

# Digital Drilling Control System

Full range of rig control for global onshore and offshore drilling applications

TECHNOLOGY



## Table of Contents

|                                          |   |
|------------------------------------------|---|
| Digital Drilling Control System.....     | 3 |
| Versatile User Interface .....           | 4 |
| Control and Monitoring HMI Screens ..... | 5 |
| Remarkable User Experience .....         | 7 |



North American Pad Drilling Land Rig

# Digital Drilling Control System

Cameron's Digital Drilling Control System™ (DDCS) is ideal for knowledgeable drilling contractors who are in need of reliable control systems that are also simple to use. DDCS represents an outstanding value in drilling automation.

Cameron's DDCS portfolio creates an integrated control and information system that boosts drilling operations. Its advanced programming and interface architecture makes it easier to monitor and control sophisticated drilling equipment. Distributed input/output (I/O) is strategically placed to connect remote devices to the communications network. Overview of the process is conducted from a high-technology workstation providing a powerful drilling command center.

## Features

- Reduces costs associated with overall drilling operation and maintenance
- Allows operator to simultaneously maintain supervision over drillfloor activities and crew members
- Automatically synchronizes a machine's operation while continually monitoring the condition of its auxiliary system
- Greater uptime with quicker changes between equipment tasks
- Available interface options ranging from conventional standing consoles to modern operator chairs
- Computer displays provide task-specific information to enable quick comprehension, while avoiding information overload
- Interlocks and early warning alarms add safety to help deter human error
- Factory dynamic software simulations allow for faster commissioning time
- Full service customer support with remote login availability



Caspian Sea Jackup Drilling Rig DNV Class



Southeast Asia Tender Assisted Drilling Rig ABS Class

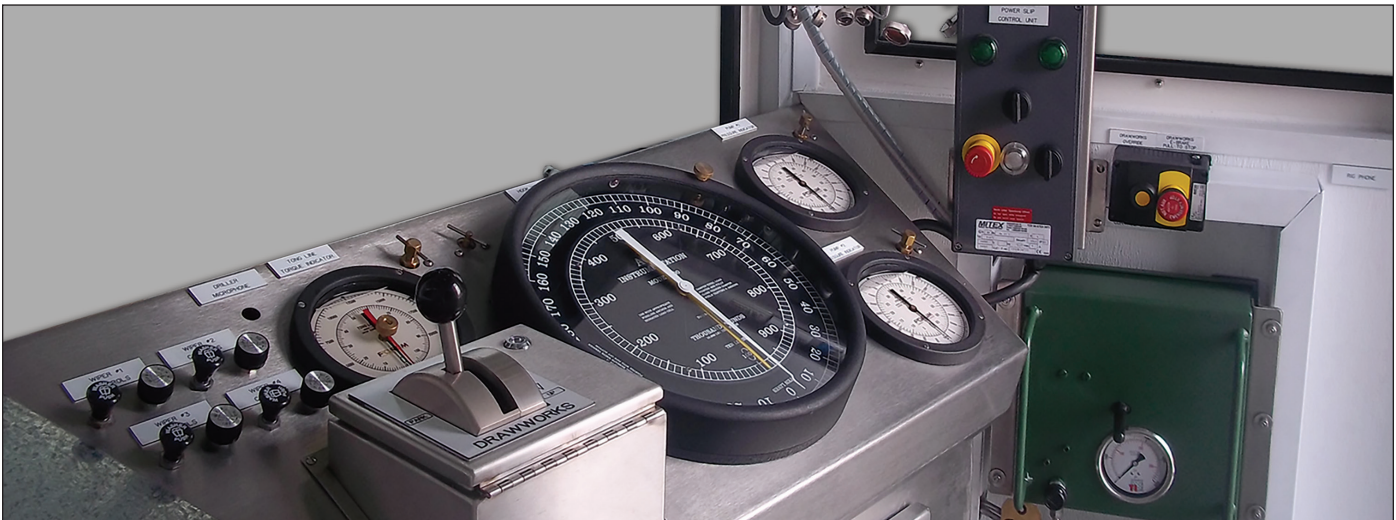
# Versatile User Interface

## Workstation

Commonly housed inside a driller's cabin, the workstation is fully customizable and can be tailored to fit within any drill floor layout. Engineered to pay close attention to environmental and human conditions, the workstation's main focus is operator safety, line of sight, convenience of controls and overall comfort. Options are available from conventional standing consoles to modern operator chairs.

