gauge, concentric borehole. When pumping stops, the cutter blocks retract. Dependable retraction of the cutter blocks helps avoid stuck BHAs. Integrated jet nozzles and flow paths improve evacuation of cuttings while drilling. The reamer enables full flow through the BHA in both open and closed positions.

Features & Benefits

- Improve drilling performance.
- Provides on-demand wellbore enlargement.
- Ensures full-gauge concentric wellbores.
- Unlimited activations regardless of wellbore inclination.
- Full-flow capability in reaming and non-reaming modes.
- Effective cleaning of borehole with integrated jet nozzle & flow paths.

Specification

Reaming size (in)	14-1/2	12-1/4	11-3/8	9-7/8	7	3-1/4
Hole size (in)	12-1/4	10-5/8	9-1/2	8-1/2	5-7/8	3-3/4
Tool OD (in)	12.19	10.56	9.44	8.44	5.84	4-1/2
Tool ID (in)	2	1-3/4	1-5/8	1-1/2	1.06	0.875
Max FR (gpm)	1200	950	900	700	400	160

无限次开关随钻扩眼工具

工具介绍

合力无限次开关随钻扩眼工具可在井下随时根据需求激活或关闭，为客户的下套管及固井作业提供有力保障。

轨道式的刀翼激活系统使用两套轨道之间的切换实现在地面以排量变化对工具进行实时控制。

该工具可广泛应用于需要稳定的随钻扩眼的井况，一体式的设计提升了工具在轴向负荷及扭矩等方面的承受能力，并同时减小在扩眼作业过程中出现的震动。

优势与特点

- 无论井斜大小，均可实现无限次开关。
- 无论扩眼模式还是非扩眼模式，都可以以最大排量循环。
- 可实现刀翼的快速激活以及回收。
- 优化的流体通道可对井眼进行充分清洁。
- 工具确保在井眼内居中。

工具参数

外径	8"	9-1/4"
内径	2"	2"
扩眼范围	9" ~ 10-1/4"	10-1/4" ~ 11-3/4"
最小主井眼	8-1/4"	9-1/2"
最大排量	750 gpm	750gpm

Infinite Acting Drilling Reamer

Introduction

The Infinite Acting Drilling Reamer, hydraulic actuated on demand, enables fast activation and effective hole enlargement, delivering improved casing running and cement clearance.

An track-type flow activation system, combing two series of tracks, is utilized to switch between two operation modes on demand by changing flow rate on surface.

The reamer is effective in a variety of formations where simultaneous drilling and hole-enlargement reliability are required.

The reamer’ s one-piece & balanced design increases the load and torque carrying capability while reducing drilling-generated vibration.

Features & Benefits

- Unlimited activation regardless of wellbore inclination.
- Full flow capacity in reaming and non-reaming modes.
- Deployment and retraction of PDC block in minutes.
- Effective cleaning of borehole with optimized flow paths.
- Ensure full-gauge concentric wellbore.

Specification

OD	8"	9-1/4"
ID	2"	2"
Enlarged Hole Size	9" ~ 10-1/4"	10-1/4" ~ 11-3/4"
Minimum Pilot Hole Size	8-1/4"	9-1/2"
Maximum Flow Rate (gpm)	750 gpm	750gpm

旋转式套管清刮器

工具介绍

套管刮削器可用于清除残留在套管内壁上水泥块、水泥环、硬蜡、各种盐类结晶和沉积物、射孔毛刺以及套管锈蚀后所产生的氧化铁等物，以便畅通无阻地下入各种下井工具，可提高工具下入和作业的成功率，例如封隔器的坐封成功率等。旋转式套管清刮器设计短小紧凑，采用一体式芯轴设计，强度更大。清刮单元表面积更大，刀翼可旋转且允许正常排量的循环。刀翼由高品质的耐磨合金钢制成且经过特殊热处理工艺，坚硬而不易碎裂。刀翼的倒角设计既能保证对套管内壁的清刮效果，又保证不会挂卡在套管内壁的任何台阶处。

优势与特点

- 刀片总成与本体之间可相对旋转，钻具旋转时刀片总成相对于套管不转，以保护套管。
- 采用碟形弹簧元件，弹力更大、伸缩范围更大。
- 特殊设计的刀片使刮削更干净、更顺畅，具有循环自洁功能。

工具参数

适用套管尺寸	刀片伸出外径	接头螺纹
5-1/2″	133~115 mm	NC31
7″	170~146 mm	NC38
9-5/8″	238~210 mm	NC50

表中未列规格可根据客户需求订制

Rotating Casing Scraper

Introduction

The Rotating Casing Scraper is designed for the removal of mud, cement, bullets, rust, scale, paraffin, perforation burrs and other obstructions from the inside walls of casing, helping to run different types of string smoothly and safely, e.g. packer running and sitting. The Rotating Casing Scraper is short and compact, utilizing a simple one-piece mandrel design constructed to be rugged, yet simple to operate and maintain. The scraper conditions more surface area than other tools on the market, which can be rotated and allows normal flow rate to pass through. The Blades are precision cast from high-quality wear-resistant tool steal with special heat treatment.

Features & Benefits

- The relative rotation happened between knives assembly and body, meanwhile the knives assembly is relative still to casing when rotating the drill pipes.
- disc spring is utilized to provide larger elastic force with wider expansion range.
- Specially designed knives scrape cleaner and smoother with the capability of self-cleaning.

Specification

Casing Size	Knives OD	Connection
5-1/2″	133~115 mm	NC31
7″	170~146 mm	NC38
9-5/8″	238~210 mm	NC50

连续油管定向工具

工具介绍

连续油管定向工具用于连续油管作业中需要井下工具高扭矩转向的工况，包括连续油管钻井或连续油管打捞作业。该工具由流量激活并控制动作，通过增加排量，工具内压力上升，通常在1000psi左右，并推动活塞下行。下行的活塞通过螺旋驱动轴结构产生周向扭矩，该扭矩通过经特殊设计的离合装置传递给下部钻具，使下部钻具发生旋转，每次旋转的角度取决于活塞行程的距离，通常一次行程旋转30°。排量降低后，活塞在弹簧作用下回到初始位置，此时离合器脱开，下部钻具锁定新位置，待排量重新提升后再次重复旋转动作。

优势与特点

- 无级顺时针转向。
- 高扭矩输出。
- 结构简单，便于操作及维保。
- 旋转控制精准。
- 降低排量后可在新旋转位置自锁。

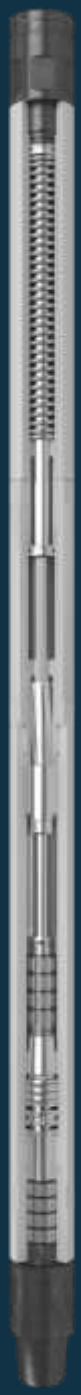
工具参数

外径 (in)	1-3/4	2-1/4	2-7/8	3-1/8
内径 (in)	0.312	0.39	0.75	0.95
扣型	1" AMMT	1-1/2 AMMT	2-3/8 PAC	2-3/8 REG
激活压力 (psi)	500-1000	500-1000	1000-3500	1000-4000
抗拉 (lbs)	43000	43000	80000	95000

Coiled Tubing Indexing Tool

Introduction

The tool is designed for coiled tubing applications in which a high-torque downhole rotation of the lower string is required—e.g., CT drilling, or hook-wall overshot use for fishing below the tail pipe. The tool is operated by flow activation. By increasing the flow rate, a pressure is achieved at the tool whereupon a piston will stroke downward. This downward movement rotates a drive shoe by means of a helical driveshaft, converting linear motion into torque. The torque is transmitted to lower BHA through a special clutch system. The degree of orientation imparted is dependent on the distance the piston moves. The drive shoe will normally rotate 30° in a single cycle. To repeat the cycle, the flow rate is reduced back to normal circulation, the piston will automatically return to start position so that the tool is reset. The cycle can now be repeated as before.



