reliable. safe. efficient.

CONNECTED TO SUCCESS

BENTEC DRILLING RIG EQUIPMENT

BENTEC

High performance electrical equipment and advanced control systems.

Many years of experience have led Bentec to become one of the world's leading manufacturers of high-quality drilling rig solutions and best-in-class drilling rig components.
Bentec's headquarters are located in Bad Bentheim, Germany, with additional production and service facilities in Tyumen, Russia and Nizwa, Sultanate of Oman.

As a fully vertical integrated systems provider, Bentec offers a unique combination of resources. This, together with our industry experience and expertise, enables us to deliver customer-focused drilling solutions that include the design, engineering and manufacture of fully customized drilling rigs, all types of mechanical drilling equipment and all electrical drilling and control systems.

As a result, Bentec rigs successfully operate in all of the world's major oil and gas fields.

Bentec's highly sophisticated electrical equipment and control systems are perfectly aligned with both external and company-own mechanical products and standards.

The Bentec Power Control Rooms and Control Systems, including all required VFD and SCR Systems for main drives, were developed by Bentec.

Bentec infoDRILL is our drilling information and data management system.

Bentec's software products Soft Torque and Soft Pump were developed in collaboration with some of our our clients and set a new industry standard for Top Drive and Mud Pump Controls.

All our products are developed in-house with the aim of achieving best-in-class status, increasing drilling efficiency, exceeding health, safety

and environmental targets, and maximizing value for customers and life cycle economics. Our rigs can be certified according to API, ATEX, GOST and other standards.

One of Bentec's core competencies and main USPs is our fully integrated approach. This enables us to put together rig packages, which include the installation of all drilling systems, and to deliver comprehensive, qualified rig solutions.

Bentec's best-in-class drilling solutions help to reduce our customers' cost of ownership due to their highest quality standards and efficiency "Made in Germany".

All main components in our electrical systems have been developed in-house on the basis of Bentec's engineering, manufacturing and service expertise, and are field-proven.

BENTEC SOLUTIONS

- **Design, engineering and manufacture of fully customized drilling rigs including Rig Masts and Substructures**
- **Full range of mechanical drilling equipment**
- **Main electrical drilling and control systems**
- **24 / 7 field support service**
- **Repair and overhauling**
- **Spare parts supply and logistics**
- **Rig and equipment upgrades**
- **Re-certification**
- **System integration and commissioning**
- **Global project management**

POWER CONTROL ROOM

Bentec POWER CONTROL ROOMS are perfectly aligned AC- or DC-based power distribution systems built from self-developed main components and are designed for handling rough drilling applications.

UNIQUE FEATURES

- Customized design and equipment
- Safe and reliable system
- Compact size
- Backup onboard air conditioning
- Own development of VFDs and SCRs
- Remote access
- Field-proven equipment
- Configurable for either onshore or offshore rigs
- Available for either arctic and desert environments
- DNV, GL, and ATEX compliant
- Available for all rigs

Bentec is committed to manufacturing safe and reliable systems that provide all the power and control electronics needed to power up all of the electric units on a drilling rig. The Bentec POWER CONTROL ROOM provides a high-quality solution for electric distribution in the drilling business.

In addition to PLC controlled SCR or VFD units, the Bentec POWER CONTROL ROOM contains all of the required components such as a main switchboard, generator control, motor control center, small power distributions, and transformers to power up all of the electrical consumers on the rig. Each POWER CONTROL ROOM has a customized assembly due to differing customer requirements.

The modern dedicated assignment of the AC or DC drive units enables simultaneous use of all motors, avoiding contactors and switches. The container can be supplied either by the generator or grid container.

