Ocean Floor
Field Development
Dril-Quip provides over 25 years of experience in the innovative design, development, manufacture and installation of its field-proven products for a wide array of subsea applications, for independent and major operators, in world record water depths, for the harshest environments. In almost every major producing region of the world, you will find Dril-Quip products and people in the field, proving their reliability.

At Dril-Quip, no job is finished until it’s a job well done.
Setting a global standard in the development of offshore drilling and production equipment

- Concept
- Engineering
- Project Management
- Design and Development
- Manufacturing
- Systems Integration Testing
- Installation
- Training and
- After-Market Service
**Dril-Quip, Inc.** is one of the world’s leading manufacturers of offshore drilling and production equipment that is well suited for use in deep-water applications. The Company designs and manufactures subsea, surface and rig equipment for use by oil and gas companies in offshore areas throughout the world. Dril-Quip also provides installation and reconditioning services and rents running tools for use with its products.

Dril-Quip’s principal products consist of subsea and surface wellheads, subsea and surface production trees, mudline hanger systems, specialty connectors and associated pipe, drilling and production riser systems, wellhead connectors and diverters. The Company has developed its broad line of subsea, surface and offshore rig equipment exclusively through internal product development efforts. Dril-Quip has continually introduced new products and product enhancements since its founding in 1981.

Dril-Quip’s manufacturing operations are vertically integrated, with the Company performing essentially all of its forging, heat treating, machining, fabrication, inspection, assembly and testing at its own facilities.

The Company’s common stock is traded on the New York Stock Exchange under the symbol “DRQ”.

**Facilities**

Headquartered in Houston, Texas, Dril-Quip has manufacturing facilities in the United States, Scotland, Singapore and Brazil. The Company also has sales and service offices in numerous locations throughout the world.
RESOURCES

PROJECT MANAGEMENT
Project management capabilities have enabled Dril-Quip to better manage the design, manufacture and delivery of Dril-Quip products on large integrated projects throughout the world.

The project management techniques utilize time-proven processes, which are defined at the start of a project via a formal Project Execution Plan (PEP). This formalized project management system has proven invaluable for successful management of the resources required to complete projects on time and to the customers’ requirements.

ENGINEERING
Dril-Quip’s technological leadership in the industry is the result of an ongoing commitment to a professional engineering staff with in-depth experience in the design of drilling and production equipment. This experience is supported by state-of-the-art computer systems networked to expedite and optimize the process of modeling, analyzing, modifying and testing each design. These capabilities enable Dril-Quip to consistently provide new and improved products to the oil and gas industry worldwide.

MANUFACTURING
Dril-Quip products are manufactured from selected high-grade forging material. Computer-controlled machine tools are used for dimensional accuracy, precision machining and consistent quality. Each product is inspected, assembled and tested prior to shipment. Computer tracking systems are used to schedule and monitor each customer’s order during the manufacturing process. This attention to detail ensures product quality and on-time delivery.

SERVICE
In order to ensure vital support to the offshore industry, Dril-Quip field service technicians are rigorously trained and tested in the proper use, handling and repair of Dril-Quip products. Only the most qualified and knowledgeable personnel are employed by Dril-Quip for field service. These technicians are then posted at strategically-located Dril-Quip facilities throughout the world, readily available to our customers on a 24-hour basis.

TRAINING
The Dril-Quip Training Department offers to the industry training courses in the installation, operation and maintenance of offshore drilling and production equipment. These courses utilize computer-assisted training tools, models and actual equipment to enhance the participants’ knowledge of offshore operations. Dril-Quip’s Training Department offers custom courses tailored toward specific projects and customer requirements.
Dril-Quip was founded in 1981 as a small equipment supplier for Gulf of Mexico operators. Its first product line was specialty connectors, which helped establish Dril-Quip’s reputation for innovative design and highly reliable product. The company has continued to introduce new products for offshore applications, working closely with operators to develop each product so that it would meet their requirements and address the challenges encountered in difficult field conditions and in increasingly deeper waters. Over the years, industry recognition for the quality of our products grew steadily and, encouraged by a responsive market, the Dril-Quip product line gradually increased to encompass most of the major components for complete field developments.