Features & Benefits

- Stepless clockwise orientation.
- Maximum high-torque capability.
- Simple and robust orientation mechanism.
- Precise rotational control.
- Locking at any new position by reducing fluid volume.

Specification

OD (in)	1-3/4	2-1/4	2-7/8	3-1/8
ID (in)	0.312	0.39	0.75	0.95
Connections	1" AMMT	1-1/2 AMMT	2-3/8 PAC	2-3/8 REG
Act. Pressure (psi)	500-1000	500-1000	1000-3500	1000-4000
Tensile Strength (lbs)	43000	43000	80000	95000

连续油管马达

工具介绍

合力高效连续油管马达被广泛应用于各种井下作业工况，包括磨铣、侧钻以及切割等。

由特级工具钢加工而成的高精度泥浆润滑轴承，提供均匀稳定的载荷分布以及更大的钻压承受能力，且易于拆装，维保成本更低。

利用高性能橡胶来输出更大的功率和扭矩，该橡胶具有更佳的弹性-硬度平衡性，更耐高温及腐蚀，从而拥有更长的使用寿命。

工具参数

尺寸	定转比	级数	转速排量比	最小排量	最大排量	最大扭矩	最大压耗
1-11/16"	5：6	5.0	3.42 转/升	95 lpm	170 lpm	247 Nm	7.5 MPa
2-1/8"	5：6	6.0	2.73 转/升	76 lpm	189 lpm	347 Nm	9 MPa
2-7/8"	5：6	3.5	0.82 转/升	227 lpm	454 lpm	640 Nm	5.2 MPa
2-7/8"	5：6	4.7	1.00 转/升	189 lpm	473 lpm	875 Nm	7 MPa
2-7/8"	5：6	7.0	1.40 转/升	76 lpm	303 lpm	1048 Nm	10 MPa
3-1/8"	7：8	3.0	0.48 转/升	303 lpm	636 lpm	1342 Nm	12 MPa
3-1/2"	5：6	3.0	0.65 转/升	227 lpm	636 lpm	1133 Nm	12 MPa

Coiled Tubing PDM

Introduction

HELI efficient Coiled Tubing PDM has been widely used in a variety of downhole conditions, including milling, sidetracking and cutting.
High precision mud lubricated bearings machined from premium tool steel provide uniform and stable load distribution and greater WOB resistance with easy disassembly and lower maintenance costs.
Using high-performance rubber for greater power and torque output, the rubber has better elastic-hardness balance, and is more resistant to high temperature and corrosion, resulting in longer service life.

Specification

OD	Robe	Stage	RPM /FR (r/l)	Min FR	Max FR	Max Torque	Max Pressure Drop
1-11/16"	5:6	5.0	3.42	95 lpm	170 lpm	247 Nm	7.5 MPa
2-1/8"	5:6	6.0	2.73	76 lpm	189 lpm	347 Nm	9 MPa
2-7/8"	5:6	3.5	0.82	227 lpm	454 lpm	640 Nm	5.2 MPa
2-7/8"	5:6	4.7	1.00	189 lpm	473 lpm	875 Nm	7 MPa
2-7/8"	5:6	7.0	1.40	76 lpm	303 lpm	1048 Nm	10 MPa
3-1/8"	7:8	3.0	0.48	303 lpm	636 lpm	1342 Nm	12 MPa
3-1/2"	5:6	3.0	0.65	227 lpm	636 lpm	1133 Nm	12 MPa

文丘里负压系统

工具介绍

文丘里工具是利用文丘里负压效应来清除井底落物、碎片等杂物的打捞工具。当开泵时从水眼喷射出高速流体，从而在工具腔体内造成相对真空，于是井底杂物便被抽吸进入捞筒内。

优势与特点

- 循环压力小，降低漏失风险，减小对产层的污染。
- 可用于高漏失无返出的井况，井内页面高于水眼高度即可工作。
- 更大的负压吸力。
- 单次入井可捕获更多的沙子。
- 工具底部可与磨铣工具连接，破坏井底胶结物。

工具参数

负压与排量对照					
水眼尺寸	排量（gpm）				
	500psi	1000psi	1500psi	2000psi	2500psi
0.062 in	2.2	3.1	3.9	4.4	5
0.078 in	3.5	5	6.1	7	7.9
0.094 in	5.1	7.2	8.9	10.2	11.4
0.109 in	6.9	9.7	11.9	13.8	15.4
0.125 in	9	12.8	15.7	18.1	20.2
0.14 in	11.3	16	19.6	22.7	25.4
0.156 in	14.1	19.9	24.4	28.2	31.5
0.171 in	16.9	23.9	29.3	33.8	37.8
0.187 in	20.2	28.6	35.1	40.5	45.2

Venturi Vacuum System

Introduction

A venturi tool is used to clean up junks or debris at bottom of hole with venturi negative pressure principle. The high-velocity flow produced by nozzles create vacuum effect inside the tool, and thereby the junks at bottom of hole are sucked into the tool.

Features & Benefits

- Low pressure and low risk of lost circulation to protect reservoir
- Apply for high lost circulation well without return. The tool works once the fluid level in the wellbore higher than the depth of nozzles
- Larger negative pressure sucking force
- More sand can be caught within one trip
- Milling tools can be connected at bottom to break bonding

Specification

Flow to Create a Given Pressure Drop					
Nozzle Size	Flow Rate（gpm）				
	500psi	1000psi	1500psi	2000psi	2500psi
0.062 in	2.2	3.1	3.9	4.4	5
0.078 in	3.5	5	6.1	7	7.9
0.094 in	5.1	7.2	8.9	10.2	11.4
0.109 in	6.9	9.7	11.9	13.8	15.4
0.125 in	9	12.8	15.7	18.1	20.2
0.14 in	11.3	16	19.6	22.7	25.4
0.156 in	14.1	19.9	24.4	28.2	31.5
0.171 in	16.9	23.9	29.3	33.8	37.8
0.187 in	20.2	28.6	35.1	40.5	45.2