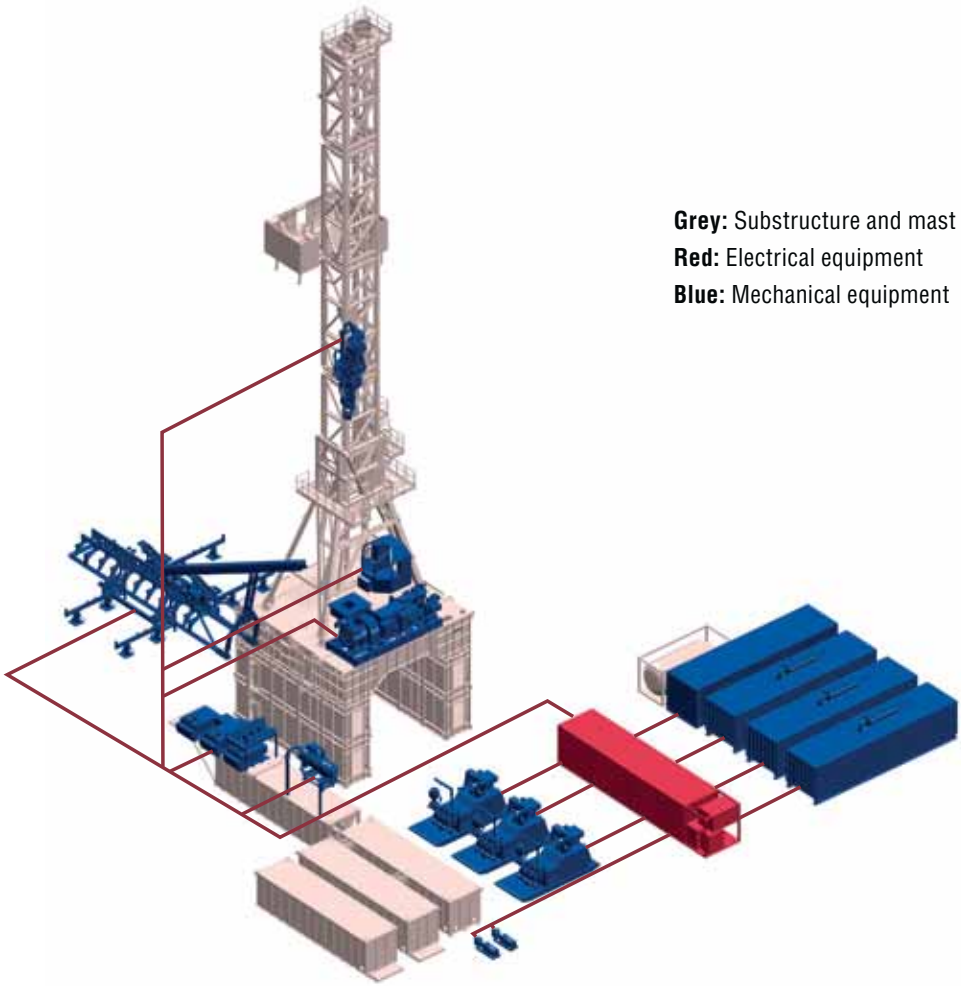
The main components such as the generator control, main switchboard, SCR and VFD units, etc. are Bentec's own developments which ensure a perfectly aligned and highly reliable system with no interfaces to 3rd party equipment. All components are specially developed and field proved for harsh drilling environmental conditions. A special backup air conditioning system, developed by Bentec, ensures interruption-free operation in any environmental condition on earth.

On request, a remote access client can be installed in the POWER CONTROL ROOM. In case of failure, a Bentec service technician can log into the system and rectify the problem, wherever the operation is based in the world, without any need for travelling time.

A combination of the Bentec POWER CONTROL ROOM and other Bentec systems such as the DRILLER'S CONTROL ROOM with the infoDRILL, ANTI COLLISION SYSTEM, the SOFT TORQUE ROTARY SYSTEM, and many more offers a perfectly aligned solution for controlling and indicating all of the parameters on a drilling rig.

Our Generator Power Management System in combination with our regenerative drawwork braking control will assure the best energy consumption in class for the safest and most economic operation of the rig.

Bentec has more than 30 years of experience in developing, manufacturing and commissioning power control rooms in every conceivable environment on earth. This assures an absolutely safe, reliable and service-friendly product that is perfectly aligned for use on both onshore and offshore drilling rigs.



Grey: Substructure and mast
Red: Electrical equipment
Blue: Mechanical equipment

TOP DRIVE CONTROL ROOM

The Bentec TOP DRIVE CONTROL ROOM offers an absolutely reliable standalone solution for powering up electrically driven Top Drives.

