STREICHER

DRILLING TECHNOLOGY

- Automated Pipe Feeding System
- HTV Pipe Handling Systems
- Skidding Systems
- Hydraulic Power Units
- Mud Pump Modules
- Power Systems
- Driller's Cabins – Single and Double
- Instrumentation, Controls and Integration
- Operator Chairs
- Load/Torque Cell System

DRILLING EQUIPMENT

STREICHER Automated Pipe Feeding System – Pipe Handler Crane

The hydraulically operated STREICHER Pipe Feeding System works fully automated in sequences. The system is controlled either out of the driller's cabin or directly on site by a member of the drill crew. The pipe feeder unit enables a transportation of the tubulars towards the drilling rig until a certain handover position is reached and the automated pipe handler takes over the tubular. The loading of the pipe feeder unit can be done either by a simple forklift (onshore) or a pipe handler crane (offshore). Offshore, the pipe handler crane is based on a knuckle boom design and comes completely with a gripper head with 180° rotational capability. The system can handle tubulars of 2 ½" up to 20" diameter and API length ranges II and III without any modification work. To guarantee maximum safety, a CCTV system is installed to assist the crane operator. Both systems are anti-collision and functional safety certified accord. IEC 61508 and ex-proven accord. European Standard 94/9/EC (ATEX). Design and construction comply with European regulations and standards; European Machinery Directive 2006/42/EG.

STREICHER Automated Pipe Feeding System

- Three Beams with Hydraulic Driven Chain Conveyers
- Connecting Shaft for Synchronization and Tube Isolating
- Ejector Arms for Bringing Back Equipment to Storage Device
- Proportional Hydraulic Valves for all Functions
- Additional Levers for Manual Operation
- Suitable for API Range II and Range III Tubulars
- Fully Automated in Sequences
- Handling of Different Kinds of Tubulars or other Equipment
- Certified Functional Safety System accord. IEC 61508
- Certified Anti-Collision System

Optional

- Offshore Application
- Electronic Synchronization
- Electric Drive Motors
- Explosion Proof Design

Technical Information

- Max. Storage Capacity: 12 pcs (5 ½" DP)
- Tubular Range: 2 3/8" – 20"
- Loading by Forklift or STREICHER Pipe Handler Crane
- Horizontal Pipe Transportation: Chain Conveyer
- Total Weight: 17,600 lbs. (8,000 kg)

STREICHER Pipe Handler Crane

- Max. Outreach: 46.0 ft (14.0 m)
- Tubular Range: 2 3/8" – 20"
- Max. Lift Capacity: 11,000 lbs. (5,000 kg)
- Total Weight: 23,100 lbs. (10,500 kg)

STREICHER Horizontal to Vertical (HTV) Pipe Handling Systems

The HTV Pipe Handler consists of 16 scissor gripping fingers which have an operating range of 2½" up to 20" tubulars. The gripper finger plates can be exchanged by teflon inserts for the handling of chrome tubulars. The gripper is connected to a slewing arm by a rotation device which allows the gripper to rotate from horizontal to vertical position. A rack and pinion system enables the gripper as well as the rotation device to execute a vertical motion simultaneously to the transition between horizontal and vertical orientation. The slewing arm and the special kinematics of the gripper enable the pipe handler to relocate the respective tubular directly above well center, independent of tubular diameter. To guarantee maximum safety, a CCTV system is installed to observe the automated HTV pipe handler as well as the pipe feeding system. The STREICHER Pipe Handling System is anti-collision and functional safety certified accord. IEC 61508 and ex-proven accord. to European Standard 94/9/EC (ATEX). Design and construction comply with European regulations and standards; European Machinery Directive 2006/42/EG.

