



# Drilling Products Overview

Total rig package solutions for your drilling needs





## Total Rig Package Solutions

Cameron Total Rig Package Solutions bring the Cameron reputation for safety and reliability to all your equipment and service needs. This complete suite combines our best-in-class equipment and comprehensive services, providing customers with a lower total cost of ownership. Through our worldwide network of resources, we present full life cycle support, from conceptual design to a full range of services. And our global infrastructure provides service and support wherever and whenever needed. For reliable rig equipment and far-reaching service, the clear choice is Cameron.

Cameron understands that maximizing uptime means lower total cost of ownership and greater returns for our customers. With growing demands for rig efficiency, the value of safety and reliability cannot be overstated. Through a comprehensive approach that impacts every aspect of our business, Cameron is dedicated to ever-increasing rig efficiency.

### **Quality and performance**

Cameron invests in state-of-the-art engineering and unrelenting quality control processes throughout the design, engineering, project management, and manufacturing of your equipment. This has garnered a reputation in the industry for high-performance, quality products.

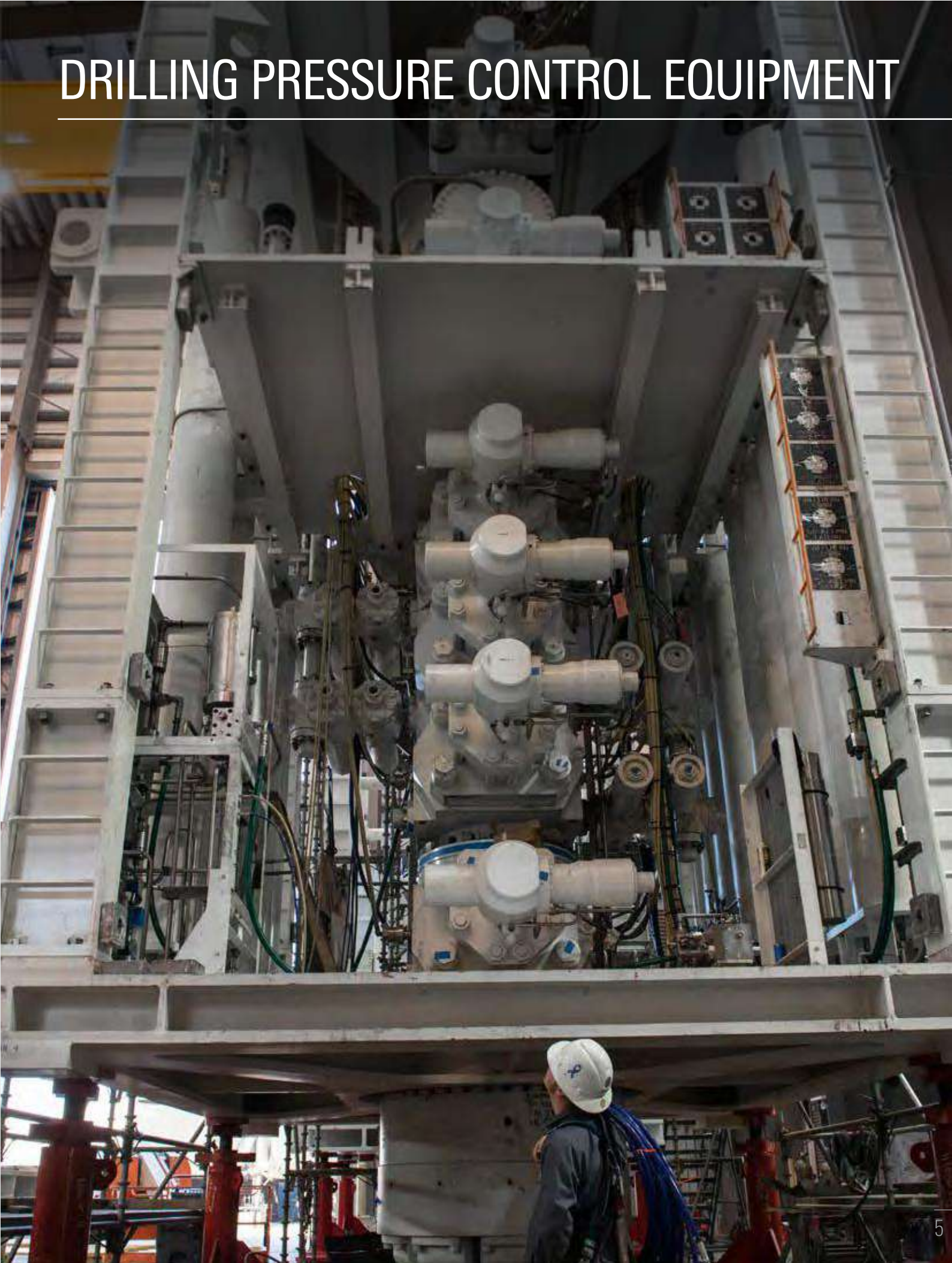
### **Service and support**

Providing technical expertise and extensive training programs, Cameron services are available to help you meet your objectives throughout the life cycle of your project. With your return on investment in mind, our network of technical specialists spans the globe so there's no waiting for support.

### **Integrated solutions**

Cameron Total Rig Package Solutions ensure your entire system incorporates a high level of product integrity. By leveraging a cohesive package that's built to withstand the specific challenges of your project, you assure more reliable long-term performance and lower costs.

# DRILLING PRESSURE CONTROL EQUIPMENT



# Blowout Preventers (BOPs)

Focused on reliability and safety, Cameron continues to innovate in response to your drilling BOP needs. With the world's largest installed base of BOPs, Cameron has provided a legacy of technology leadership, from the industry's first BOP in 1922 to the world's first 13-5/8 in 25,000 psi BOP. With Cameron, reliability begins in the design phase and continues through the use of proprietary products, including high-performance elastomers.