UNIQUE FEATURES

- Compact MCC
- Safe and reliable system
- Redundant onboard air conditioning
- Own development of VFDs
- Remote access
- Field-proven equipment
- Available for 3rd party Top Drives
- Available for onshore and offshore rigs
- Available for arctic and desert environment
- DNV, GL, and ATEX conformity
- Available for electrically driven Top Drives with an AC asynchronous motor

The Bentec TOP DRIVE CONTROL ROOM provides a high-quality standalone solution for powering up each electrically driven Top Drive.

In addition to the PLC-controlled VFD unit, the Bentec TOP DRIVE CONTROL ROOM contains all the components required for operating a Top Drive. These include an MCC for auxiliary drives, a step down transformer, a harmonic filter, and a range of other controls. All of the Top Drive's parameters are accessible via an HMI inside the TOP DRIVE CONTROL ROOM. The driller's controls are located on the drill floor and serve to control all functions of the Top Drive. The plugged connections located outside the container significantly reduce the rig move time.

The VFD unit, a Bentec-own development, is a perfectly aligned and highly reliable system. Featuring a redundant air conditioning system designed by Bentec, it ensures that operation is possible in any environmental conditions.

On request, a remote access client can be installed in the TOP DRIVE CONTROL ROOM. In the event of failure, a Bentec service technician can log into the system for troubleshooting purposes.

Bentec combines all of the experience it has gained from more than 30 years of developing and enhancing power control rooms to offer a safe, reliable and user-friendly TOP DRIVE CONTROL ROOM.

VARIABLE FREQUENCY DRIVE

Bentec VARIABLE FREQUENCY DRIVE is an own-developed adjustable AC motor drive system for drilling machinery.

AVAILABLE POWER RANGE:

Up to 3 300 hp / 2 400 kW

UNIQUE FEATURES

- Bentec-own development
- Water or air-cooled compact system
- Available for onshore and offshore rigs
- Field-proven equipment
- Full load-tested
- Built-in cubicle solution
- Remote access

The Bentec VARIABLE FREQUENCY DRIVE is a state-of-the-art converter technology developed for the special operational requirements on drilling units. Because it has been self-developed by Bentec, the VARIABLE FREQUENCY DRIVE provides an absolutely reliable system for drilling applications.

The Bentec VARIABLE FREQUENCY DRIVE can be combined with the Bentec AC motor to create a perfectly aligned configuration able to meet all high power drilling requirements on rigs. Moreover, the system can also be adjusted to work with different types of motors such as ABB, GEB 22, Reliance, etc.

All parameters of the Bentec VARIABLE FREQUENCY DRIVE can be accessed remotely. Therefore, in the event of a failure, a service engineer can access the Bentec VARIABLE FREQUENCY DRIVE for troubleshooting purposes. Each Bentec VARIABLE FREQUENCY DRIVE is full load-tested before installation.

The Bentec VARIABLE FREQUENCY DRIVE is available as a water- or air-cooled version, and meets all the requirements for operating main drives – such as Top Drives, drawworks, mudpumps, Rotary Tables, etc. – on drilling rigs.

SOFT TORQUE ROTARY SYSTEM

Saves costs by eliminating drill string stick-slip effects.

AVAILABLE SYSTEMS:

MK III for DC systems
MK VFD for AC systems

UNIQUE FEATURES

- Eliminates the stick-slip effect
- Extends Top Drive performance due to optimized torque use
- Significantly increases the rate of penetration
- Reduces drill bit wear
- Reduces the number of round trips
- Improves well quality
- Protects the bottom-hole assembly
- Approved by SHELL
- Field-proven equipment
- Available for all rigs with DC or AC driven Top Drive or Rotary Table
- Available for onshore and offshore rigs
- Easy to retrofit