## Human Machine Interface (HMI)

The HMI is interactive through the use of smooth hand controls and purposed data. HMI screen menus provide convenient access to content where parameters are easily adjustable to combine precision with concise activity-based information. The display's uniform color palette with subtle embossments significantly reduce eye fatigue and spotlight key notifications for the operator. For enhanced operator usability, industrial-grade computer touchscreens are sunlight viewable with rapid touch responsiveness. HMI screen examples are illustrated on the following pages.



Standing Driller's Console



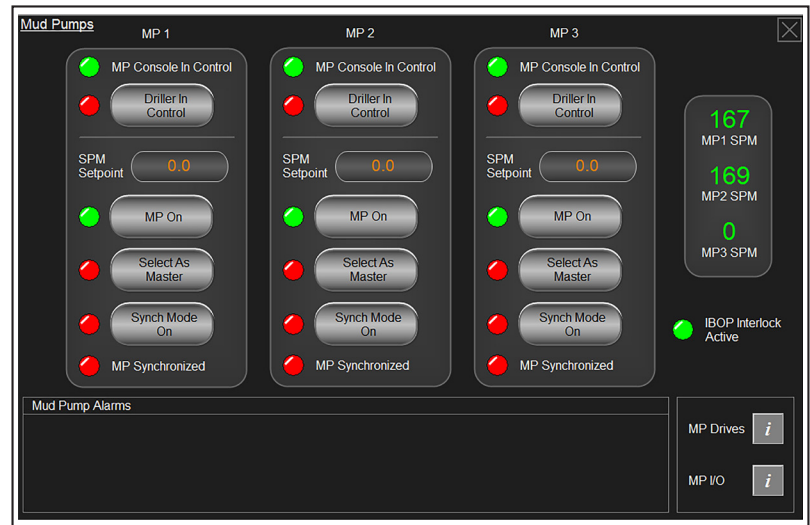
Pipe Handling/Assistant Driller's Chair

# Control and Monitoring HMI Screens

Designed specifically for reliability in demanding drilling environments, Cameron's DDCS encompasses the ideal range of control and monitoring functions. These functions are supported with automatic control and real-time monitoring of auxiliaries, alarm feedback, and data logging capabilities for all related equipment.

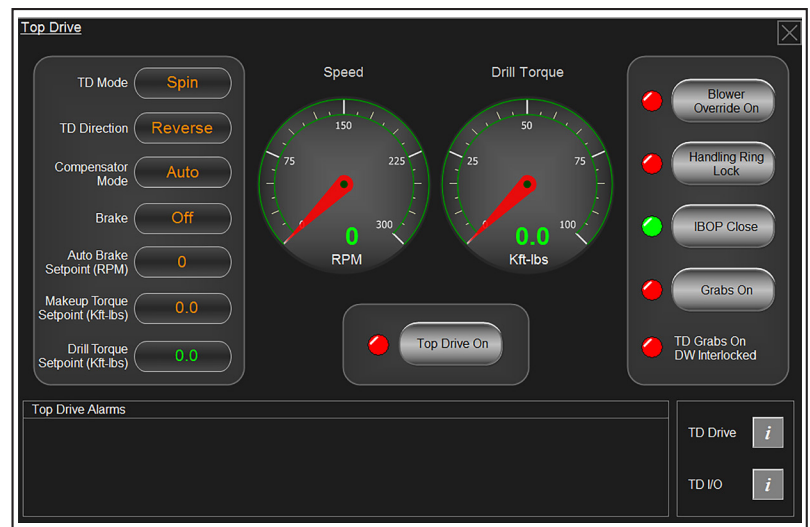
## Mud Pumps

- Local-to-remote operator control exchange
- Selectable number of mud pumps running
- Stroke per minute command and feedback
- Synchronization of mud pumps to provide steady pressure and flow output
- Over-pressure and over-temperature warnings with optional shutdown
- Dual-motor mud pump load sharing integrity
- Top drive Internal Blowout Preventer (IBOP) interlock allows mud pumps to turn on only when IBOP is open, preventing damage to the mud system
- Standpipe pressure limit