## Ram-Type BOPs

Cameron offers an extensive product line of ram-type BOPs with features that help to reduce rig maintenance and downtime.



### EVO\* Compact Offshore BOP

Application	Offshore (subsea and surface) and onshore
Bore sizes and working pressures	18-3/4 in 15,000, 20,000 psi
Body styles	Single, double, triple
Pressure-energized rams	Yes
Lock type(s)	Hydraulic; EVO-Loc* BOP locking system and motors
Bonnet studs instead of bolts:	Yes

Tandem booster bonnets available for increased shearing and sealing capabilities. Super shear bonnets available for shearing casing.



### TL\* Offshore Ram-Type BOP

Application	Offshore (subsea and surface) and onshore
Bore sizes and working pressures	18-3/4 in 5,000, 10,000, 15,000, 20,000 psi
Body styles	Single, double, triple
Pressure-energized rams	Yes
Lock type(s)	Hydraulic; RamLocks (5,000, 10,000, 15,000 psi working pressure), ST lock (10,000, 15,000, 20,000, 25,000 psi working pressure), Wedgelocks (5,000 psi working pressure)
Bonnet studs instead of bolts	Yes

Tandem booster bonnets available for increased shearing and sealing capabilities. Super shear bonnets available for shearing casing.



### U\* Onshore Ram-Type BOP

Application	Offshore (surface) and onshore
Bore sizes and working pressures	7-1/16 in, 11 in, 13-5/8 in 3,000 to 15,000 psi; 16-3/4 in 3,000 to 10,000 psi; 20-3/4 in 3,000 psi; 21-1/4 in 2,000, 5,000, 10,000 psi; 26-3/4 in 3,000 psi
Body styles	Single, double, triple, quad
Pressure-energized rams	Yes
Lock type(s)	Manual locks standard; hydraulic locks optional
Hydraulically opening bonnets	Yes

Large bore bonnets and FXT bonnets available for increased shearing and sealing capabilities.



### UM\* Convertible-Bonnet Ram-Type BOP

Application	Offshore (subsea and surface) and onshore
Bore sizes and working pressures	7-1/16 in and 11 in 3,000 to 15,000 psi; 13-5/8 in 10,000 psi
Body styles	Single, double, triple, quad
Pressure-energized rams	Yes
Lock type(s)	Manual locks standard; hydraulic locks optional
Hydraulically opening bonnets	Yes
Bonnet studs instead of bolts	Yes

Large bore bonnets and FXT bonnets available for increased shearing and sealing capabilities.