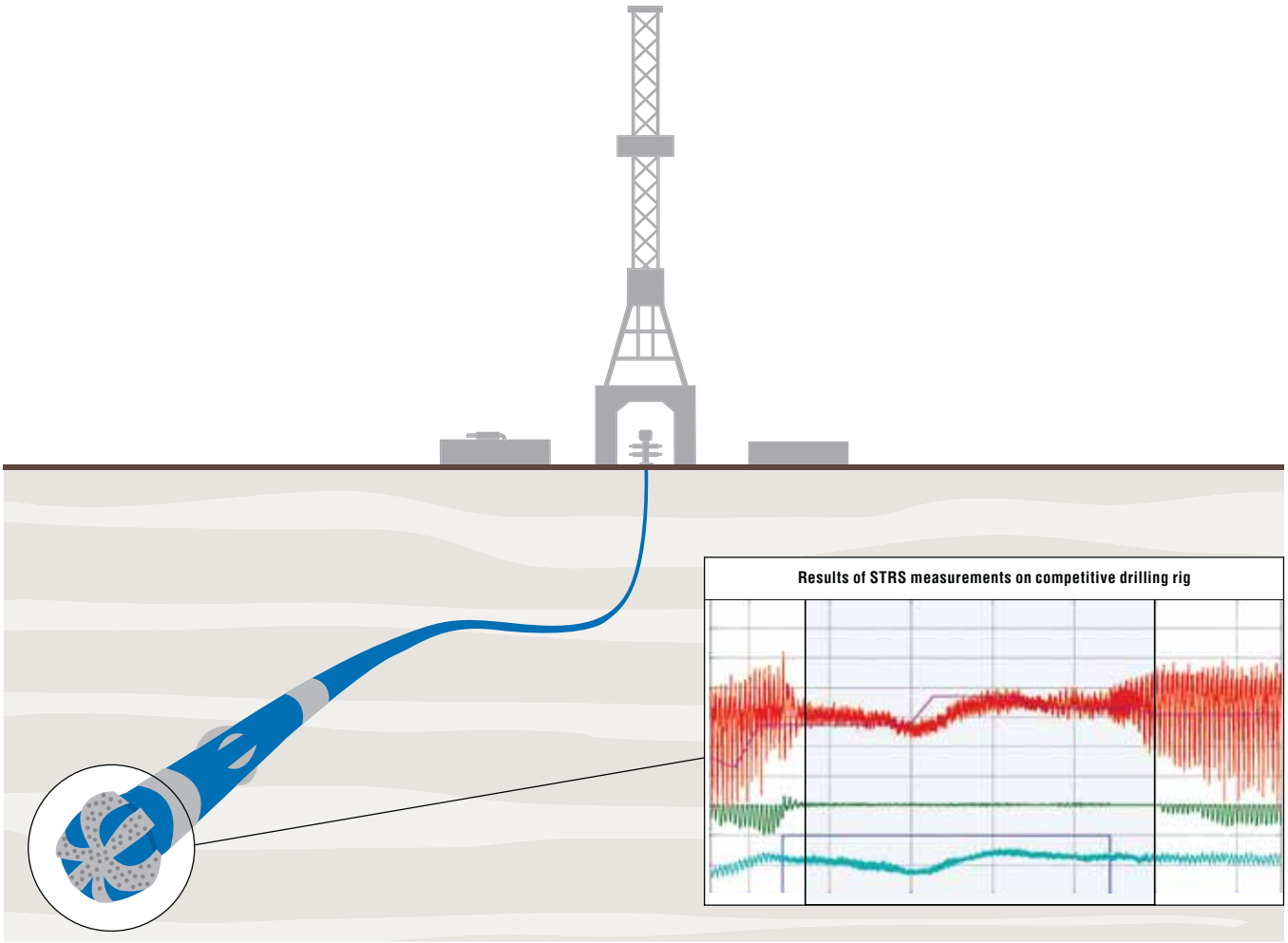
The Bentec SOFT TORQUE ROTARY SYSTEM is designed to significantly enhance drilling performance by preventing the stick-slip effect. The stick-slip effect refers to torque fluctuation depending on the weight on bit and the drive speed. This effect causes extremely high operating cost due to higher bit wear, decreased rate of penetration, increased wear of the bottom hole assembly, and more round trips.

The SOFT TORQUE ROTARY SYSTEM is based on the worldwide accepted SHELL algorithm which was developed to counteract drill string fluctuation. The algorithm precisely calculates set parameters for the drive controller by taking into account the behavior and conditions of drill string and drive system dynamics. The combinations of the SOFT TORQUE ROTARY SYSTEM and Top Drive act as a damper for torsional vibrations. This results in a significant reduction of torque fluctuations and stick-slip behavior, which in turn increases the rate of penetration, protects the drilling equipment, and results in significant cost savings. Furthermore, if the SOFT TORQUE ROTARY SYSTEM is active, the drill torque can be increased.

The system is also available as a retrofit package which can be easily installed in existing drilling rigs. The SOFT TORQUE ROTARY SYSTEM can either be delivered with an additional human machine interface or integrated into the Bentec infoDRILL system.