水力内割刀

工具介绍

液力割刀可以用于打捞作业及弃井作业中的单层或多层管柱的内切割。三刀翼设计，敷焊进口硬质合金，能够完成多种壁厚和钢级的管材的切割。液力割刀的切割范围从2-3/8”至60”，且不受井况限制，无论居中、偏心、管外有水泥或无水泥，均可进行切割作业。

优势与特点

- 纯液压与机械驱动，降低井下风险。
- 三刀翼设计加强工具居中度。
- 投球打压使刀片伸出，在此之前可以正常循环。
- 球座及底部探针设计使得在刀片张开至最大角度时有明显压降。
- 当停泵时刀片在弹簧作用下自动回收。
- 刀片的几何形状设计使其产生完全的径向切割，充分利用了工具压降，并尽可能减小切削量。
- 刀片根据所需切割管材的类型进行个性化设计，进口材料焊接。

工具参数

外径 (in)	切割尺寸 (in)	扣型	最大张开
1-7/8"	2-3/8"	1" AMMT	3-5/8"
2-1/8"	3-1/2" to 5-1/2"	1-1/2" AMMT	6"
4-3/8"	5-1/2" to 9-5/8"	2-7/8" REG	8"-12"
5-3/4"	7" to 16"	3-1/2" REG	9"-21"
8-1/4"	9-5/8" to 36"	6-5/8" REG	12"-58"
11-3/4"	13-3/8" to 60"	6-5/8" REG	19"-69"

Hydraulic Pipe Cutter

Introduction

The hydraulic pipe cutter reliably servers single or multiple strings of casing for fishing operation and well abandonment. Three heavy-duty cutter arms, dressed with crushed carbide, are capable of completing an interval cutout in a variety of pipe weights and grades. The hydraulic pipe cutter is available in a range of sizes that cut 2-3/8 to 60-in diameter pipe and is not dependent on pipe conditions including concentric, eccentric, cemented and non-cemented.

Features & Benefits

- Normal circulation is allowed before dropping a ball
- A ball seat and probe gives a positive pressure indication of maximum knife swing during operations
- When pressure is removed, the knives retract automatically
- The knives are designed to produce a near radial cut, taking full advantage of the available tool pressure and removing the minimum amount of steel to sever the pipe
- The knives and inserts are customized to fit different types of pipes and be manufactured with imported material

Specification

OD (in)	Cutting Size (in)	Connection	Max Opening
1-7/8"	2-3/8"	1" AMMT	3-5/8"
2-1/8"	3-1/2" to 5-1/2"	1-1/2" AMMT	6"
4-3/8"	5-1/2" to 9-5/8"	2-7/8" REG	8"-12"
5-3/4"	7" to 16"	3-1/2" REG	9"-21"
8-1/4"	9-5/8" to 36"	6-5/8" REG	12"-58"
11-3/4"	13-3/8" to 60"	6-5/8" REG	19"-69"

一趟开窗侧钻系统

工具介绍

合力针对不同尺寸、钢级、壁厚的套管及狗腿度提供安全高效并且可回收的一趟开窗侧钻服务。合力一趟开窗侧钻系统由高效磨鞋总成（开窗磨鞋及修窗磨鞋，可根据井况由两铣锥或三铣锥组成）、连接销钉、斜向器、液压管线及锚定组成。当斜向器管串到达预定深度和方位时开泵，液压油在泵压作用下推动活塞剪断销钉。销钉剪断后芯轴继续下行，从而将卡瓦推出。当卡瓦完全推出后停泵，倒刺锁紧螺母将芯轴锁死，防止卡瓦回缩。对管串施加钻压，剪断磨鞋与斜向器的连接销钉，磨鞋沿斜面下行开始开窗作业。开窗作业完成后下入捞钩将锚定收回。

优势与特点

- 无论井眼方位，均可以窗口与靶点之间最短路径进行开窗作业。
- 特殊设计的开窗铣鞋配合进口硬质合金可快速开窗。
- 锚定的防转卡瓦确保磨铣与钻进的高效进行。
- 两种方式可回收锚定和斜向器。
- 可满足超短半径钻井的开窗需求。
- 柔性短节可包含UBHO接头。

工具参数

工作范围 (in)	外径 (in)	扭矩 (ft.lbs)	最大承压 (lbf)
4 1/2 - 7	3.69	6000	50000
7 - 9 5/8	5.62	30000	100000
9 5/8 - 13 3/8	8	50000	150000
13 3/8 - 20	11.75	80000	150000

One-trip Casing Exit System

Introduction

Heli delivers reliable and efficient one-trip retrievable casing exit service designed for a variety of casing size and grade and dogleg severity. The one-trip casing exit system combines a single trip, full gauge milling system with a single angle concave that incorporates multiple anchor options. It ensures a smooth transition from the parent wellbore into lateral section, improving milling performance and yielding faster penetration rates in tough-to-drill formations meanwhile maintaining gauge retention of milling assembly.