## Top Drive

- Drill, spin, and torque modes of operation
- Drill and makeup torque limit inputs
- Automatic brake release and activation with coast to stop
- Automatic handling ring lockout
- Full range positioning of elevator links
- Counterbalance to relieve top drive weight during pipe connections
- Active thread compensator to lift top drive after breakout
- Stick-slip prevention
- Automatic grabs release after breakout
- Directional steering
- Link tilt monkey board anti-collision



## Control and Monitoring HMI Screens *(continued)*

Cameron's DDCS is built using modular programming blocks which can be scaled and tailored to match each drilling equipment package. Capacity can be extended to include ancillary drilling systems such as pipe handling and mud processing.

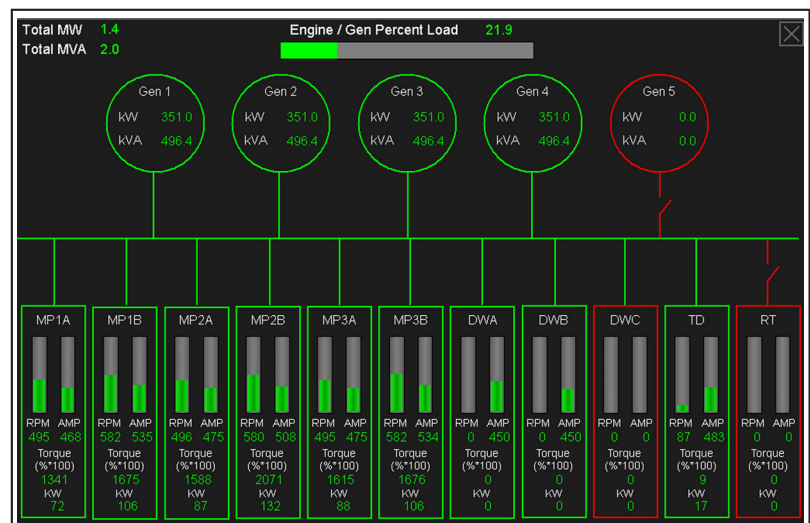
### Drawworks

- Robust joystick to manually raise, lower, and park traveling equipment
- Adjustable high and low travel stop points with momentary manual override
- Automatic and manual emergency brake activation
- Drill line protection featuring adjustable hookload limit
- Kinetic Energy Monitoring System (KEMS) for optimized static and dynamic speed control
- Drawworks motor load sharing with option to select motor quantity
- Regenerative braking of variable frequency drive (VFD) motors
- Automatic driller mode based on rate of penetration (ROP) and weight on bit (WOB)
- Modes for creep speed and slip-and-cut
- Top drive grabs interlock to prevent travel when grabs are engaged



### Power Distribution

- Single-line representation of bus-connected generators and drilling equipment
- Graphical percent loading of engine and generators
- Display of bus total (in MW and MV-amp)
- Display of each generator (in kW and kv-amp)
- Drilling equipment VFD feedback and display
- One-click shortcut to VFD HMI screens
- Drilling equipment power limiting and priority sequencing of VFD loads to prevent exceeding generator supply