Gripper Unit
- Operating Range from 2 3/8" to 20"
- Hoisting Capacity of 11,000 lbs. (5,000 kg)
- Max. Operating Torque of 73,800 ft-lbs. (100,000 Nm)
- Fail Safe by three Safety Barriers
- Check Valve in each Gripping Cylinder
- Hydraulic Accumulators for Safe Grip without Pump Power
- No Modification Works for Tubular Diameter Change

Pipe Handling Arm
- Max. Operating Torque of 73,800 ft-lbs. (100,000 Nm)
- Fail Safe by 2 Safety Barriers
- Safety Brakes
- Hydraulic Rotary Actuator with a max. Angle of 180°
- Position and Rotary Sensor for Fully Automated Drive
- PLC Control via Safety Profibus or Profinet (Ethernet)

Lifting Carriage
- Hydraulically Driven Rack & Pinion Drive (Optional: AC Driven Winch)
- Lifting Speed up to 164 fpm (50 m/min)
- Fail Safe by 2 Safety Barriers
- Fail Safe Motion by Application of Counterbalance Valve
- Safety Brakes
- Position and Rotary Sensor for Fully Automated Drive
- PLC Control via Safety Profibus or Profinet (Ethernet)

Racking System and Mast
- Proportional Hydraulic Valves for all Functions
- Additional Levers for Manual Operation
- Position Sensors for Fully Automated Drive
- PLC Control via Safety Profibus or Profinet (Ethernet)

Safety Arms System
- Automated Safety Arms for Safe Handover
- Safety Arms are Integrated in Anti-Collision System
- PLC Control via Safety Profibus or Profinet (Ethernet)

Controls and Monitoring
- Control Panel for Automatic Operation
- Touch Screen Computer for Surveying
- Data Acquisition with Historical Failure Archive
- Safety Surveillance of Automatic Moves by an Independent System
- UPS for Interrupt-Free Power Supply of Control System

Technical Information
- Fully Automated in Sequences
- Drill Pipe Range: 2 3/8" – 6 5/8"
- Drill Collar Range: 3 1/8" – 9 3/4"
- Tubular Range: 2 3/8" – 20"
- Max. Hoisting Capacity: 11,000 lbs. (5,000 kg)
- Max. Length of Tubulars: 48.0 ft (14.6 m) – API Range III
- Max. Travel Speed: 164 fpm (50 m/min)

STREICHER Skidding Systems

STREICHER offers several designs of customised and tailor-made hydraulic operated skidding systems which are suitable for on- and offshore operations. The sophisticated and field proven systems can be characterised by the elementary design, the rugged construction and the ease of maintenance. The skidding system allows both, moving the drilling rig only and moving the rig in combination with the existing drilling support equipment to minimize non-productive time between rig release and the subsequent spud-in. The STREICHER Skidding System is designed to perform push and pull operations, whereby the system does not have to be modified if the skidding direction has to be changed. The usage of consistent skidding mats allows smooth expansion of the respective skidding range. A special kind of base frame system – developed for offshore operations – enables two direction rig moving operations. The skidding systems can be either controlled by the dedicated skidding panel or by remote control. The power supply is effected by an auxiliary hydraulic power unit or the main drilling rig HPU.

STREICHER Claw Skidding System

- Skidding Mats to Place the Drilling Rig
- Skidding Mats are Covered with Rails and Pockets
- Cylinder Consoles Claws into Pockets
- Consoles Use Skidding Mats as Brace Support
- Guide Rail Allows Easy and Save Movement
- Unlimited Movement – No Interference Necessary
- Two Direction Movement (Push/Pull)
- No Manual Locking Necessary
- Optional: Skidding of Utility Drilling Equipment