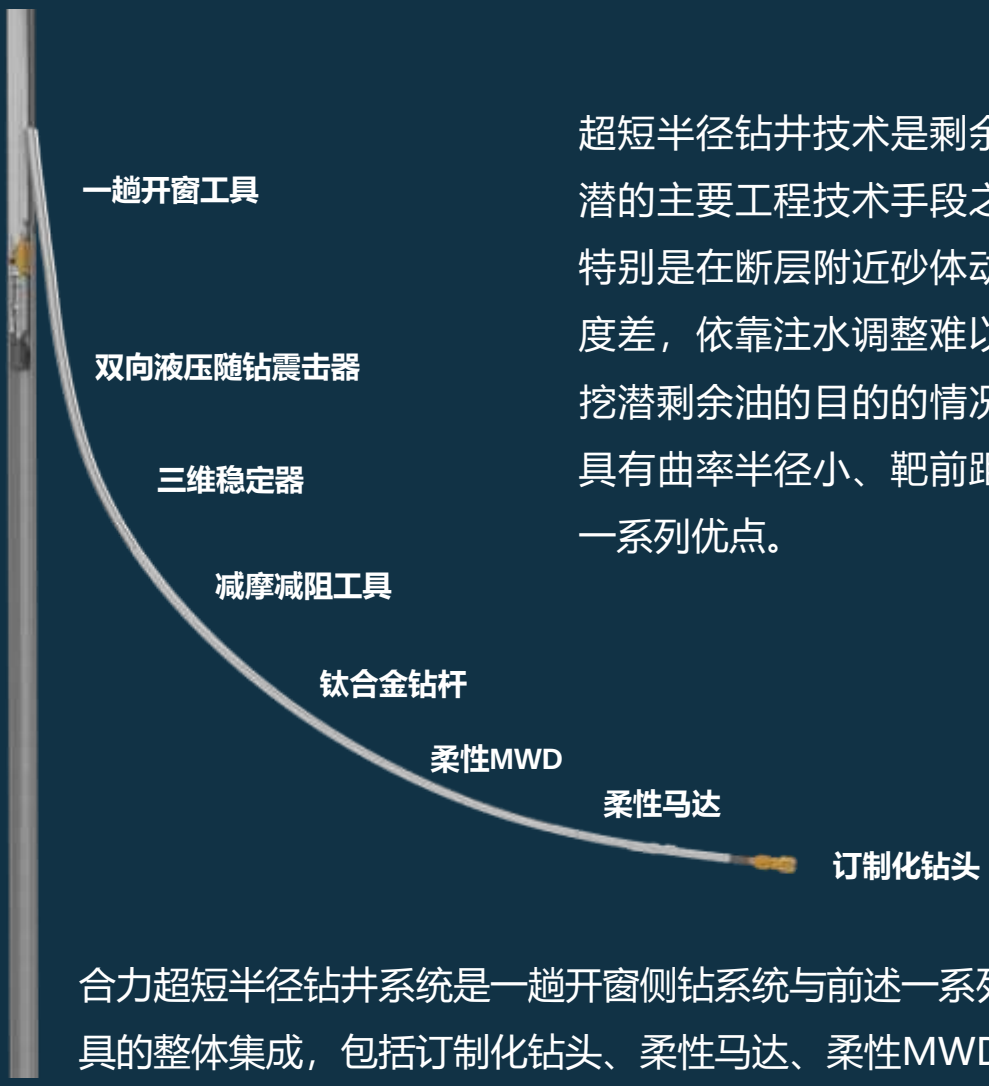
Features & Benefits

- Designed for safe, quick rig floor makeup.
- Set exit direction for the shortest possible route to hit the target, casing exits created independent of hole azimuth.
- Aggressive lead mill geometry enhanced through insert placement.
- Orient, anchor, mill window and rat-hole in a single trip by design.
- Anti-rotational slip provides superior anchoring during the milling and drilling operation.
- Two options to retrieve anchor and whip-stock.
- The system fits the requirements of short radius or ERD.
- Flex mill tool joint design can incorporate a UBHO sleeve.

Specification

Working Range (in)	OD (in)	Torque (ft.lbs)	Max Load (lbf)
4 1/2 - 7	3.69	6000	50000
7 - 9 5/8	5.62	30000	100000
9 5/8 - 13 3/8	8	50000	150000
13 3/8 - 20	11.75	80000	150000

超短半径钻井系统



超短半径钻井技术是剩余油挖潜的主要工程技术手段之一，特别是在断层附近砂体动用程度差，依靠注水调整难以达到挖潜剩余油的目的的情况下，具有曲率半径小、靶前距短等一系列优点。

合力超短半径钻井系统是一趟开窗侧钻系统与前述一系列井下工具的整体集成，包括订制化钻头、柔性马达、柔性MWD、三维稳定器、减摩减阻工具、钛合金钻杆、双向液压随钻震击器等。

订制化钻头：钻头专门设计用来满足小井眼导向和切削的需求。

柔性马达：由钻压控制多弯角柔性马达可满足7-15m曲率半径。

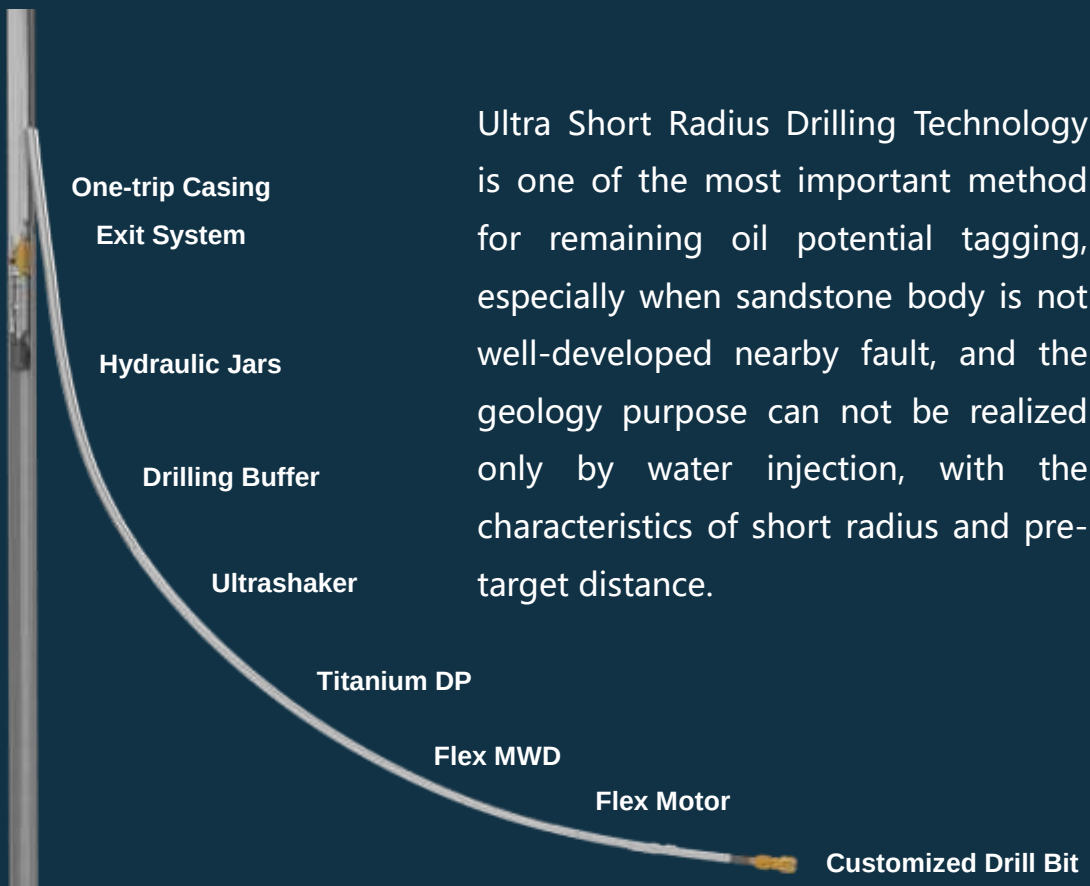
柔性MWD：可满足108°/30m狗腿度及方位伽马监测。

钛合金钻杆：重量是普通钻杆的一半，强度是普通钻杆的两倍。

减摩减阻工具：改善钻压传递。

三维稳定器：减小钻具粘滑。

Ultra Short Radius Casing Exit & Drilling System



Ultra Short Radius Drilling Technology is one of the most important method for remaining oil potential tagging, especially when sandstone body is not well-developed nearby fault, and the geology purpose can not be realized only by water injection, with the characteristics of short radius and pre-target distance.

Heli Ultra Short Radius Drilling system is an integration of One-trip Casing Exit system and a series of downhole tools introduced above, including customized drill bit, flex motor, flex MWD, drilling buffer, Ultrashaker, Titanium DP & hydraulic drilling Jars.

Customized Drill Bit: The bit is typically designed for slim hole steering and cutting efficiency.

Flex Motor: WOB-controlled multiple flex bent to realized the drilling operation of 7-15m curvature radius.

Flex MWD: Designed for 108°/30m with sectional GR monitoring.