These components include:

- **Subsea Wellhead Systems**
- **Specialty Connectors**
- **Subsea Production Trees**
- **Subsea Manifolds**
- **Flowline Connectors**
- **Subsea Production Control Systems**
- **Installation and Workover Control (IWOC) Systems**

To engineer reliable system integration of our products, Dril-Quip expanded its project management expertise and developed the necessary protocol for successful management of large-scale project design.

Dril-Quip product prototypes undergo rigorous Factory Acceptance and Systems Integration Testing before being placed in the field.

All Dril-Quip products are ISO-9000:2001 and API certified.
DRIL-QUIP’s SS Series Subsea Wellhead Systems are 10,000 and 15,000 PSI systems that feature weight-set metal-to-metal annulus seals. Subsea wellhead system components include the guide base, conductor wellhead, primary 18 ¾ wellhead, primary casing programs designed to fit your application, supplemental casing programs (optional), and all associated seal assemblies, wear bushings, bore protectors and running tools.

CONFIGURATIONS
Configurations of the DRIL-QUIP line of SS Series Subsea Wellhead Systems include the standard SS-15 System; the SS-15ES System for deepwater use where higher bending and tensile capacities are required; the SS15 Big Bore II Wellhead System for drilling and running large-bore diameter casing string through pressurized water sands; The SS-15 System adapted for TLP/Spar applications, and the SS-10/SS-10C Systems, pressure-rated for 10,000 psi.

GENERAL FEATURES
• Simple, reliable, trouble-free operation
• Fewer trips required
• Weight-set seal assemblies provide true dual metal-to-metal seals with elastomeric backup
• Same seal assembly fits all hangers 14” and smaller
• Seal assemblies are locked down to hangers
• Seal assemblies are retrieved by vertical pull, with no rotation required
• One running tool runs all casing hangers with seal assemblies
• All casing hangers are automatically centralized in the wellhead
• Large flow-by areas around casing hangers
• 18 ¾” and 16” seal assembly outer lock ring locks seal assembly and casing hanger down
• High pressure and high load carrying capacity due to a unique landing shoulder at the bottom of the 18 ¾ wellhead housing
• High bending load capacity between the 30” and 18 ¾” housing (on SS-15 Systems)
• BOP stack can be tested with wear bushings installed
• Tubing hanger profile standard on all wellheads
• Subsea tie-back profile standard on all casing hangers that land in the wellhead
**Specialty Connectors**

**Quik-Thread® Connectors**

Quik-Thread Connectors offer fast make-up, reliable sealing and versatility to excel in a variety of drilling applications. Their rugged thread form and automatic self-aligning profiles allow for quick and easy installation in the field. Quik-Thread Connectors can be outfitted with anti-rotation keys for added security in harsh drilling environments. Metal-to-metal sealing is also an option.

Quik-Thread Connectors make up in 2 1/2 turns and cannot be cross-threaded.

**Recommended Applications**
- For casing run from any floating rig where rig movement and deepwater current may be encountered
- For casing run from a dual-activity floating rig
- For “lost circulation” hole sections
- For riser casing strings in mudline suspension system wells
- For long-term fatigue life (H and HC-type)

**Multi-Thread™ Connectors**

The Multi-Thread Connector is a member of the Quik-Thread line of connectors. It maintains the field-proven performance of the Quik-Thread design with the advantage of making up in only 5/8 of a turn, and also cannot be cross-threaded.

Multi-Thread Connectors and protectors have an identifying groove that easily distinguishes them from Quik-Thread Connectors.

**Recommended Applications**
- Shallow water applications
- All bottom supported drilling vessels or moored floating drilling vessels
- Applications where casing will be run directly into the hole

**Features: Quik-Thread and Multi-Thread**

- Easy stabbing
- Self-aligning
- No cross-threading
- Fast make-up
- Low torque
- Visual indication of make-up
- High strength
- High-pressure sealing
- Driveable
- Anti-rotation devices available
- Reusable
- Fully tested
- Field-proven technology
- Easily weldable
**QUIK-STAB™ CONNECTORS**

Quik-Stab Connectors provide for fast, reliable weight-set connections of large-diameter tubulars. Their design allows for high-angle stabbing and self-aligning and automatic locking of pin and box. Quik-Stab Connectors are an excellent choice for applications that require fast make-up without rotation.