STREICHER Clamp Skidding System

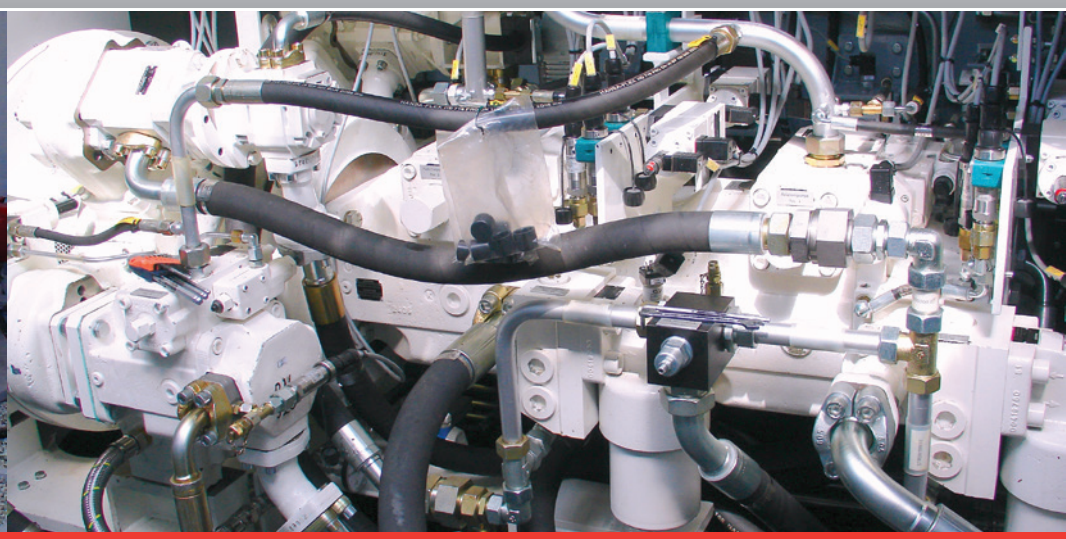
- Hydraulic Skidding Clamps
- Clamps Adjustable for Different Types of Beams
- Unlimited Movement – No Interference Necessary
- Two Direction Movement (Push/Pull)
- No Manual Locking Necessary
- Optional: Skidding of Utility Drilling Equipment

Technical Information (Standard HPU)

- Max. Working Pressure: up to 5,080 psi (350 bar)
- Max. Working Stroke: 3.3 ft (1.0 m)
- Max. Flow Rate: 303 gpm (80 l/min)
- Skidding Speed: 1.6 ft/min (0.5 m/min) @ 303 gpm (80 l/min)
- Standard Hydraulic Power Supply: 60 hp (45 kW)

Optional

- Remote Control
- Higher Power/Speeds
- Other Pressures and Strokes
- Explosion Proof Design
- Skidding of Utility Drilling Equipment



STREICHER Hydraulic Power Units

The STREICHER Hydraulic Power Units stand for compact design in combination with high class components. Optionally the HPU modules can be developed for operation in hazardous areas. A project specific number of hydraulic pumps, installed inside the HPU module, generate the necessary working pressure and flow rate for different kinds of consumers like hoisting system, drilling system, pipe handling and drill floor equipment. The hydraulic pumps are driven either by a diesel engine or an AC motor. The system is equipped with high pressure filters. An automatic cooling and heating system is installed to keep the oil in an optimal temperature range.

Weight and Dimensions (Typical)

- Length: 20" (6,058 mm)
- Height: 9,6" (2,896 mm)
- Width: 8" (2,438 mm)
- Weight: 36,740 lbs. (21,200 kg)

Technical Details (Typical)