#### T-81 Small-Bore Compact Ram-Type BOP

Application	Onshore
Bore sizes and working pressures	7-1/16 in 3,000, 5,000 psi; 9 in 3,000, 5,000 psi
Body styles	Single, double, triple
Pressure-energized rams	Yes
Lock type(s)	Manual locks only
Hydraulically opening bonnets	Yes
Bonnet studs instead of bolts	Yes; also studs on the door



#### T-82 Compact Ram-Type BOP

Application	Onshore
Bore sizes and working pressures	7-1/16 in 3,000, 5,000 psi; 11 in 3,000, 5,000 psi; 13-5/8 in 3,000, 5,000 psi
Body styles	Single, double
Pressure-energized rams	Yes
Lock type(s)	Manual locks only
Hydraulically opening bonnets	Yes
Bonnet studs instead of bolts	No

### Annular BOPs

Cameron offers a variety of field-proven annular BOPs to fit your desired drilling applications. Our portfolio includes models that feature a quick-release top for prompt packer changeout and, when vertical space is limited, reliable solutions in a compact design.



#### DL High-Pressure Annular BOP

Application	Offshore (subsea and surface) and onshore
Bore sizes and working pressures	7-1/16 in to 21-1/4 in and 2,000 to 10,000 psi
Body styles	Single, dual configurations available for certain sizes
Packer	High-performance CAMULAR* annular elastomer technology



#### T-84 Low-Pressure Annular BOP

Application	Onshore
Bore sizes and working pressures	7-1/16 in 3,000, 5,000 psi; 9 in 3,000 psi; 11 in 3,000, 5,000 psi; 13-5/8 in 3,000 psi
Body styles	Single
Packer	Synthetic rubber



#### T-90 Short-Body Annular BOP

Application	Onshore
Bore sizes and working pressures	7-1/16 in 3,000, 5,000, 10,000 psi; 9 in 3,000 psi; 11 in 3,000, 5,000 psi; 13-5/8 in 3,000, 5,000 psi
Body styles	Single
Packer	Synthetic rubber

# Rams and Ram Packers

Cameron offers the most comprehensive line of rams and ram packers in the industry. Our rams cover a wide range of drilling requirements, including shearing high-strength casing and drill collars. Cameron also offers a choice of rams for variable bore sealing and high-temperature applications.

Cameron is known as a pioneer in variable bore sealing technology. The name variable bore ram (VBR) is synonymous with the CAMERON\* VBR\*. In addition, Cameron offers FLEXPACKER\* ram technology, FLEXPACKER NR\* narrow-range ram packer, and dual bore FLEXPACKER technology, which provide sealing on specific bore sizes.



*Pipe ram*



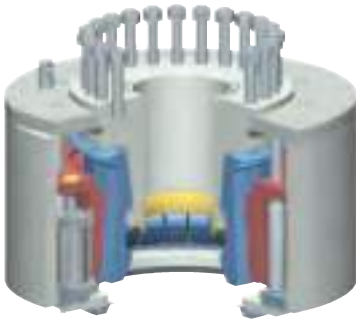
*VBR*



*CDVS cable double-v shear ram*

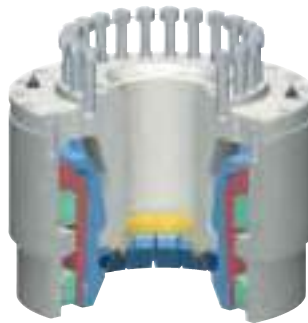
# Connectors

As drilling depths have increased, Cameron has expanded its product offerings to include a full range of collet connectors able to secure your subsea BOP stack connections from shallow to ultra-deepwater environments.