**FEATURES:**
- High-angle stab
- Self-aligning
- Automatic positive lock
- Mechanical release
- Requires no rotation
- Rugged, high-strength design
- Reliable high-pressure sealing
- Reusable
- Easily weldable
- Driveable
- Anti-rotation features
- Field-proven technology

**PIPE AND FABRICATION**

All Dril-Quip manufacturing facilities are equipped to fabricate connectors to casing joints in accordance with customer specifications, using qualified procedures that conform to industry standards.

Dril-Quip stocks pipe of various sizes and grades to fabricate casing joints quickly upon customer request. Pipe stocks are kept in every Dril-Quip manufacturing facility for fast delivery worldwide. Mill certificates are available for all pipe in stock to ensure quality and traceability. Dril-Quip supplies connectors, pipe and fabrication for turnkey casing joints of consistent and verifiable high quality. This translates into timely deliveries and cost savings for the customer.
**SingleBore™ Production System**

Dril-Quip’s SingleBore Production System is a field-proven and economical alternative to traditional completion system design. The workover riser system and surface tree associated with the SingleBore system are simpler and less expensive than systems required for traditional dual bore trees. The SingleBore Tree and Tree Cap Running and Retrieving Tool can incorporate a shear gate valve.

Flow through the tree to and from the annulus occurs in a series of connected bores and a 1” O.D. high-pressure line run with the workover control umbilical.

The SingleBore Tree body incorporates integral production master and production swab valves, and an annulus master valve. The SingleBore Tree is available for through-tree pigging.

The SingleBore Production System eliminates the need to run and retrieve a wireline plug to open and close the annulus.

Dril-Quip’s annulus ball valve design replaces any requirement to set a wire line plug. The tubing hanger is available for standard or H2S service. Tubing sizes up to 7” can be accommodated while maintaining a full 2” annulus access.

**Singlebore Tubing Hanger System with Sb-Valve**

- The SingleBore Tubing Hanger allows downhole safety valve control, injection line connections, downhole temperature and pressure monitoring, and a submersible pump power cable, if required
- The tubing hanger is available for H2S and severe service
- Tubing sizes up to 7” can be accommodated while maintaining a 2” annulus access
- Dril-Quip’s patented sb-Valve replaces annulus plug profile in the tubing hanger, and the necessity for dual bore running string
- The Sb-Valve is pressure balanced so that pressure in the annulus will not accidentally open or close the bore
- The Annulus SB-Valve system is testable from above to confirm sealing integrity
**THE UNIQUE FEATURES OF THE SINGLEBORE TREE ENABLE OPERATORS TO SAVE TIME AND MONEY**

- The SingleBore Tree requires less time for installation and workover than all other tree types
- The SingleBore Tree is more compact, shorter and more cost-effective than an equivalent dual bore or horizontal completion tree
- The workover riser system and surface tree for the SingleBore Tree are simpler and less expensive than systems for traditional dual bore trees
- Since no wireline plug is required for the annulus, vertical access to the annulus is not needed. The only vertical bore through the SingleBore Tree is the production bore
- The design can accommodate tubing diameters in the range of 2 3/8” to 7”. The production bore is normally set off-center to accommodate control line connections
- Since only one vertical bore exists, the SingleBore Tree can be run on tubing or drill pipe with an umbilical. The SingleBore Tree design eliminates the need for an expensive dual bore completion riser system
- Flow through the tree to and from the annulus occurs in a series of connected bores. Annular flow from downhole exits from the side of the tree through the annulus master valve. During running or retrieving, or during workover, a 1-inch OD high-pressure line run with the workover control umbilical provides access to the annulus
- The SingleBore Tree and Tree Cap Running and Retrieving Tool replace an expensive lower riser package and an emergency disconnect system
- The SingleBore Tree is available for through-tree pigging
- The SingleBore Tree maintains all safety features of a dual bore tree
- The SingleBore Tree body incorporates integral production master and production swab valves and an annulus master valve
**DUAL BORE PRODUCTION SYSTEM**

Dril-Quip’s field-proven Dual Bore Production System is designed to provide direct overhead access (via completion riser) to the production and annulus bores. This allows the setting of wireline plugs in the tubing hanger to secure the well prior to removing the BOP stack. The Dual Bore System is available in pressure ratings of up to 15,000 psi. All of the components utilize field-proven technology.