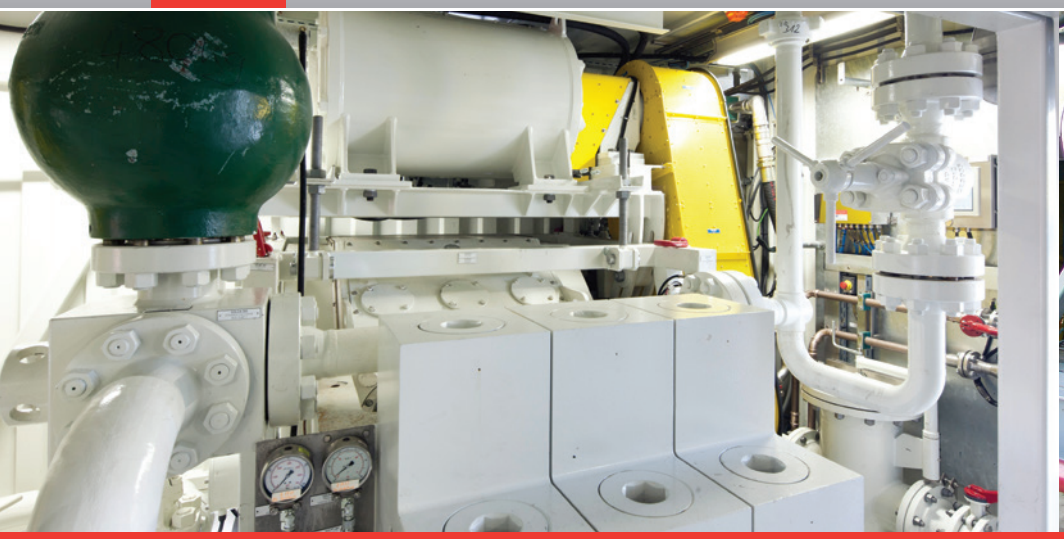
- Driven by Diesel Engine or AC Motor
- Hydraulic Pump for Rotation; Closed Loop
- Hydraulic Pump for Push/Pull; Closed Loop
- Hydraulic Pump for Auxiliary Functions; Open Loop
- Hydraulic Feed Pump for Rotation and Push/Pull
- High Pressure Filters, Feed Filters, Reverse Flow Filters
- All Filters with Contamination Indicators
- Air Cooled Hydraulic System
- Automatically Controlled Heating and Cooling System

Technical Information (Typical)

- Rated Power: 805 hp (600 kW) up to 1,120 hp (900 kW)
- Max. Working Pressure: 5,000 psi (345 bar)
- Max. Volume: 145 gpm (550 l/min) up to 317 gpm (1,200 l/min)
- Hydraulic Tank Capacity: 10.1 bbls (1.6 m^3)

Options

- Offshore Application
- Water Cooled Hydraulic System
- Suitable for Redundant Operation
- CSC Shipping Container
- Noise Insulation on Walls and Roof
- Noise Absorption on Air Inlets and Outlets
- Leakage Monitoring of the Entire Hydraulic System
- Divisible into 2 Parts with max. 11 metric tonnes
- Other Power Ratings
- Other Functionalities
- Explosion Proof Design
- VFD or Soft Start Controlled AC Motor



STREICHER Mud Pump Modules

The STREICHER Mud Pump Module stands for compact design in combination with state-of-the-art components. All modules are connected with quick connectors to minimize the installation time. Charge and discharge lines as well as the respective strainer and dampener units are already integrated in the module arrangement. The triplex single acting piston pump is driven by a frequency controlled AC motor which is connected to the pump via v-belt or chain drive. An installed jib crane facilitates maintenance and mud pump modification works. A rugged main frame construction allows stacking different kinds of modules on top of the mud pump. The system is controlled either out of the driller's cabin or directly on site by a member of the drill crew. The STREICHER Mud Pump Modules are available in containerized and skid mounted design.

Installed Equipment
- HP Triplex Single Acting Piston Pump
- VFD Controlled AC-Motor
- Air or Water Motor Cooling System
- Chain or V-Belt Drive
- Integrated Dampener and Strainer Units
- Integrated Charge and Discharge Line
- Liner Spray System
- Maintenance Jib Crane
- Lube Oil System

Optional Features
- AC-Motor Top or Rear Mounted
- Sound Proofing
- Installed CCTV System
- Integrated Centrifugal Charge Pump
- Integrated Low Pressure Suction Strainers
- Skid Mounted or Containerized
- On-Site Control Panel
- Soft-Pump Function
- Pump Saver (Offshore Solutions)
- Explosion Proof Design

Key Features
- Integrated Reset Relief Valve
- Closed Loop Piston Liner Water Cooling System
- High and Low Pressure Pulsation Dampeners
- High Pressure Discharge Strainer
- Remote Operation from Driller's Cabin
- Zero Discharge Philosophy
- Module Divisibility
- Quick Connectors for Smooth Module Installation