### **Model 70 connector**

*The Model 70 collet connector is offered in sizes and pressure ratings for a wide variety of applications.*



### **HC connector**

*The HC high-capacity collet connector is similar to the Model 70 connector, but is designed to provide greater preload to withstand higher separating forces.*



### **DWHC connector**

*The DWHC deepwater, high-capacity collet connector is a high-strength drilling and completion collet connector, engineered for the high loads encountered in ultra-deepwater applications.*



### **HCH4 connector**

*The HCH4 connector locks onto an H4 wellhead.*



### **EVO-Con connector**

*The EVO-Con\* adaptable collet connector works on various wellheads, giving you increased versatility and capacity, and is made with only one hydraulic unit.*



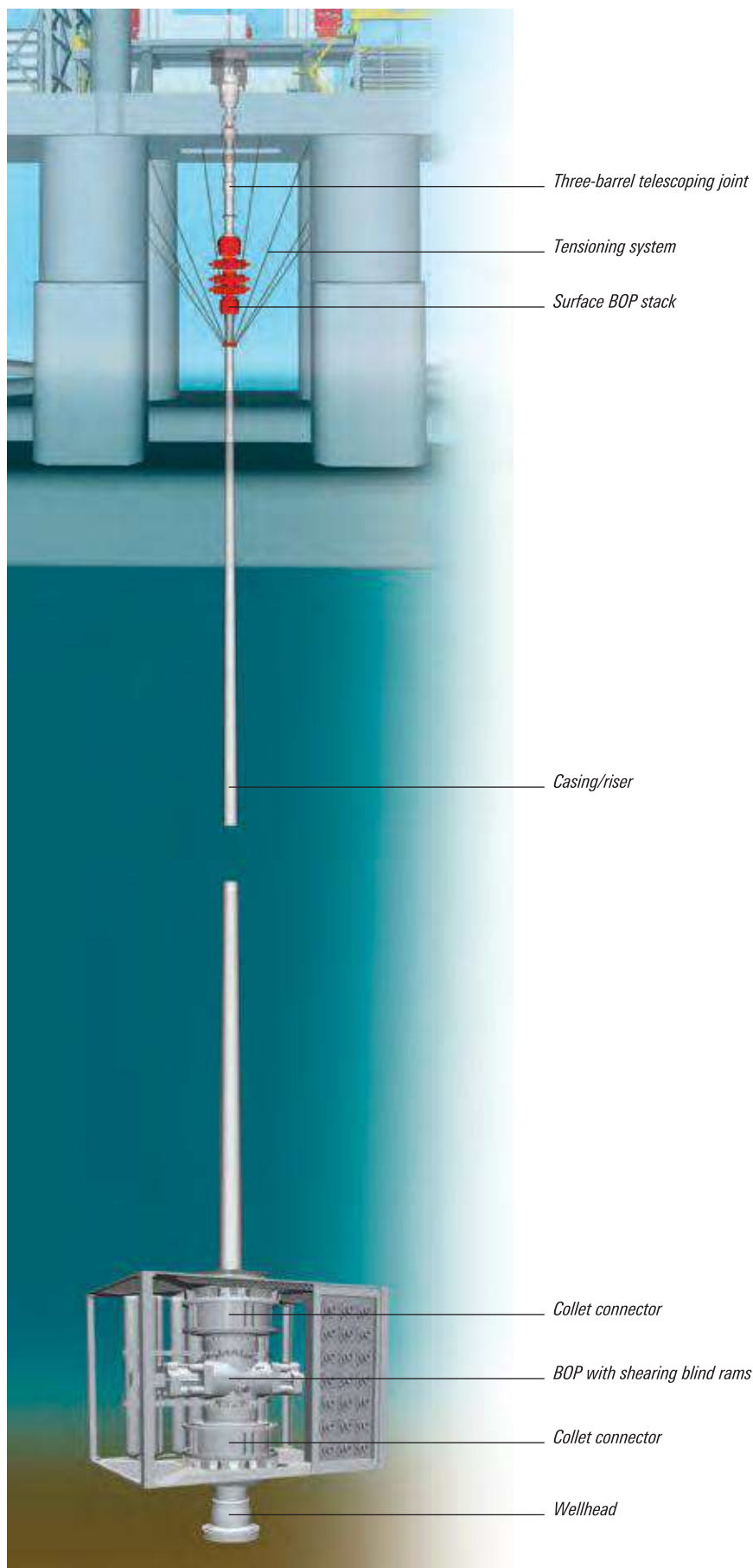
# ESG System

The Cameron ESG\* environmental safeguard BOP control system is a safe, reliable and cost-effective alternative to traditional subsea drilling practices, combining field-proven equipment into an evolutionary new system.