**System Features**
- Accommodates tubing sizes up to 5” with 2” annulus access
- Includes Dril-Quip’s field-proven high performance gate valves with metal-to-metal sealing
- Dril-Quip’s integral field-proven DX® Wellhead Connector is standard
- Valve overrides available with a variety of position indicators and ROV interfaces
- Adaptable to a variety of flowline and control system connections
- Easily adapted to accommodate most casing programs
- Engineering analyzed and tested
- Field-proven performance

**Features of the Dual Bore Tubing Hanger**
- Easily accommodates electrical, hydraulic and chemical injection downhole functions
- Adjustable Tubing Hanger Lockdown Ring accommodates casing hanger stacking tolerances
- Weight-set metal-to-metal seals are standard
- Standard industry tools and procedures are used for orienting the Tubing Hanger during installation
- Includes orientation pin and orientation elevation check tool to confirm proper installation
- Field-proven performance

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**LOWER RISER PACKAGE (LRP), EMERGENCY DISCONNECT PACKAGE (EDP), COMPLETION RISER AND HANDLING TOOLS**

In addition to the Dual Bore Production System, Dril-Quip offers the LRP, EDP, Completion Riser and associated tools. The complete package can be supplied as an integrated subsea production system.

Both the LRP and the EDP feature Dril-Quip’s high performance gate valves with the ability to shear wireline or coiled tubing, and Dril-Quip’s type DA (Dual Alignment) Connector. The gate valves include manual overrides with industry standard ROV interfaces. Both units are available with special emergency control features. In the event the control umbilical is severed, the LRP is equipped with independent controls to shut in the well, and independent controls on the EDP will close the LRP on the well and activate emergency lift-off cylinders.

**Completion Riser Features**
- Fast, easy connection saves rig time
- Hydraulic or manual spider for running the tree and tubing hanger
- Available with independent controls to shut in the well if control umbilical is severed
- Clamping bands allow installation of tubing hanger/tree cap umbilical and tree umbilical
- Includes the following components:
  - Make-up Tongs
  - Riser Handling Tools
  - Stress Joint
  - Tension Joint
  - Surface Joint
  - Surface Tree

Dril-Quip’s Installation and Workover Control (IWOC) System provides direct control to the tools used to install the tubing hanger, tree and tree cap.
GUIDELINELESS SUBSEA PRODUCTION SYSTEMS

Dril-Quip’s Guidelineless Subsea Production System’s design incorporates the latest innovations in deepwater completion technology. All Dril-Quip trees can be designed and configured to accommodate guidelineless completion operations.

SYSTEM FEATURES

- Guidelineless flowline connection system can be lay away, pull-in or jumper spool
- Optional special purpose completion guide base can incorporate connection points for flowline and control umbilical
- Optional tubing spool available for manufacturer-to-manufacturer crossover and/or side outlet annulus access
- Includes all associated tools necessary, including Emergency Disconnect Package (EDP) and Lower Riser Package (LRP), completion riser and Installation Workover Control System
- Can be run on mono-bore completion riser with a wireline bore selector
- Compatible with electrohydraulic and/or multiplex production control systems
- Can interface with any manufacturer’s completion riser, LRP and EDP
- Can be equipped with multiple ROV interfaces
- Gate valve actuators rated to 6,000 feet of water standard; optional actuators rated to 10,000 feet of water available upon request
- Manufactured to industry standards and customer specifications
- Field-proven performance
Subsea Manifolds

Subsea manifolds are an integral part of many subsea development projects. Dril-Quip supplies manifolds for shallow-water developments and harsh deep-water service. Dril-Quip’s manifolds are engineered to offer solutions to the flow-control challenges presented by today’s subsea production environments. Manifold designs are geared toward optimizing flow paths and minimizing leak paths to increase reliability and performance. A finite element analysis is performed, components are sized to nominal pipe diameters and quality material selection makes Dril-Quip’s manifolds “best in class.” Hydrodynamic analysis is performed and installation methods are evaluated. Dril-Quip’s manifolds are designed to operate for up to 25 years in water depths of up to 10,000 feet, in working pressures to 10,000 PSI and temperatures up to 250°F.