Available Sizes
- 750-Series: 750 hp (560 kW)
- 1000-Series: 1,000 hp (746 kW)
- 1300-Series: 1,300 hp (970 kW)
- 1600-Series: 1,600 hp (1,200 kW)
- 2200-Series: 2,200 hp (1,642 kW)

Available Pressure Ranges
- 5,000 psi (345 bar) Version
- 7,500 psi (517 bar) Version

STREICHER Power Systems

The STREICHER Power System is designed for a safe and reliable use in drilling and oilfield operations. The system contains all necessary power and control electronics to guarantee an effective drilling process. Main components of the STREICHER Power System are the PLC controlled VFD power units for the drilling rig's main drives, a generator management system, a main switchboard, a small and compact motor control center (MCC), onboard air conditions or chiller units as well as transformer units which are necessary to power up the complete rig. The modules of the power system are equipped with a false floor for routing the integrated cabling, piping and ducting systems. The STREICHER Power System is available in air cooled and liquid cooled version. The false floor of the air cooled version is used for ducting the cooled air from the AC into the respective cubicles. The warm air is routed back to the chillers via top mounted channels. The liquid cooled version uses the false floor to accommodate the necessary piping system which is needed for routing the liquids to the VFD power modules.

Power Generation Control

- Control & Management of Engine Incomer Circuit Breaker
- Optional Load Sharing System
- Adjustable Load Ramps
- One Central Control & Monitoring Panel in Cubicle Front Door
- Under and Over Voltage, Reverse and Reactive Power Protection
- Power Limitation Control and Indication
- Integrated in the Overall PROFINET Network
- Designed as Redundant System
- In Ring Topology

Power Generation Management

- Selectable Power Supply Grid, Engines or as Combination
- Individual Adjustable Limits for Grid Power Supply and Engines
- Automatic Sequencing for Starting of an Engine
- Intelligent Asymmetric Load Sharing (Individual Engine Settings)

Dual Fuel Option

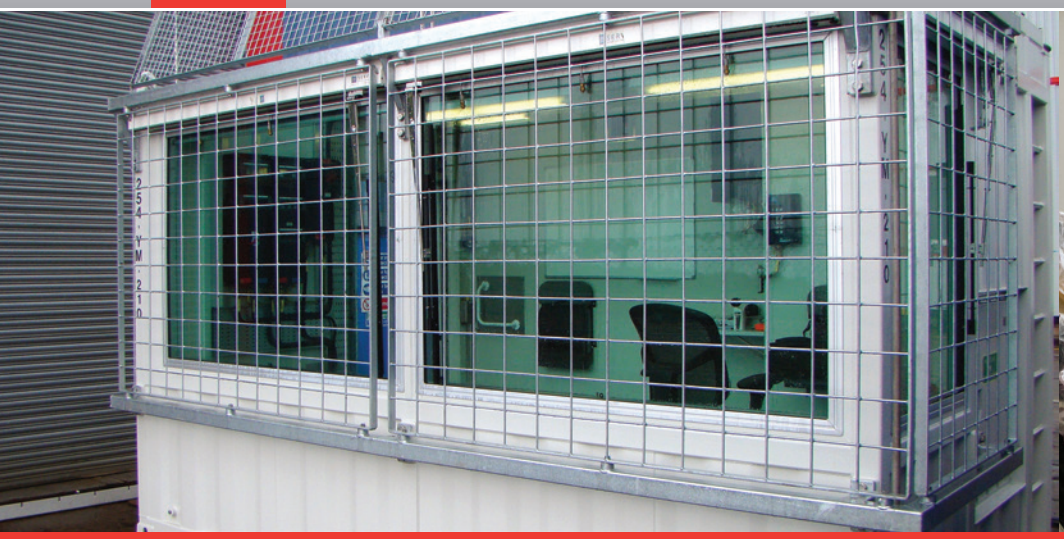
- Dual Fuel Management for Diesel, Natural and Landfill Gas
- Fixed or Variable Diesel Fuel in Gas Mode via Mixer Modules
- Diesel Assistance for Load Step Compensation in Gas Mode
- Automatic Switch to Diesel Mode Operation if Gas Supply Fails
- Integrated in the Overall PROFINET Network