Evolving traditional methods one step further, the Cameron ESG system utilizes a floating vessel equipped with a combination of subsea and surface modules. The subsea portion, at only a fraction of the size and weight of a traditional subsea stack, is used to shear, seal and disconnect from the seabed while the traditional surface BOP stack handles all the well control functions.

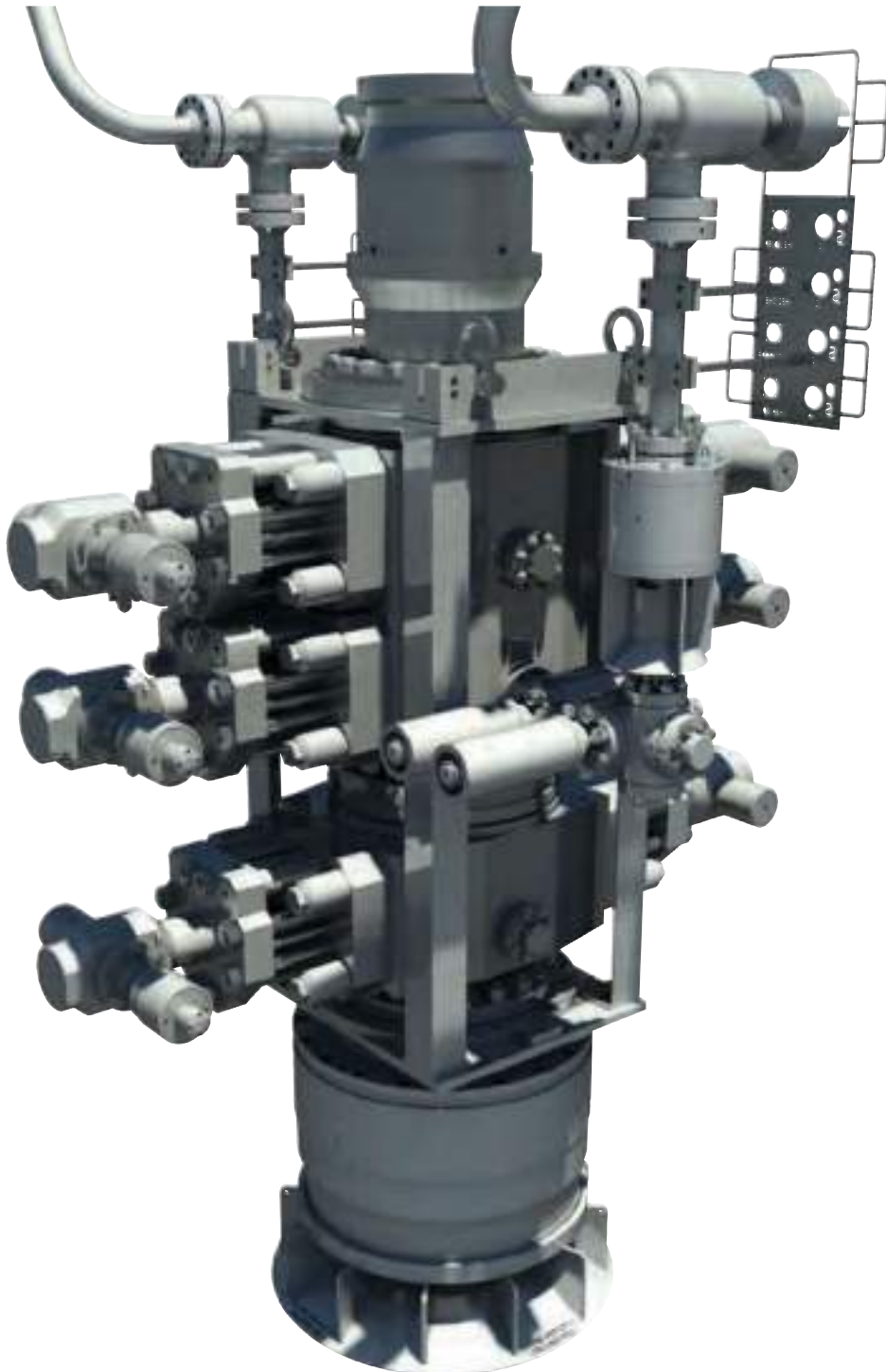
The subsea stack consists of upper and lower wellhead connectors, a ram-type BOP with shearing blind rams and a mini (acoustic, electric, ROV-actuated or hydraulic) control system. The subsea portion is connected to a traditional surface BOP stack via a high-pressure riser system, Cameron exclusive triple-barrel telescoping joint and a motion compensation system.