Applications

- Oil production
- Gas production
- Gas lift injection
- Water injection

Manifold Features

- Skirt, monopile or suction anchor foundations
- Accommodates flowline ranges 2” through 6”
- Options available for leveling
- Available with Dril-Quip’s high-performance gate valves
- Available with Dril-Quip’s fiber-optic based control system
- Accommodates retrievable choke modules
- Manifolds are available with flow-through pigging or removable loops to allow round trip pigging
The DQ-VC is a field-proven vertical flowline connector designed to exacting standards for reliable, cost-effective performance. The DQ-VC is available with integral or non-integral hydraulic functioning, and with a rigid or flexible pipe configuration for maximum adaptability to customer requirements.

**DQ-VC™ Flowline Connector**

**DQ-VC with Integral Hydraulics**
- 5,000 PSI pressure rating
- Metal-to-metal sealing
- Hydraulic unlock, lock, seal release and seal test functions
- Secondary mechanical unlock provided

The DQ-VC is available as a piggable connector with up to 12 hydraulic couplers, a piggable loop with metal-sealing swivel arms and pigging isolation valve provided.

**DQ-VC with Non-integral Hydraulics**

To minimize connector cost, the DQ-VC can be configured with all hydraulic functions actuated through the DQ-VC Running Tool, so that no hydraulics are left subsea. With this design, multiple pipe sizes are provided using the same connector and running tool. The DQ-VC with non-integral hydraulics is rated to 10,000 feet of water depth.

**Major System Components**
- Vertical Flowline Running Tool (two required)
- Jumper and Collet Connectors
- Receiver Structure (male hubs located at tree, manifold, PLEM and PLET)
- Spreader Bar and Rigging

**Features of the DQ-VC Running Tool**
- Hydraulic Running Tool
- ROV operated, no umbilical required
- Mechanical override of all locking functions
- Running Tool is retrieved after connectors are locked and gasket is tested
- Control land cylinders draw hub faces together after Running Tool has initially landed out on receiver
- Lock cylinders provide force required to lock and preload connection

**Features of the Jumper and Collet Connectors**
- No hydraulics on connectors
- Jumper ends include two downward-facing Collet Connectors
- Jumper can be run from construction vessel or drill rig
- Bore sizes range from 3” to 11”
MULTIPLEX CONTROL SYSTEM
Dril-Quip’s Multiplex Control System is a key component of the subsea completion system. With Dril-Quip’s system, users have real-time access to sensors monitoring well-reservoir performance and tree equipment status. The system’s open architecture allows for control and monitoring of over 50 wells and the collection of all data within five seconds. MODBUS protocol allows customers to easily link to the platform control system.
A single control module can operate 36 functions and monitor 12 sensors. A flexible design allows Dril-Quip engineers to create a system for clients’ applications employing standard equipment modules. Dril-Quip can package this system for shallow or deepwater applications up to a 10,000-foot depth.
Dril-Quip’s innovative fiber-optic-based communications system is the only system on the market that provides four independent channels. Reliable noise-free communications allows each channel to operate at 115K baud for a total of 460K baud. Dril-Quip’s Multiplex Control System uses single-mode fiber technology that provides reliable communications over 100-plus miles of fiber cable.

MASTER CONTROL STATION
Dril-Quip’s Master Control Station (MCS) allows the operator to control and monitor the subsea completion and surface equipment in the Production Control System.

The station’s open architecture is compatible with the latest industry technology, using high-bandwidth Ethernet communications to achieve the highest throughput of data. Additional computers are used for third-party sensor control monitoring. Dril-Quip’s design offers the customer a highly reliable, flexible, and high-speed field-proven solution.

HYDRAULIC POWER UNIT
Dril-Quip’s Hydraulic Power Unit (HPU) is designed using computerized hydraulic analysis to meet project specification. Standard designs for differing environmental requirements are available employing Delta V Controllers.