SHELL confirms that the Bentec SOFT TORQUE ROTARY SYSTEM complies with SHELL requirements.

Bentec combines all of the experience it has gained from more than 20 years of developing and enhancing SOFT TORQUE ROTARY SYSTEMS to offer a highly reliable and field-proven SOFT TORQUE ROTARY SYSTEM.


Results of STRS measurements on competitive drilling rig


STRS ON
STRS OFF
Torque
RPM

DRILLER'S CONTROL ROOM

Safe and reliable system to control and indicate all of the rig application's parameters.

UNIQUE FEATURES

- Custom-made solutions
- Plug & play connections
- Available for onshore and offshore rigs
- Available for arctic and desert environments
- ATEX zone 1 certified equipment
- Soundproofed security glass
- Field-proven equipment
- Available for all drilling rigs

The Bentec DRILLER'S CONTROL ROOM provides a comfortable high-quality solution which is perfectly in line with the requirements of offshore and onshore drilling rigs.

The Bentec DRILLER'S CONTROL ROOM is a custom-made solution which contains all of the control and indication instruments required for the specific application. A specially aligned air conditioner makes the Bentec DRILLER'S CONTROL ROOM suitable for application in arctic and desert environments.

The Bentec DRILLER'S CONTROL ROOM housing consists of top-grade stainless steel which requires no additional painting. The specially processed surface of the stainless steel ensures glare-free operation on the drill floor and inside the cabin. Special soundproofed security glass ensures maximum personnel safety and stress-free working. Pluggable connections between the POWER CONTROL ROOM, the rig's drilling equipment, and the DRILLER'S CONTROL ROOM minimize rig move duration significantly.

The Bentec DRILLER'S CONTROL ROOM can be retrofitted in existing drilling rigs. A combination of the Bentec DRILLER'S CONTROL ROOM, Bentec POWER CONTROL ROOM, and Bentec infoDRILL system provides a perfect solution for indicating and handling all of the drilling rig's parameters without interface problems.

COLOR CAMERA SYSTEM

Bentec COLOR CAMERA SYSTEMS for safe and reliable rig monitoring.

AVAILABLE CAMERAS:

- **Pan tilt zoom camera**
- **Zoom camera**
- **Dome camera**
- **Compact camera**

UNIQUE FEATURES

- Complete overview of all drilling rig activities
- Four different camera types for all conceivable applications
- ATEX certified equipment
- Easy to retrofit
- Available for desert and arctic environments
- Available for onshore and offshore applications
- Field-proven equipment

The Bentec COLOR CAMERA SYSTEM allows users to monitor the whole drilling rig from one central point and view places with limited visibility in a safe and reliable way.

Four different types of camera, the pan tilt zoom camera, the zoom camera, the dome camera, and the compact camera, allow users to adapt the system based on their desired application. Up to four cameras can be integrated into a single system. Customers can also request a customized version of the Bentec COLOR CAMERA SYSTEM, which incorporates more than four cameras.

The human machine interface is a state-of-the-art TFT touch-operated monitor. The cameras are either controlled via touch screen or function keys underneath the display. The operating software allows users to view two or four cameras at the same time when in split screen mode.

The complete system is suitable for arctic temperatures and desert temperatures. The housing of each component is heated to prevent condensation.

The Bentec COLOR CAMERA SYSTEM complies with the strictest standards for the drilling industry and is suitable for use in ATEX zone 1, which ensures maximum safety.

INFO DRILL

Drilling information system for all relevant drilling parameters with intuitive user interface.

AVAILABLE FOR ONSHORE AND OFFSHORE DRILLING RIGS.

