Drilling Systems

Superior Performance

Offshore operations have many challenges and 20,000 psi only increases the complexity. Harsh conditions, ultra deep water, speed of operations, environmental impact, weight of equipment and safety of your people are just some of the things to consider. We understand. You need the best topside equipment to make it happen from a partner that is capable of designing, executing and integrating the complete system.

Cylinder Hoisting
- Delivered in 750, 1000, and 1250 sT
- Capable of 1500, 1750, 2000 sT and beyond
- Push button speed change across all load ranges
- Faster acceleration/deceleration and response
- Accumulator and pressure vessels for energy recovery and passive compensation
- Multiple cylinders provide operational redundancy
- Multiple parallel wires share load – increased safety
- No slip/cut, 5 year wireline life
- Floor mounted active/passive compensation
- Completely open drillfloor layouts
- Lowered center of gravity

Single Layer Winch
- Delivered in 350 and 750 sT
- Capable of 1000, 1250, 1500, 1750, 2000 sT and beyond
- Improved speeds across all load ranges
- Faster acceleration/deceleration and response
- Kinetic Energy Recovery System (KERS)
- Multiple motors, brakes, drives, and flywheels provide operational redundancy
- Multiple parallel wires share load – increased safety
- No slip/cut, 5 year wireline life
- Winch and crown mounted active/passive compensation
- Completely open drillfloor layouts
- System operates at less than 10 rpm

*Dual Active Heave Drawworks configurations available in 1250 and 1500 sT ratings

Top Drive Systems
- TDX 1500
  - Max Torque: 105,000 ft-lbs
  - Hoisting: 1,500 sT at elevator
  - Rotating load capacity: 1,500 sT

Other Products
- BX 7 Elevator - 1,250 sT
- BX 9 Elevator - 1,500 sT
- Links - Weldless, forged from single piece
- Pipe handler

Floor Operations
- ARN 270
  - Triple grip design
  - 200,000 ft-lbs make/break torque

Other Products
- PS495 hydraulic power slip: 1,250 - 1,500 sT capacity
- Manipulating arms
- Service access baskets
- Utility winches: 5 - 30 sT

Solid Control / Pumping System
- DORS™ Routing System
  - Automated mapping and remote control transfer system
  - Maximize uptime
  - Reduce risk of contamination
  - Reduce chemical/mud losses
  - Efficient plant usage/capacity

Other Products
- Mud pumping
- Mud mixing
- Storage/tanks
- Valves and piping
- Engineering support team for mud package

Motion Compensation
- Riser Tensioning
  - NRT-4800 N-Line riser tensioner
  - 4,800 kips max tension capacity
  - Riser anti-recoil system
  - Redundancy - capable of operating on four of six cylinders

Drill String Compensation
- Active and passive compensation
- Floor mounted compensators
- Crown mounted compensators
Configure the perfect package for your ultra deepwater requirements with a wide range of dependable NOV topside options.

**Proven Innovation**

**Committed to Your Success**
- Rigorously-tested designs - robust, reliable, redundant
- Configured packages
- Evolution of proven concepts
- Invested in world-class R&D facilities

**Seamless Execution**
- Industry-leading project management
- Close collaboration with our partners
- Worldwide quick response manufacturing facilities

**Priority on Safety**
- Safety is integral to our design
- - Drops compliance
- - Ergonomic considerations
- - Regulatory partnerships
- Condition based monitoring and maintenance features
- Remote monitoring and advisory capabilities
- Multi-machine control system
- Hands-off operations
- Our standards meet or exceed industry regulations

<table>
<thead>
<tr>
<th>Control System</th>
<th>Tubular &amp; Riser Handling</th>
<th>Lifting and Handling</th>
<th>Other Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyberbase™</td>
<td>CRX</td>
<td>Trident Crane</td>
<td></td>
</tr>
<tr>
<td>- Integrated drilling control system for advanced drilling rigs</td>
<td>- Height: 148 ft</td>
<td>- Purpose built for fiber rope but can also handle hybrid rope or steel wire</td>
<td></td>
</tr>
<tr>
<td>- Application interfaces for web driller and kick monitoring</td>
<td>- Maximum stand height: 142 ft</td>
<td>- AC PM electric drive on winch enables reduced power consumption</td>
<td></td>
</tr>
<tr>
<td>- Complies with highest safety standards</td>
<td>- Reach: 5 m</td>
<td>- Substantial weight savings</td>
<td></td>
</tr>
<tr>
<td>Other Products</td>
<td>Other Products</td>
<td>Other Products</td>
<td></td>
</tr>
<tr>
<td>- Multi Machine Control (MMC)</td>
<td>- 2⅛” – 22” tubular OD range (Excludes fingerboard limits)</td>
<td>- Lower CoG of crane system compared with winch above deck</td>
<td></td>
</tr>
<tr>
<td>- VFD power distribution</td>
<td></td>
<td>- Lifting Operator Station</td>
<td></td>
</tr>
<tr>
<td>- Maestro™ drilling power allocation</td>
<td></td>
<td>- BOP handling system</td>
<td></td>
</tr>
<tr>
<td>- SoftSpeed II™</td>
<td></td>
<td>- Xmas tree handling</td>
<td></td>
</tr>
</tbody>
</table>