THIRD PARTY UNIT
Dril-Quip’s Third Party Unit (TPU) can be custom configured with computers to monitor a variety of third party sensors. The Third Party Unit can also be configured to include a data historian with remote access capabilities.

TOPSIDE UMBILICAL TERMINATION UNIT
Dril-Quip’s termination unit provides an electrical, hydraulic and optical interface to the umbilical. Each unit is configured to meet customer specifications and industry standards as well as zone and environmental requirements.
**Shallow and Deepwater Subsea Control Modules**

Dril-Quip's Shallow and Deepwater Subsea Control Modules offer operators advanced multiplex electrohydraulic systems designed to control and monitor the subsea completion system.

Each module includes a Subsea Electronics Module (single or dual configuration), up to 36 hydraulically-latched pilot control valves with pressure transducers, metal-sealing hydraulic couplers, electrical/optic connectors, hydraulic fluid filters and accumulators.

### The Shallow Water Control Module

is attached to the tree with a simple diver-assisted latch mechanism. It is designed for subsea operations in water depths up to 700 feet. The module provides control and monitoring of 12 hydraulic functions and is expandable. It also monitors up to 12 electrical sensors.

### The Deepwater Control Module

installs into a mounting base which provides guidance, soft landing, coupler make-up and module lock. Dril-Quip’s base and funnel are designed to easily mount to subsea trees, manifolds and distribution units. The deepwater module is designed for subsea operations of up to 10,000 feet, and provides control and monitoring of 24 hydraulic functions (also expandable). Monitoring of 24 or more electrical sensors is provided.

Both control modules communicate via high speed (115K baud) Fiber-Optic or Signal On Power (9.6K baud). The modules employ dual modems and power supplies in the Subsea Electronics Module. Each module has a design life of 20 years and is designed to meet or exceed ISO industry standards.

**Subsea Electronics Module**

Dril-Quip’s Subsea Electronics Module is microprocessor-based (16-bit) for an optimum combination of capability, reliability and simplicity. Dril-Quip’s design incorporates downloadable software allowing for reprogramming, changing operation, configuration management or diagnosis without requiring retrieval of the module.

One communications channel is dedicated to module operation and the remaining three channels are available for digital sensors with RS-485 interfaces, such as downhole pressure temperature sensors, intelligent well sensors and flow sensors. The module is designed for low power consumption, minimizing the size, weight and cost of the umbilical. The Subsea Electronics Module is capable of operating with either single- or three-phase power.

**Software Support**

Dril-Quip’s Control System software runs on a Delta V platform for control and monitoring of the production equipment.

All software programs necessary for reliable operation of the system and to meet each customer’s functional requirement are included.

Screen displays may be custom-configured for user-friendly graphics that model equipment architecture and operation.
Dril-Quip’s Installation and Workover Control (IWOC) System provides direct control to the tools used to install the tubing hanger, tree and tree cap.

Dril-Quip’s IWOC System incorporates all of the necessary controls required to deliver hydraulic power to each of the functions required. It can accommodate electric pass-through to all of the electric downhole functions that may be required. The IWOC System is designed to the same high-quality standards that are used in Dril-Quip’s Production Control System.

The IWOC System typically includes a Hydraulic Power Unit, Master Control Station, Umbilical stored on a winch-controlled reel, sheaves and junction plates.

Dril-Quip’s Multiplex IWOC System is offered for deep and ultra-deep installation and workover requirements.
FOR EDP, LRP AND TREE INSTALLATION

Dril-Quip’s IWOC System is used to install the tree while maintaining necessary control of the Emergency Disconnect Package (EDP) and Lower Riser Package (LRP) when applicable. It is also used to install the tree cap.

The IWOC System utilizes the same control panel and hydraulic power supply as is used to install the tubing hanger. A larger hose umbilical and reel may be required to accommodate the additional functions associated with the tree, EDP and LRP. If so, corresponding sheaves to accommodate the larger hose bundle will also be supplied.

Dril-Quip’s IWOC System is available in Direct Hydraulic and Multiplex configurations.

Dril-Quip’s IWOC System is available with a dedicated Hose Bundle and Reel. The smaller reel is for tubing hanger installation and the larger reel is for tree installation.

36-function Control Umbilical and Junction Plate on the Emergency Disconnect Package (EDP)