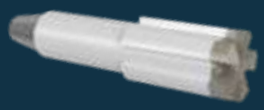
Titanium DP: With half weight and double strength of traditional DP.

Ultrashaker： To improve weight transfer.

Drilling Buffer: To reduce stick-slip.

磨铣工具

通过软件计算模拟确保每个磨铣工具与待磨目的物的高度适配性，包括优化磨铣工具在真实工况下的流场分布，使其达到携屑和冷却硬质合金的最佳平衡，在提升磨铣效率的同时延长工作寿命；优化切削单元的设定，包括硬质合金的材质（硬度级别）、几何形状、不同切削单元的组合配置等，以达到工作面的攻击性与耐久性的最佳平衡；优化磨铣工具在高速旋转及研磨扭矩的作用下的动平衡，以避免公转和自转干扰而引起的涡动，从而提升作业效率并降低井下事故风险。利用先进的控温焊接技术对硬质合金和本体进行熔合，极大降低了合金欠烧或过烧的概率，提升了磨铣工具的整体强度；采用大功率超声波以2万赫兹的频率冲击磨铣工具焊接区域，按计算值对硬质合金施加应力场，从而消除残余应力，进一步提升磨铣工具的强度和整体性。

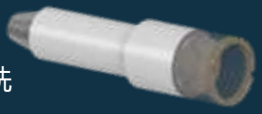


P型磨鞋
偏心及深V型设计

刀翼式磨鞋
斜面设计多层布齿

A型领眼磨鞋
保持居中持久磨铣

铣锥
用于套变套损修复



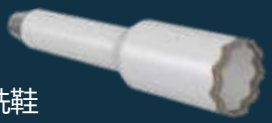
引鞋式磨鞋
用于特殊落物磨铣

凹底刀翼磨鞋
高效落物及井底垃圾清除

食人鱼磨鞋
偏心凹底多种硬质合金敷焊保障磨铣强度

B型领眼磨鞋
用于居中快速磨铣

西瓜铣鞋
可用于正划眼及倒划眼



套铣鞋
全系列多种结构的套铣鞋

Milling Tools

The software-calculation guarantee the compatibility of milling tools and the target to be milled, including the best hydraulic to balance cuttings carrying & cooling and to balance the efficiency & duration. The dynamic balance simulation is also performed to avoid the whirling motion caused by interference of rotation & revolution, reducing the possibility of downhole risk. The 4-axis CNC is utilized for machining mill body to guarantee the strength and hydraulic performance of the mill. The advanced temp. controlled welding technology is utilized to melt inserts & body, minimizing the possibility of over-heat & under-heat. The high power ultrasonic is utilized to eliminate residual stress, further improving the integrity of mills.

P-Type Mill
Eccentric & Deep-V Design

Bladed Mill
Inclined Layout of Multiple Layers of Inserts

A Pilot Mill
For Centralized Durable Milling

Taper Mill
For Repairing Casing

Guide Mill
For Special Junk Catching

Concave Bladed Mill For Efficient Junk Removal

Flat Bladed Mill
A Variety of Inserts Available with Optimized Hydraulics

B Pilot Mill
For Centralized Fast Milling

Watermelon Mill
For Reaming & Back Reaming

Wash-over Shoes
Whole Series of Wash-over Shoes

旋转下套管系统

设备介绍

旋转下套管装置是一种基于顶部驱动钻井系统，集机械、液压于一体的用于下套管作业或者作为套管钻井驱动的专用设备。该装置针对不同规格的套管形成两种结构（内卡式、外卡式）的系列化产品，适用于各种规格不同壁厚的下套管作业。它代替目前国内外钻井广泛使用的套管钳等下套管设备，充分发挥顶驱的优越性，不仅实现了套管柱的自动化连接，而且可以提供旋转下放套管以及循环泥浆的能力，大大减少下套管遇卡、遇阻等潜在的安全危害，极大地提高了下套管作业的成功率，为套管顺利下入到计划深度提供了装备保证，同时还减少了下套管需要的人员，具有安全、高效等特点。

优势与特点

- 一体化作业（旋转、提升、循环），安全高效
- 吊环/卡瓦双通道提升，微牙痕钳牙夹持技术
- 可更换卡瓦，一套装置覆盖多种规格套管

设备参数

	内插式	外套式
套管尺寸	9-5/8″ -13-3/8″	3-1/2"-7-5/8"
额定载荷	500 Short Tons	350 Short Tons
最大上扣扭矩	40,000 Ft Lbs.	40,000 Ft Lbs.
最大下压	12.5 Ton	12.5 Ton
最大转速	200 RPM	200 RPM
最大循环压力	5,000 PSI	5,000 PSI
最大排量	760GPM	490 GPM

Rotary Casing Running System

Introduction

Heli Rotary Casing Running System is a specialized device for casing running or casing drilling based on TDS system. The product series contains two types of structure covering different size of casing, including internal catch and external catch. The system has been widely used worldwide as an alternative of conventional TRS equipment, taking full advantage of TDS. By applying RCRS, the rotation and circulation of casing can be realized anytime if needed, reducing the downhole risk and enhancing the operation efficiency dramatically.

Features & Benefits

- Integrated operation of rotating, hoisting and circulation
- Two hoisting type (elevator & slips) with micro teeth invasion tech.
- Replaceable slips to cover different size of casing.

Specification

	Internal Catch	External Catch
Catch Range	9-5/8″ -13-3/8″	3-1/2"-7-5/8"
Rated Load	500 Short Tons	350 Short Tons
Max M/U Torque	40,000 Ft Lbs.	40,000 Ft Lbs.
Standard	API 8C PSL1	API 8C PSL1
Max Push	12.5 Ton	12.5 Ton
Max RPM	200 RPM	200 RPM
Max Cir. Pressure	5,000 PSI	5,000 PSI
Max Flow Rate	760GPM	490 GPM

双油管下入系统

双油管卡盘有高强度钢材制造而成，操作方便，同时可操作四个气缸不同状态开合工作，不存在误操作可能，能够满足1到3.5寸油管作业，能承载400吨，具有井下控制管线及电缆的导向功能。主气源独立接口能分别接通上卡盘和下卡盘的控制单元，管线接头具有自锁功能，防止意外脱落。由钻台气源提供动力输出，压力要求80psi。

Dual-tubing Running System

Dual-tubing running slips is made of high-strength steel. 4 set of independent pneumatic cylinder can be controlled separately, eliminating the risk of mis-operation. The system meets the requirement of 1” to 3.5” tubing running, with load capacity of 400 tons and the function of guidance of downhole control lines and electric cable. The control unit of upper slips and lower slips can be connected separately with function of automatic self-locking to avoid unwanted disconnect. The system needs a 80 psi air supply.