**Other Considerations**
- BOP handling system
- 20ksi choke & kill manifold
- Gantry cranes and trolley systems
- Onsite inspection and repair

**Tubular & Riser Handling**

**CRX**
- Height: 148 ft
- Maximum stand height: 142 ft
- Reach: 5 m
- 2⅛” – 22” tubular OD range (Excludes fingerboard limits)

**Trident Crane**
- Purpose built for fiber rope but can also handle hybrid rope or steel wire
- AC PM electric drive on winch enables reduced power consumption
- Substantial weight savings
- Lower CoG of crane system compared with winch above deck
- Lifting Operator Station

*Offshore lattice and knuckle boom cranes also available

*For reference use only, subject to change. Please contact your local sales contact for more information.
Higher Hookloads

Configurable Rigfloor
As offshore drilling moves into deeper water and more complex reservoirs executing a project on time and under budget has never been more critical.

Our commitment to helping our customers overcome these challenges has never been greater.
Rigorously Tested
- Above API standards
- BOP shell test to 1.5x
- Detailed results available on request

Proven Concepts
- Evolution of principles used in industry-leading 15,000 psi stacks
- Maintains NOV standard 5,000 psi working pressure
- 12,000 ft. water depth rating
- Low Force Shear System

Advanced & Simplified
- Modular stack configurations (6, 7, or 8 cavity)
- Low shock SPM valves
- Boltless doors and replaceable seal seats for enhanced serviceability

Robust & Reliable Controls
- Reduced number of seals by 67% in control pod
- Retrievable RCX™ Control Pod with 140 function capability
- Retrievable EHBS with integrated acoustics

Weight Conscious
- Depth Compensated Bottles
- Multi-ram capability potentially eliminates a cavity
- Shearing capability potentially eliminates a cavity
- Lightweight riser flange design

Safety Priority
- Ram position indicators
- High angle release riser connector
- Comprehensive fault logging – BOP health monitoring
- Configurable stack frame with space to work
- Ladders and platforms at each level

Retrievable RCX Control Pod
- Dual Retrievable Modules
  - LMRP
  - BOP
- 174” H X 102” W X 54” D
- 40,000 lbs
- 140 Functions
- Operating Pressure: 5,000 psi
- Regulated Pressures
  - 5,000 psi
  - 3,000 psi
- Common Retrieval Tool with EHBS
- -20° C to 50° C (-4° F to 122° F)

Wellhead Connector
- Model: CDX-2030
- 20,000 psi Rated Wellbore Pressure
- Industry-leading bending and tension capacity
- Unlock force 30% greater than locking force
- Load path directly through self-locking segments
- 92% surface coverage on locking profile allows for higher pre-load without damaging wellhead/mandrel
- Use of common parts across other models for increased availability
- Locking piston visual indicators with wear based maintenance grooves
- Utilize H4 locking profile

Depth Compensated Bottles
- Most efficient subsea accumulator
- Maintains performance regardless of depth
- Significantly reduce number of bottles needed

Usable Vol. H W D Weight (Max)
19.95 Gal 150” 34” 19.5” 7,208 lb
24.2 Gal 175” 34” 19.5” 7,984 lb
30.3 Gal 210” 34” 19.5” 9,077 lb
32.8 Gal 225” 34” 19.5” 9,545 lb

LMRP HAR Connector
- Model: CHX-1030
- HAR – High Angle Release
- 10,000 psi Rated Wellbore Pressure
- 1,500 psi Rated Operator Pressure