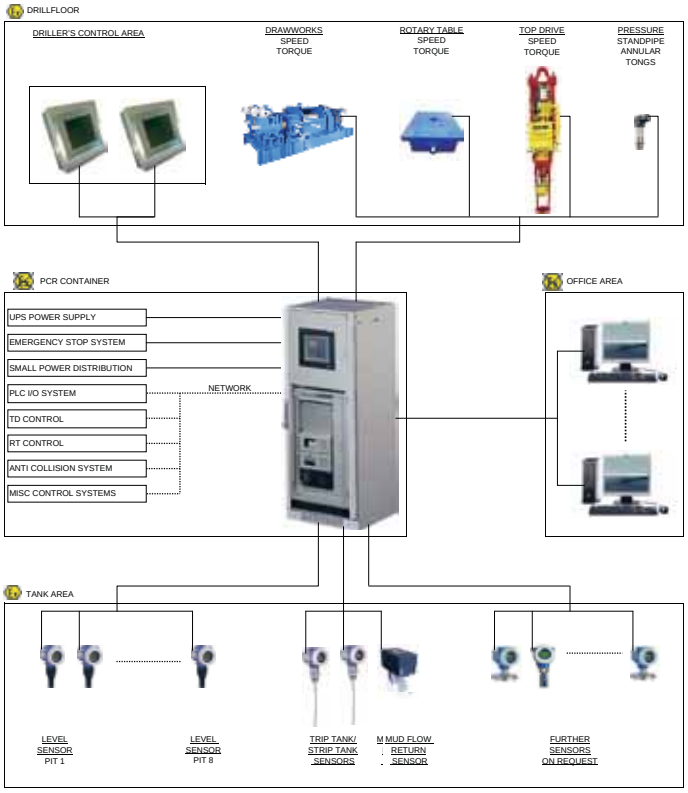
UNIQUE FEATURES

- Available for onshore and offshore drilling rigs
- Simple and intuitive user interface
- Real-time PC-based drilling information system (SCADA)
- Easy to retrofit
- Real-time and historical drilling data recording
- PLC-based drilling instrumentation system (DAQ)
- All settings such as alarm points, scaling, zoom, etc. can be performed without the use of a keyboard
- Different screen layouts provide information needed for the current operation
- The user language can be changed at any time during operation

The Bentec infoDRILL provides a state-of-the-art drilling information system on a very competitive price level. infoDRILL has a simple and intuitive user interface which comes with drilling data indication and hard disk recording. All drilling instrumentation data can be accessed by the driller in the driller's control room or by other rig personnel via remote client access. All settings like alarm points, scaling, zoom, etc. can be performed without using a keyboard. Different screen layouts for drilling, tripping, etc. provide only the information needed for the current operation. Languages and measurement units are adjustable at any time.

infoDRILL replaces the "old school" mechanical drilling recorder. Whenever needed, a manually generated report, which shows all relevant drilling data, can be printed. The report design is based on the mechanical recorder style. Every print-out could be done based on time with up to 10 channels at time on paper or electronically stored file on the hard disk drive in pdf-format.

infoDRILL opens the horizon to the service personnel, when it comes to troubleshooting in case of a failure.


DRILLFLOOR
DRILLER'S CONTROL AREA
DRAWWORKS
SPEED
TORQUE
ROTARY TABLE
SPEED
TORQUE
TOP DRIVE
SPEED
TORQUE
PRESSURE
STANDPIPE
ANNULAR
TONGS
PCR CONTAINER
UPS POWER SUPPLY
EMERGENCY STOP SYSTEM
SMALL POWER DISTRIBUTION
PLC I/O SYSTEM
TD CONTROL
RT CONTROL
ANTI COLLISION SYSTEM
MISC CONTROL SYSTEMS
NETWORK
OFFICE AREA
TANK AREA
LEVEL
SENSOR
PIT 1
LEVEL
SENSOR
PIT 8
TRIP TANK/
STRIP TANK
SENSORS
MUD FLOW
RETURN
SENSOR
FURTHER
SENSORS
ON REQUEST


infoDRILL
benTEC
Hook Position
Block Speed
Trip Tank 1
146,9
-21,5
47,6
0,9
7,0 %
28,1
Anti Collision System
Automatic Mode
Mudpumps
Rig Tong DS
Rig Tong OOS
Racking
3276
1020
benTEC

ANTI COLLISION SYSTEM

Safe and collision-free operation of the traveling equipment.

UNIQUE FEATURES

- Redundant PLC-controlled safety surveillance system
- Prevents damage from collision of mast and drill floor equipment
- Ensures safety by controlling the position of the traveling block with precisely predictable stops in any position within the safety zone
- Freely programmable upper and lower limit of safety zone
- Round trip time significantly reduced
- Field-proven equipment
- Easy to retrofit
- Available for all rigs

The Bentec ANTI COLLISION SYSTEM protects the mast and drilling equipment in the center line from collisions and damage when operating the traveling equipment. The system continuously monitors all of the traveling equipment's movements in the mast. Safety is achieved by controlling the position of the traveling equipment with precisely predictable stops in any position within the safety zone. This provides a high level of protection to prevent personnel injury and damage to the mast or drill floor equipment. Any differences in calculations made by two independent control systems immediately initiate emergency braking in case of a system failure.