液压油管钳

油管尺寸范围	1.66" - 5.5"
上卸扣扭矩	15000 ft.lbs
最大转速	60 rpm
钳臂长度	762mm
长度	962mm
宽度	1050mm
高度	1665mm
背钳最大压力	5800 psi

合力液压油管钳由液压马达驱动，可对1.66”至5-1/2”范围内的油管进行上卸扣作业。低速旋转时可在正转和反转两个方向上提供15000ft.lbs的扭矩。油管钳的设计包括转子装置内的夹紧系统，以提供具有最大夹持力的安全卡套管夹具，并在高负载条件下为操作员提供保护。这种独特的夹持概念还使用了一个承载钩型节段，以吸收上扣和卸扣操作过程中产生的径向力。箱体和滚柱为回转装置提供轴向和径向支撑，回转装置使用爬坡半环围绕圆周引导端盖。

可选配套装置:

微压痕钳牙; 扭矩监控系统; 转速控制系统

Hydraulic Tubing Tong

Pipe size range	1.66" - 5.5"
M/U & B/O torque	15000 ft.lbs
Max. rotor speed	60 rpm
Tong arm length	762mm
Length	962mm
Width	1050mm
Height	1665mm
Max. clamping pressure at backup	5800 psi

The HELI Hydraulic Tubing Tong is a hydraulic motor-driven tong capable of running tubing from 1.66″ to 5-1/2″ in diameter. The tong can produce up to 15000 ft.lbs in low gear, forward or reverse operation.

The tong design includes a clamping system inside the rotor unit to provide secure tubing grip with maximum gripping forces and protection for the operator under high load conditions. This unique gripping concept also uses a load-bearing hook-type segment to absorb radial forces developed during make-up and break-out operations. The case body and rollers provide axial and radial support for the rotary, which guides the cage plates around the circumference using cam followers.

Optional devices:

Micro-grip Jaws; Torque Monitor System; Rotor Speed Control System

液压防喷盒

额定功率	300W
额定电压	DC24V
额定电流	2A
防护等级	IP65
耐温	-20℃~50℃
远程通信协议	MODBUS TCP

为了使钻井作业符合健康、安全、环保要求，钻杆防喷盒广泛用于石油钻具上卸过程中，是阻止泥浆飞溅污染平台的一种防护工具。合力防喷盒采用液压和电控的全新结合方式，即保留了液压手操带来的可靠性，又通过电控实现一键操控及远程遥控，实现井口设备自动化。

- 多种控制方式：本地手动操控、遥控器控制、远程上位机控制。
- 自动模式下，可通过遥控器或上位机触发一键防喷及一键归零。
- 防爆箱内置RJ45接口，默认MODBUS TCP通信协议（可根据客户要求定制通信协议），支持上位组态远程控制。
- 防爆箱内置控制器为SIEMENS 1200系列，控制具备自动运行时，动作超时预警停机及一键急停。

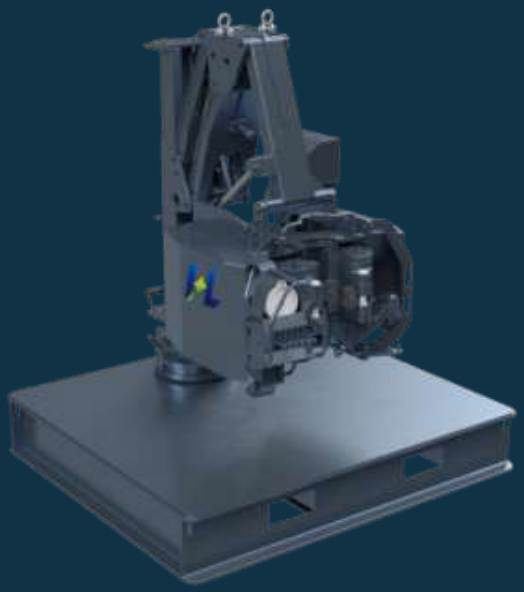
Hydraulic Mud Box

Rated Power	300W
Rated Voltage	DC24V
Rated Current	2A
Protection Level	IP65
Temperature	-20℃~50℃
Communication Protocol	MODBUS TCP

In order to meet the HSE requirements of drilling operations, mud box is widely used in breaking out drill pipes, which is a device to prevent mud splashing around. Heli hydraulic mud box adopts a new combination of hydraulic and electronic control, combining the reliability of hydraulic hand operation, and the convenience of remote & electric control, realizing the automation of wellhead equipment.

- Multi control: manual, remote and upper computer system
- One-button operation can be triggered by remote control or upper computer in automatic mode.
- RJ45 is installed in explosion-proof box, default MODBUS TCP communication protocol (can be customized upon customer requirements), supporting remote control of upper configuration.
- The controller in the explosion-proof box is SIEMENS 1200 series, which has automatic operation, timeout warning & stop and one-button emergency stop.

铁钻工



整机重量	3175kg
液压需求	150 LPM/145 BAR
管径范围	108mm-216mm
旋扣速度	100 RPM （5英寸管）
旋扣扭矩	2400 NM
最大上扣扭矩	80000 NM
最大卸扣扭矩	108000 NM
工作高度	584mm ~ 1498mm
工作半径	1525mm
升降范围	1830 mm

设备介绍

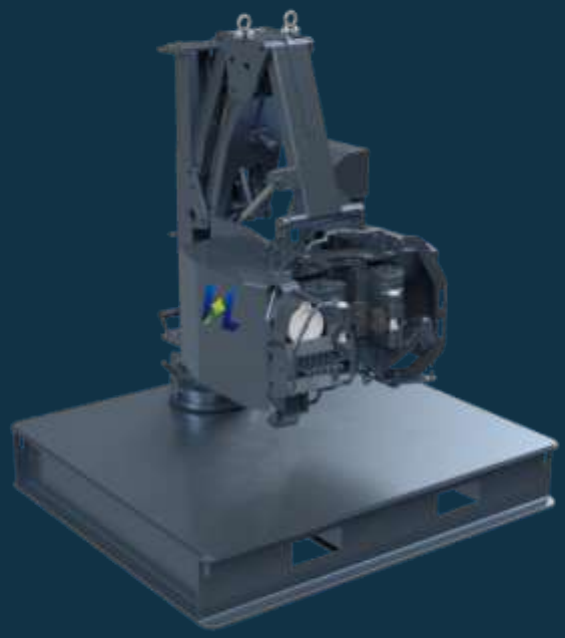
该设备自动化程度较高，作业时能够显著降低现场人员的劳动强度，由柱体、伸缩臂、工作钳头及液压系统组成，具有低总重、结构紧凑、占地面积小等优点，尤其适用于钻台空间有限的中小钻机。

优势与特点

- 自动化程度较高，现场操纵简单可靠；
- 扭矩传感器动态响应快，上扣扭矩较为精准；
- 无电缆和电气组件，可使用于防爆要求严格场所；
- 上扣回转角度达30°，上卸扣方便迅速；
- 可兼容现场各种液压站或液压动力源，液压油量及压力均较低，节能降耗；
- 整机重量轻、外形紧凑，安装简单，转场时间少；
- 主体材料抗腐蚀能力强，尤其适用高温或海上环境。