In the event of an emergency, the control system is used to signal the subsea BOP to shear the pipe. Once the shearing blind rams shear and seal off the bore, the control system is used to signal the upper connector to disconnect, allowing the rig to be moved safely off location with minimal loss of drilling or well fluids.



# Capping Stack

Building on a legacy of innovative BOP products, Cameron now designs and manufactures capping stacks. These stacks provide an additional method for safely shutting in a well or diverting the flow to a containment system. These small, lightweight stacks, varying in size and working pressure, are designed to fit on top of a subsea BOP stack or wellhead and can be configured per customer's request.



# Diverter

Cameron diverter solutions provide low-pressure flow control to direct wellbore fluids away from the immediate drilling area to maximize safety of personnel and equipment. These diverters are used primarily to divert drilling fluids to mud systems in shallow fluid and gas flows, drilling with a rotating head, or drilling with a marine riser. Cameron offers the CF-A low-pressure flow control floater diverter for floaters and the CF-B low-pressure flow control jackup diverter for jack-up rigs.



*CF-B diverter*



*Diverter housing*



## **CF-A diverter**

The Cameron CF-A diverter is fully customizable for customer-specific floater operations and is designed for reliable, efficient use. The system consists of a diverter housing, outlet valves, running tools, controls system, diverter assembly, and storage skid.

The CF-A diverter supports up to 75.5 in rotary tables and has a hang off capacity of up to 2.5 MMlb. It is a single annular packing element with a pressure rating up to 500 psi. The CF-A model features four hydraulic locking dogs that also provide hydraulic functionality, thus reducing hoisting and providing a simplified running and retrieval of the diverter assembly. It also eliminates the need to secure hoses to the diverter assembly while providing hydraulic fluid for the operations.



## **CF-B diverter**

The Cameron CF-B diverter is fully customizable for customer-specific jack-up rig operations and is designed for reliable, efficient use. The system consists of a diverter housing, outlet valves, running tools, controls system, diverter assembly, overshot packers, and storage skids.

The CF-B diverter supports up to 49 in rotary tables and is qualified up to 1,000 psi. Packers can be split and hinged to allow them to be changed out with pipe in the hole. J-slot type running tools are entirely mechanical and require no hydraulics. The bolt-on hydraulic stabs automatically engage receptacles in the diverter housing during deployment, thus eliminating the need to make/break hydraulic connections during running and retrieval.

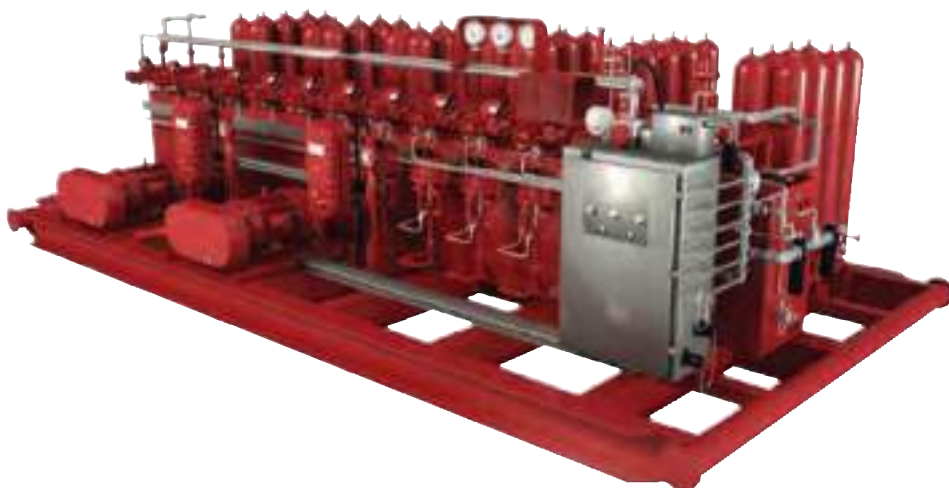


*CF-A diverter and running tool*

# BOP Controls and Monitoring Systems

As a leading supplier of BOPs, Cameron is uniquely qualified to design, manufacture, install and service drilling control systems tailored to the specific requirements of Cameron BOPs. By providing superior design, dependable performance and excellent field service, Cameron is an industry leader in the supply of drilling control systems for land, platform and subsea applications. Available controls range from simple-hydraulic to all-electric systems.