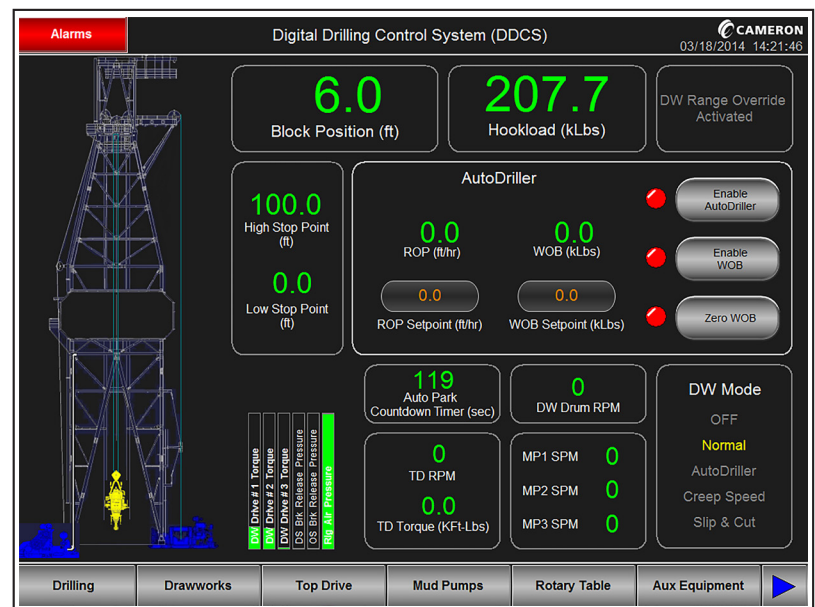


# Remarkable User Experience

At the heart of Cameron's DDCS is a commitment to customer service. Engineers are engaged from design through commissioning to ensure successful project execution. Product service facilities are positioned globally to support local rig needs. In addition, training is available to provide early hands-on experience. All of this is aimed to put the user in control of their operations and offer the most value to our customers.

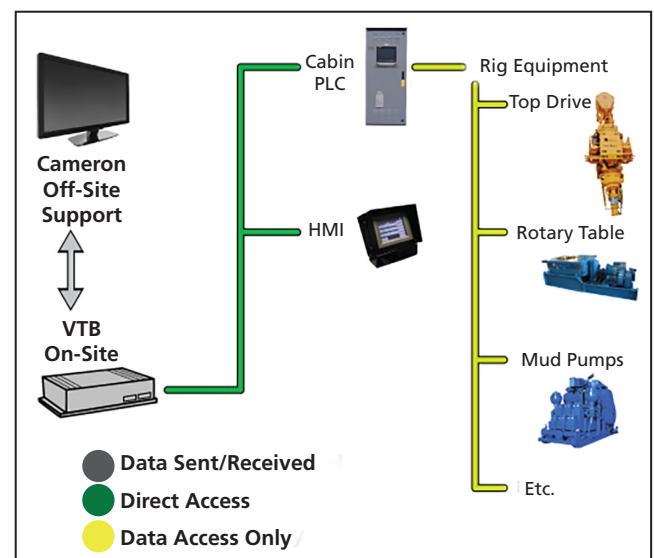
## Proven Performance

- Cameron's DDCS uses readily available hardware and software platforms to ensure seamless rig upgradability
- The latest in field-proven automation hardware is selected to merge complex real-time systems with flexible end-user needs
- Using refined algorithms that have been developed over years of rig installations, Cameron's DDCS software is designed by knowledgeable drilling control specialists who are aware of the unique demands created by each customer application
- To ensure a pre-commissioning test of the control system, dynamic simulations are performed before each order is delivered
- The final product is united through qualified Cameron personnel who continually strive to provide the highest level of customer support



## Virtual Tech Box Service

- Provided with each drilling rig package, the virtual tech box (VTB) creates a remote login portal to the DDCS network for Cameron's Technical Support Center
- Once the rig grants access, this login enables system analysis, troubleshooting, and software updates – all without the need for on-site personnel.
- By identifying problems at the component level and thereby decreasing field service trips, a VTB service agreement saves rig owners a significant amount of time and money by increasing operational uptime.
- New alarms, updated HMI screens, additional safety interlocks, and an interface with external devices are examples of the modifications that can be made to the DDCS per the user's request



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Learn more about Cameron's Digital Drilling Control System at:

[www.c-a-m.com](http://www.c-a-m.com)



#### **HSE Policy Statement**

At Cameron, we are committed ethically, financially and personally to a working environment where no one gets hurt and nothing gets harmed.