The Bentec ANTI COLLISION SYSTEM can be extended with the Rig Control System, which prevents collision with all other drilling equipment on the rig such as pipe handling systems, casing stabbing boards or cherry pickers. Movement of the traveling equipment within the safety area depends on the position of the interlocked equipment, the desired direction, and the hook position. If it enters the minimum safety distance, movements are automatically stopped in order to safely prevent any collisions with the crown block, Top Drive or Rotary Table and any additional rig equipment in between.

Bentec combines all of the experience it has gained from more than 25 years of developing and enhancing ANTI COLLISION SYSTEMS to offer a highly reliable and field-proven safety system.

SERVICE LOOPS

Retrofitting of Top Drive service loops that withstand extreme operation and harsh conditions.

AVAILABLE POWER RANGES:
up to 2 682 hp / 2 000 kW

UNIQUE FEATURES
- Suitable for most commercially available Top Drive brands
- High traction and torsion force resistance
- Smallest possible bending radius
- Made-to-measure insulation material
- Climate range -45°C to +55°C, also when in motion
- Suitable for arctic and desert environments
- Suitable for onshore and offshore rigs
- Suitable for all common AC and DC Top Drives
- UL, VDE, IEC certified cables
- Customized power range and design
- Field-proven equipment

Bentec SERVICE LOOPS provide a highly reliable power and control supply solution for all common Top Drives and are interchangeable with the OEM service loops. By casting the power plugs and the end of the outer tubes, Bentec SERVICE LOOPS are able to withstand harsh environments and highest mechanical tractive forces.

A special coating material provides high impact strength, oil and chemical resistance, ultraviolet resistance, and low flammability. The special wire insulation of the power cables also comes with extremely high elongation characteristics. Bentec SERVICE LOOPS are equipped with EX-Zone plugs at Top Drive end that meets all common EX-Zone requirements for use on drilling rigs.

Bentec SERVICE LOOPS are ideal for use with most commercially available Top Drives in all power ranges up to 2 682 hp / 2 000 kW. Bentec has more than 40 years of experience when it comes to cabling drilling rigs and drilling equipment.

SOFT PUMP SYSTEM

Precisely coordinates the output of all mud pumps and synchronizes the timing of the pump strokes.

AVAILABLE FOR ALL ELECTRICALLY DRIVEN PUMPS

UNIQUE FEATURES

- Optimized pump pressure
- Improved MWD / LWD thanks to control of frequency and amplitude of pressure pulses
- Reduced stress of pulsation dampener bladder
- Reduced stress of high pressure piping, valves, etc.
- Reduced vibration within the mechanical part of the mud pumps
- Increased lifecycle of mud pump components and drive motors
- Easy adjustment of mud pump stroke per minute by the driller
- Can be installed on all electrically driven pumps
- Simple operation via HMI
- Field-proven equipment
- Easy to retrofit

The Bentec SOFT PUMP SYSTEM is a software solution which is developed to precisely coordinate the output pump pressure of up to four mud pumps into the common high-pressure mud line and through the borehole.

The Bentec SOFT PUMP SYSTEM synchronizes the timing of the pump strokes and leads to equal peak distances. This eliminates uncoordinated high pressure peaks due to asynchronous pump strokes which can harm the high-pressure mud lines.