Iron Roughneck

Weight	3175kg
Hydraulic Demand	150 LPM/145 BAR
OD Range	108mm-216mm
Rotation Speed	100 RPM (5” pipe)
Rotation Torque	2400 NM
Max M/U Torque	80000 NM
Max B/O Torque	108000 NM
Working Height	584mm ~ 1498mm
Working Range	1525mm
Vertical Range	1830 mm



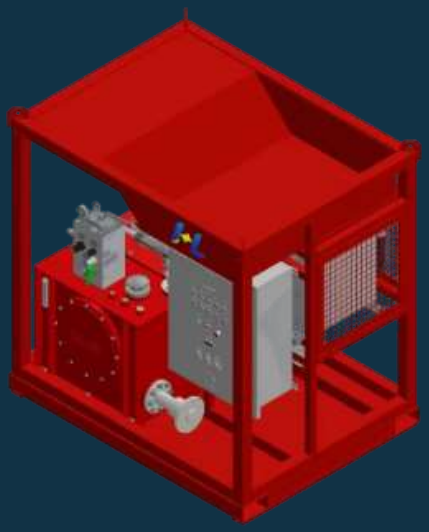
Introduction

The equipment has a high degree of automation and can significantly reduce the labor intensity of site personnel during operation. It consists of a column body, telescopic arm, work clamp head and hydraulic system, and has the advantages of low gross weight, compact structure and small footprint, especially suitable for small and medium-sized drilling rigs with limited drilling table space.

Features & Benefits

- High degree of automation and reliability.
- The torque sensor has a fast dynamic response and accurate torque control.
- No cables and electrical components, can be used in strictly Ex-proof required environment.
- The wrenching angle can reach up to 30°.
- Compatible with various hydraulic stations on site with low hydraulic oil pressure and flow rate, saving energy and reducing consumption.
- The lightweight and compact design makes it easy to install and reduce transportation time.
- The main material is corrosion-resistant, especially suitable for high-temperature or marine environments.

多功能液压站



系统压力	210bar
最大液压流量	205L /min
液压油箱容量	450L
最高液压油温度	70℃
液压油过滤精度	10μm
电源要求	380V/50Hz，80A
转速	1450rpm
整机重量	2100kg
尺寸	1830×1380×1945mm

设备介绍

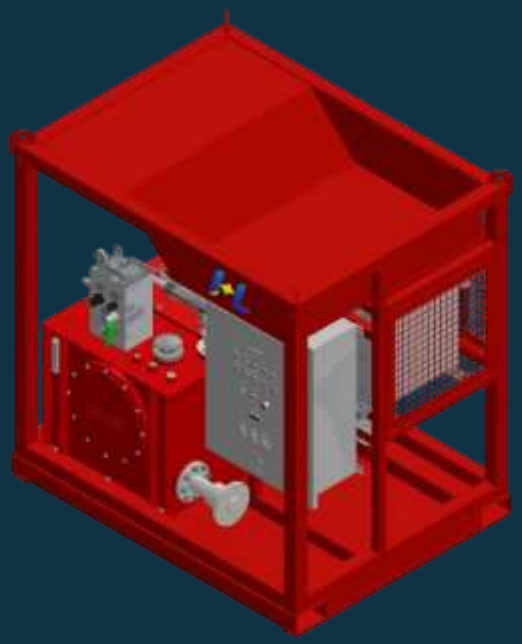
该设备主要为石油装备提供液压动力。液压站主要由液压系统和电控系统组成，可以提供高压、高流量的动力输出。动力站的设计综旨降低能源消耗，降低对环境的影响。

优势与特点

- 橇装式结构（带叉槽和吊耳）可满足陆地和海上环境快速布署和适用性。
- 该装置符合Ex d/Ex tb防爆认证，适用于在1区、2区、21区、22区潜在爆炸性环境中的安全操作
- 接受定制，提供可在低温环境下工作机型（-40°C~40°C）和在高温环境下工作机型（-10°C~55°C）。
- 液压泵为自动功率调节的柱塞泵，可用于开式或闭式液压系统，适配性能好。
- 负载敏感控制系统，可提供0-205L/min和0-210 Bar的流量输出及压力调节，降低能源损耗，绿色环保。
- 本动力站具有待机模式，接收到工作指令，系统可迅速转换到工作状态，提供合适的液压测量与压力。待机模式下，电机处于低功耗状态。避免电机与液压泵等频繁启动。

Versatile Hydraulic Power Unit

Max Pressure	210bar
Max Flow Rate	205L /min
Oil Tank Capacity	450L
Max Oil Temp.	70℃
Oil Filtrating	10μm
Electricity Demand	380V/50Hz，80A
Rotation Speed	1450rpm
Weight	2100kg
Size	1830×1380×1945mm



Introduction

This equipment is to provide hydraulic power for oil equipment. The unit is composed of hydraulic system and electronic control system, which can provide high pressure and high flow of power output. The design of the power station is aimed at reducing energy consumption and minimizing environmental impact.

Features & Benefits

- Skid-mounted structure (with fork groove and lug) can satisfy both land and sea
- environment rapid deployment and applicability.
- The unit is explosion protected according to Ex d/Ex tb regulations, for safe operations in potentially explosive atmosphere Zones 1、2、21and22.
- Customization is available, provides the model can work in low temperature environment (40°C ~ 40 ° C) and work in high temperature environment (-10°C~55°C).
- Piston pump system with automatic power regulation for use in Open-Center or Closed Center hydraulic circuits，good adaptation performance.
- The power station equipped with load sensitive control system, which can provide 0-205 l/min and 0-210 Bar of output flow and pressure and both is adjustable, this feature can reduce energy consumption and promote environmental protection level.
- This HPU has the standby function, once receiving feedbacks, the unit can be quickly switched to working mode. In standby mode, the motor is in a state of low power consumption to avoid motor and hydraulic pump to start frequently.

悬浮背钳上扣机

设备介绍

200KNM上扣机是一款能够360度连续旋转的上卸扣设备，其主要功能是给油管、套管、完井工具及测试管柱等进行上卸扣作业。 该设备主要由主背钳系统、液压动力站、操作台等部分组成。其最突出的设计是背钳采用浮动式设 ，这样可以保证作业时管柱只承受扭矩而不会受到弯矩、剪切等其它力的作用影响，保证上扣扭矩的准确性。

优势与特点

- 背钳悬浮式设计，其X、Y和Z三方向自由度均可调节，自动纠错保持同心，避免由于主背钳不同心导致力量失衡，进而导致丝扣损伤的事故发生。
- 液压夹紧缸采用蓄能补偿设计，当工件保持长时间作业时，不必担心夹持液缸掉压导致夹持致钳牙打滑，划伤管材本体的事故发生。
- 监控软件可智能判断监控曲线是否满足要求，所有数据应用数据库管理系统，便于调用，数据设置操作十分便捷。
- 该设备采用上卸扣双方向剪切式电子传感器，与传统的拉压式传感器相比剪切式传感器受到其它力的藕合作用影响较小，扭矩控制更为精准。

设备参数			
夹持范围	25到381mm	重量	6800kg
最大通过外径	384mm	尺寸	6807x1520x1915mm
15英寸时的最大上扣扭矩	217000Nm	最大转速	4rpm
液压站系统压力	280bar	液压站动力输出	37KW
液压站系统流量	205L/min	液压站工作电源	380V/50Hz

Floating Back-up Tong Bucking Unit

Introduction

This is a 360-degree continuous rotation equipment to handle pipe, casing, and completion tool, etc. The equipment mainly consists of the main back clamp system, hydraulic power station, operating table. The most outstanding design is the floating back clamp, which can ensure that the operation of the tubular column only bear the torque and will not be affected by the bending moment, shear and other forces.