BOP control systems from Cameron feature a modular design using pre-engineered, field-proven components. The unique modular design allows simple installation and retrieval of the control pod utilized in our multiplex (MUX) systems, which leads to reduced maintenance time and costs. Cameron control systems feature the latest technology with new advances in safety and functionality, providing for operational efficiency.



## **Land and platform hydraulic**

Cameron hydraulic control systems for land and platform BOPs supply hydraulic fluid used to operate the stack and associated equipment. These systems feature field-proven and reliable components designed for dependability and field serviceability. The valves use sliding CAMERON metal-to-metal shear seals for maximum tolerance of fluid contamination.



### **EH MUX subsea electro-hydraulic multiplex systems**

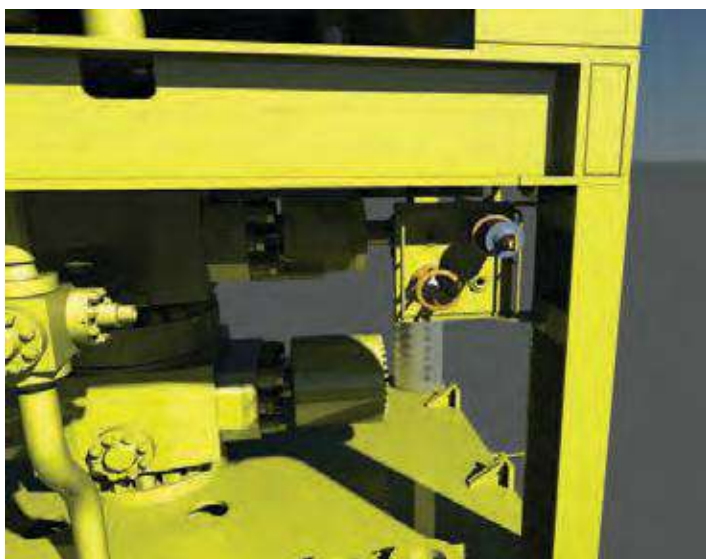
Cameron compact, lightweight EH MUX systems combine modular, field-proven components with dual-redundant electronics to provide the rapid actuation required of BOPs operating in deep water.

For operating equipment in shallower water depths, Cameron offers direct-hydraulic and piloted-hydraulic drilling control systems to deliver superior BOP control at an economical cost. Like the EH MUX systems, the piloted systems offer robust, field-proven components, but are controlled via electric connections between the surface controls and subsea control pod.





*LMRP ROV wireless data and power connection point and ROV retrievable black box recorder*



*Lower Stack ROV wireless data and power connection point and ROV retrievable black box recorder*

### **Cognition subsea BOP monitoring system**

The Cameron Cognition\* monitoring system is a network of sensors, data recorders, and communications fitted to the subsea stack of new or existing BOP assemblies, that administers mission critical information for real-time monitoring, condition based maintenance, and emergency mitigation.

Monitoring the parameters of condition in BOP equipment provides access to crucial details about performance and reliability. This presents drillers with new insight to proactively manage maintenance which is essential to maximizing operational uptime. Also, this progressive set of statistics contributes vital intelligence to identify and respond in well control emergencies. Redundant "black box" recorders store several weeks of data enabling ROV recoverable forensics of time-stamped information.

The Cognition monitoring system has the flexibility to incorporate a wide range of installer selected sensors, including but not limited to BOP ram position, hydraulic fluid condition, stack accumulator bottle volume, and solenoid performance. Four redundantly accessible data transmission paths are designed to increase availability, which includes the main umbilicals, ROV stab access points, ROV inductive high-capacity connectivity, and an acoustic system that also facilitates local power. Each connection is capable of energizing sensors and reading data from subsea historians independently of the native BOP control system. All measurements are accessible from any single connection point, implementing an unprecedented level of redundancy.