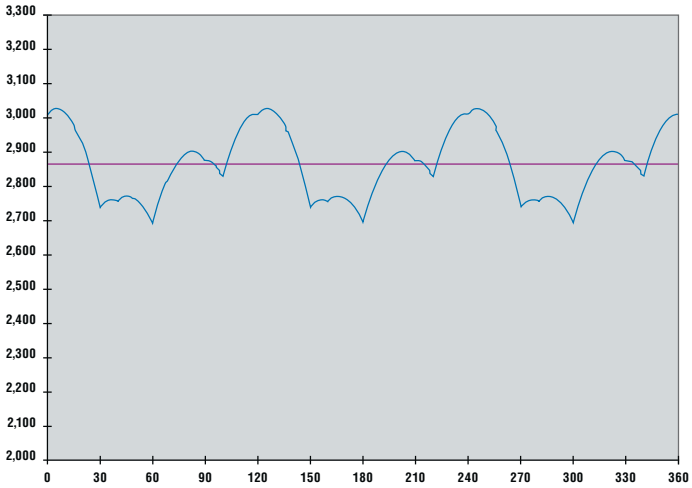
The resulting continuous low-peak pressure amplitude enables the filtration of mud pressure pulsation signals from the Measurement While Drilling or Logging While Drilling tools. This also helps to extend the lifespan of the entire mud line equipment such as mud pumps, high-pressure mud lines and pressure pulsation dampeners, which in turn minimizes maintenance and repair costs significantly. As a retrofit package the Bentec SOFT PUMP SYSTEM can be used for all types of electrically driven mud pumps.

The Bentec SOFT PUMP SYSTEM allows all pumps to be controlled with just one adjusting knob. In this parallel mode, the slave pumps adjust their speed depending on the speed of the master pump.

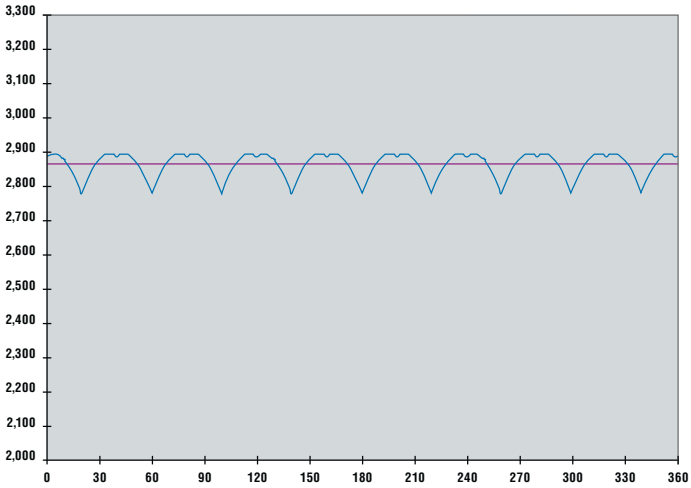
The Bentec SOFT PUMP SYSTEM is either controlled via an additional human machine interface or it can be integrated into a Bentec infoDRILL system. Stroke per minute indicators allow the number of strokes of every pump or each single pump to be counted. An alarm can also be set which indicates when a predefined number of pump strokes has been reached.

Bentec combines all of the experience it has gained from more than 17 years of developing and enhancing SOFT PUMP SYSTEMS to offer a highly reliable and field-proven system.

SOFT PUMP SYSTEM OFF



SOFT PUMP SYSTEM ON



AC MOTORS

The Bentec AC MOTORS are specially designed for safe and reliable operation in rough drilling conditions.

AVAILABLE CAPACITIES:

805 hp / 600 kW
1 140 hp / 850 kW
1 609 hp / 1 200 kW

UNIQUE FEATURES

- Available for onshore and offshore rigs
- Available for arctic and desert environments
- Field-proven equipment
- Bentec's own development
- ATEX certified
- Easily interchangeable with competitors' motors due to same footprint
- Continuous full-load torque
- Compact design

Bentec is commited to manufacturing safe and reliable equipment for use on drilling rigs. The Bentec AC MOTORS provides a high-quality solution designed for rough ambient conditions in drilling and oilfield systems.

Bentec AC MOTORS have the same footprint as competitors' motors and are thus easily interchangeable. Bentec offers AC MOTORS in different power ranges for use with drawworks, mud pumps, Top Drives, Rotary Tables and cementing units.

Bentec AC MOTORS have continuous full-load torque ranging from zero to the nominally rated speed. They are designed in line with the requirements of both onshore and offshore drilling rigs anywhere on earth. Bentec AC MOTORS are ATEX certified and suitable for operation in EX zone 1.

Bentec combines all of the experience it has gained from 25 years of commissioning, maintaining and repairing electrical AC and DC motors to develop a more reliable, robust and service-friendly product for safe drilling operation.


infoDRILL
infoDRILL
benTEC

Issue: April 2013