Features & Benefits

- The backup tong is designed with floating mechanism and can be adjusted in the X, Y, and Z directions as well. This feature can correct the rotary and backup misalignment then can keep power balance during operation and minimize thread damage accidents.
- All the hydraulic clamping cylinder are equipped with compensation device, which eliminates the risk of slipping due to low pressure when working for a long time. This feature ensures that the pipes are securely clamped and protected from damage.
- The monitoring software can intelligently determine if monitoring curves meet requirements, and all the data is managed using a database management system for easy retrieval and application. The data set operation is very convenient.
- The machine is designed with 2 shear type electronic sensor at both direction instead of the traditional push/pull pressure sensors, which is not affected by the other directional force and the monitoring torque is more precise.

Specification			
Gripping Range	25 to 381mm	Weight	6800kg
Max. Passing OD	384mm	Dimensions	6807x1520x1915mm
Max. Torque at 15-inch	217000Nm	Max. Rotary Speed	4rpm
Hydraulic station system pressure	280bar	Output of hydraulic station	37KW
Hydraulic station system flow	205L/min	Power supply of hydraulic unit	380V/50Hz

钻杆自动焊接设备

设备介绍

该设备实现了钻杆输送和装夹自动化，作业时能够显著降低现场人员的劳动强度，由集装箱式焊机模块和自动上下料模块两部分组成，焊机、液压动力站和操控台集中布置在集装箱内，具有结构紧凑，操作方便，安全环保、运输便捷等优点，尤其适用于井场批量钻杆焊接作业。

优势与特点

- 集成化、模块化设计，布局合理，结构紧凑；
- 所有操作指令集中布置在控制台上，集成度高，操作方便；
- 钻杆输送实现自动化，劳动强度小，作业效率高；
- 焊枪位置可上下前后左右调整，适应不同规格钻杆堆焊加工；
- 工作区域和焊接区域分离，并配置空调，观察窗口，工作环境更健康、更安全；
- 转场运输方便，可以快速直接在油井现场安装进行焊接作业，可以减少往返运输费用；

适用钻杆尺寸范围	2-3/8”至5-1/2”
集装箱式焊机模块尺寸	6058×2438×2591 mm
自动上下料模块尺寸	6606×4010×1145 mm
电源总容量	45 KW
电源要求	三相四线；AC380 V；50HZ
液压动力站最大压力	140bar
整机总重量	7200 kg

Drill Pipe Automatic Welding Equipment

Introduction

It is composed of two parts: containerized welding machine module and automatic loading and unloading module. The welding machine, hydraulic power station and control console are centrally arranged in the container, which has the advantages of compact structure, convenient operation, safety and environmental protection, and convenient transportation, etc. It is especially suitable for batch drilling rod welding operation at the well site.

Features & Benefits

- Integrated and modularized design;
- All operation instruction is integrated in console;
- Automatic conveying of drill pipe increases operation efficiency;
- Location of welding gun can be adjusted to handle different size of DP;
- Working area is separated from welding area and equipped with AC, providing a healthier environment;
- The fast installation and transportation can be realized.

DP range	2-3/8" to 5-1/2"
Welding Module size	6058×2438×2591 mm
DP Conveying Module size	6606×4010×1145 mm
Electricity capacity	45 KW
Electricity demand	3 phase 4 wire; AC380 V ; 50HZ
Max pressure of power unit	140bar
Total weight	7200 kg

多功能智能巡检机器人

底盘	1250mm X 920mm
高度	1200mm
重量	350kg
导航	3D 激光雷达 SLAM & IMU 姿态纠正
避障	2D LiDAR 云障碍躲避
驱动	四驱
转弯半径	原地掉头
最大覆盖	400,000 m2
防护等级	IP66
防爆等级	Exd IIB T4 G
最高速度	Wheel 1.5 m/s　　Track 0.7 m/s
续航	6 hrs
重复位置精度	±20mm
持续涉水深度	100mm
功率	800W
电池	磷酸铁锂
充电方式	无线充电
温度	-40°C 至 +60°C
通信	WIFI, 4G, 5G

- 采用四轮四驱驱动方式，提供更大的输出扭矩，增加爬坡能力，可原地转弯。
- 通用底盘结构设计，实现车轮和履带的自由更换;轮式可提供更快的移动速度;履带式能适应泥沙等更复杂的路面，实现更大的拖拽力和通过性;更丰富的应用场景。
- 采用三维激光SLAM导航，结合二维激光点云避障，实现高精度、高安全的自主巡检操作。
- 机头可升降，以适应复杂的现场环境。
- 配备防爆无线充电功能组件，提高自主充电的便利性、可靠性和安全性。
- 配备视觉、听觉及各种传感器，配合智能识别算法，全方位覆盖各种检测需求。

Versatile Intelligent Inspection Robot

Chasis	1250mm X 920mm
Height	1200mm
Weight	350kg
Navigation	3D laser radar SLAM & IMU Posture correction
Obstacle Avoidance	2D LiDAR point cloud obstacle avoidance
Drive	4 drive
Turning Radius	Rotate in place
Max. Covering	400 thousand m2
Protection Level	IP66
EP Level	Exd IIB T4 G
Max. Speed	Wheel 1.5 m/s Track 0.7 m/s
Endurance	6 hrs
Repeat Position Accuracy	±20mm
Continuous Wading Depth	100mm
Power	800W
Battery	Lithium iron phosphate
Charging	Wireless Charging
Temp.	-40°C to +60°C
Communication	WIFI, 4G, 5G

- Adopt 4-wheel 4WD drive mode to provide larger output torque, increase climbing ability and can turn in place.
- Universal chassis structure design to realize free replacement of wheel and crawler; wheel type can provide faster movement speed; crawler type can adapt to more complex road surfaces such as mud and sand to achieve greater dragging force and passability; richer applicable scenes.
- Adopt 3D laser SLAM navigation, combined with 2D laser point cloud obstacle avoidance, to realize high-precision and high-safety autonomous inspection operation.
- The head can be lifted and lowered to cope with complex site environment.
- Equipped with explosion-proof wireless charging function components to improve the convenience, reliability and safety of autonomous charging.
- Equipped with visual, auditory and various sensors, with intelligent identification algorithms, all-round coverage of various detection needs.

天津滨海新区中关村科技园融汇商务园六区9号楼
Building 9, Zone 6, Ronghui Business Park, Zhongguancun Science Park, Binhai New Area, Tianjin，China，300452
022-66621566
www.heli-china.cn