I Class Flange Type Riser
- Length: 75 ft. Joints
- OD x Wall Thickness: 22” x 0.875”
- Tapered String: 22” x 1.0625”
- Mud Weight: 16 ppg @ 10,000 ft
- Tension Capacity: 4.0M lbs - I Class
- Riser Tools, Spider, Gimbal: 1500 sT
- Telescopic joint rating: 4000 kips
- Inner/outer barrel lock rating: 3000 kips
- Rotary Table: 75.5”
- Diventer: 75.5” / 500 psi
- N-Line or Wireline tensioner options
- Buoyancy: 62” Ultralight
- Choke & Kill Lines: 7.25” OD x 4.5” ID
- Mud Boost: 5”OD x 4”ID – 7.500 psi
- Rigid Conduit Lines: 2.675” OD x 2.32” ID

Useful Volume, Height, Width, Depth, Weight Table

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Subsea Systems
Robust, Reliable, Retrieveable

NOV's 20,000 psi BOP will be controlled by the new RCX control pods. With new regulations, stack pulls have become more frequent, raising costs and inefficiency. NOV has identified root causes of failure and eliminated them through innovative design, increasing robustness and reliability. In the unlikely event of a failure, the RCX control pod can be retrieved and replaced without pulling the stack.

**20,000 psi BOP with RCX Control Pods**

<table>
<thead>
<tr>
<th>18-3/4&quot; 20K Stack Configuration</th>
<th>Dimensions (H x W x D)</th>
<th>Dimension LMRP (H x W x D)</th>
<th>Dimension Lower Stack (H x W x D)</th>
<th>Est. Weight (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Ram (3 Double)</td>
<td>685&quot; x 240&quot; x 212&quot;</td>
<td>298&quot; x 240&quot; x 212&quot;</td>
<td>387&quot; x 240&quot; x 212&quot;</td>
<td>980,000</td>
</tr>
<tr>
<td>7 Ram (3 Double, 1 Single)</td>
<td>749&quot; x 240&quot; x 212&quot;</td>
<td>299&quot; x 240&quot; x 212&quot;</td>
<td>451&quot; x 240&quot; x 212&quot;</td>
<td>1,250,000</td>
</tr>
<tr>
<td>8 Ram (4 Double)</td>
<td>775&quot; x 240&quot; x 212&quot;</td>
<td>298&quot; x 240&quot; x 212&quot;</td>
<td>477&quot; x 240&quot; x 212&quot;</td>
<td>1,350,000</td>
</tr>
</tbody>
</table>

**BOP Specifications**

<table>
<thead>
<tr>
<th>MULTI RAMS</th>
<th>PIPE RAMS</th>
<th>DESIGN</th>
<th>FLANGE CONFIGURATION</th>
<th>HEIGHT (in)</th>
<th>WEIGHT (lbs) 23&quot; Operator</th>
<th>WEIGHT (lbs) 15-1/4&quot; Operator</th>
<th>SHEAR RAMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>Single</td>
<td>Stud X Stud</td>
<td>45.00</td>
<td>58,980</td>
<td>53,480</td>
<td>60,510</td>
<td>72,970</td>
</tr>
<tr>
<td>Single</td>
<td>Single</td>
<td>Stud X Flange</td>
<td>63.00</td>
<td>66,010</td>
<td>67,540</td>
<td>72,970</td>
<td>72,970</td>
</tr>
<tr>
<td>Single</td>
<td>Single</td>
<td>Flange X Flange</td>
<td>83.00</td>
<td>73,040</td>
<td>67,540</td>
<td>72,970</td>
<td>72,970</td>
</tr>
<tr>
<td>Single</td>
<td>Double</td>
<td>Stud X Stud</td>
<td>73.50</td>
<td>78,470</td>
<td>67,540</td>
<td>72,970</td>
<td>72,970</td>
</tr>
<tr>
<td>Double</td>
<td>Double</td>
<td>Stud X Flange</td>
<td>91.50</td>
<td>85,500</td>
<td>94,900</td>
<td>102,700</td>
<td>94,900</td>
</tr>
<tr>
<td>Double</td>
<td>Double</td>
<td>Flange X Flange</td>
<td>111.50</td>
<td>92,530</td>
<td>94,900</td>
<td>102,700</td>
<td>94,900</td>
</tr>
</tbody>
</table>

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• Model: 18-3/4" 20,000 psi
• Boltless Doors
• Replaceable Seal Seats
• Automatic Locking System
• Ram Position Indicators

• 23" Operator: 52.9/52.0 Gallons (Open/Close) – 5,000 psi max
• Centralizing Shear Rams
• Pipe Rams (Multiple Sizes)
• Multi Rams (4-1/2" - 6-5/8")

*6 Ram configuration shown*