Additionally, the Cognition Knowledge Base\* software provides advanced analytics, alerts, alarms, and reports that synthesize both real-time and historical data into advantageous information. The complete package solution offers the most value to aid in preventing failures, reducing downtime, and extending the operational life of subsea BOP equipment.

# SERVICES

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With Cameron Services, you have a world of resources at your command—around the clock and around the globe. Dedicated to optimizing your operations and reducing your total cost of ownership, we have the most locations worldwide, staffed with qualified people who are accessible 24/7, so you are never without service when you need it. What's more, our integrated systems and advanced processes enable us to provide faster turnaround. And, as the OEM, we know our products better than anyone and know how to best service them.

#### **Comprehensive services expertly delivered**

As the market leader in services, we provide flexible solutions through five main areas that lower the total cost of ownership of your equipment:

- **Parts**—Immediate delivery of genuine OEM replacement parts for many Cameron products.
- **Life of field services**—Field service technicians are available around the world 24/7 to provide a wide variety of services that range from field repairs to preventive maintenance, technical support, and training.
- **Repairs**—Service centers offer a full range of equipment repair services, including disassembly, inspection, reassembly, testing, and parts replacement.
- **Remanufacturing**—Provides remanufacturing of oilfield equipment to return products to first-class, fit-for-function or working-condition performance standards.
- **Asset management**—Provides a range of asset management services, including storage/warehousing, utilization, brokering, buy-back, and exchange.











### Remote access center

To help better support our customers, Cameron control systems are designed to enable remote access. A VPN router for secure authorization and a Cameron support PC are the only two components needed to enable a gateway to all of Cameron PLCs.

### Rig efficiencies

The Cameron support center is able to remotely access each computer and PLC just as if our support team was on the rig or vessel themselves. Having the capability to remotely locate and correct issues in cooperation with the rig maintenance crew provides the customer with timely support and efficiencies in rig operations. Cameron software engineers are also available to provide customers with troubleshooting assistance which can reduce the need for the rig or vessel's maintenance crew to access the advanced software themselves.

### Cost savings

Cameron OnTrack24 Remote Access can reduce the need for costly service interventions by allowing software issues to be resolved and software updates to be implemented remotely, without the need for Cameron field service technicians onboard the rig.

### Simple upgradability

Updates to PLC software for controlling drilling equipment as well as HMI updates to the Cameron X-COM operator chair, OnTrack servers and workstations can be seamlessly implemented and tested from the Cameron remote access system.

### Laboratory

Cameron software is developed in a dynamic 3D HIL test simulator environment. Furthermore, test activities normally carried out during commissioning are verified at equipment delivery. All software is developed in accordance with DNV-RP-D201.

### Simulation

The Cameron drilling simulator is used to train the rig's operational and maintenance crews by providing familiarization of the machinery and control stations, sequences collaboration, manual operation and unexpected scenarios. In addition, the simulator also aids in internal training to ensure that our service personnel are continually updated with the latest features and equipment.

Utilizing 3D models, the Cameron drilling simulator is based on the equipment and machine software that is used on the rig, which reduces variability between real life and simulator operations. The operator is able to reverse, stop, or change the operation at any time. The simulator training is suitable for those participants who have previously taken Cameron operational training. The Cameron drilling simulator has the following main components:

- X-COM operator chairs
- Instruction station computer
- PLC simulator computer
- 3D model simulator computer
- 3D visualization system
- Audio system

# Global Network



## LEGEND

- Current locations
- ⊙ New and expanding locations

Cameron operates around the world from more than 300 locations that reach virtually all of the world's oil and gas operating basins. Our global network of sales, service, and strategically located in-house manufacturing centers means customers benefit from faster ordering times, quicker deliveries and easier access to Cameron professionals, no matter where your operations are located. Count on Cameron to be there, anywhere we are needed.



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Photos: Allan Klo, Statoil, page: 4 | Anders Martinsen, pages: 2, 30, 42, 43, 45, 46 and 47  
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