VFD and Power Distribution System

- Newest Generation of VFD Drives (DTC Control)
- Integrated Drilling Optimization Systems
- All VFDs are equipped with Direct Torque Control Function
- Available in Liquid or Air Cooled Version
- Compact Design with a Minimum of Space
- AutoDrill features are Integrated in VFD Software Drawworks
- Soft Pump Features are Integrated in the VFD Software Mud Pump
- Motor Control and Protection Monitoring
- Integrated in the Overall PROFINET Network
- Designed as Redundant System
- In Ring Topology

Miscellaneous

- Splittable Modules for Low Transportation Weight Requirements
- Explosion Proof Design
- Stackable Systems
- Offshore Solutions



STREICHER Driller's Cabins – Single and Double

The STREICHER Driller's Cabin utilises a combination of joystick, button and touch screen technology to operate the various rig systems. From the operator chair, the driller can operate drillfloor equipment, pipe handling systems, BOP (via remote panel), mud pumps, tanks and charge pumps. An installed computer for drilling data acquisition can be utilised by the toolpusher for daily reports and specialists (i.e. Directional Driller's) to review data and provide guidance to the driller during operation. All rig equipment is integrated into the PLC system. The PLC system is an open network system for easy implementation of external equipment and data exchange. The driller's cabin is designed in a way that real-time drilling data can be transferred to an operations center.

Power Generation Control

- Insulated and Air Conditioned Interior
- With or Without Operational/Driller Chair
- Plug/Socket and Quick Connectors
- Protection Grid against Falling Objects
- Optimised View
- Ergonomic Place of Work and Control Panel
- BOP and C/K Manifold Panel
- Drilling Monitor Display
- Hands-Auto Drilling via ADDS (Automatic Drill Drive System)
- Joy-Stick/Button Controls
- Control and Monitoring of all Utility Systems
- Data Acquisition System (STREICHER "I-DRILL")
- Integrated CCTV Station
- Operation in Hazardous Area 1 or 2

Optional

- Offshore Application
- Non-Ex Design
- Remote & Diagnostic Service
- Touch Screen Technology to Operate Various Rig Systems
- Fire and Gas Display Panels
- Satellite/WEB Communication

Technical Information (Single Seat Version, Individual Design)

- Overall Dimensions: 8.2 x 9.2 x 18.0 ft (2.5 x 2.8 x 5.5 m)
- Weight: 15,180 lbs. (6,900 kg)

Technical Information (Double Seat Version, Individual Design)

- Overall Dimensions: 9.5 x 9.8 x 19.7 ft (2.9 x 3.0 x 6.0 m)
- Weight: 22,440 lbs. (10,200 kg)

STREICHER Instrumentation, Controls and Integration

The STREICHER "I-DRILL" System is a server-based drilling instrumentation system which provides high-end technology on a very competitive price level. The monitoring of real-time and historical data is available for the driller. A remote access possibility allows the toolpusher and specialists worldwide to survey the drilling process by watching the same screens. All displayed information is focussed on effective and clear status indication. Different screen layouts for the respective kind of operation, e.g. drilling or tripping, provide the needed information for the current operation. The displayed language as well as the used measurement units can be adjusted at any time. The STREICHER "I-DRILL" replaces all common instrumentation systems like the old-fashioned mechanical drilling recorder. The STREICHER CCTV System can be integrated in the "I-DRILL" system to display live camera pictures as screen-in-screen function. Another option is to display the status or even control other equipment on site. This could be the VFD system or the mud system MCC. Whenever needed, an automatically generated report, showing all relevant drilling data, can be printed. The exported report design is based on the conventional and field proven drilling recorder style. Every report print-out can be done based on time, with up to 30 channels on paper and as an electronically stored file on hard disk in pdf or csv format.

STREICHER "I-DRILL" System

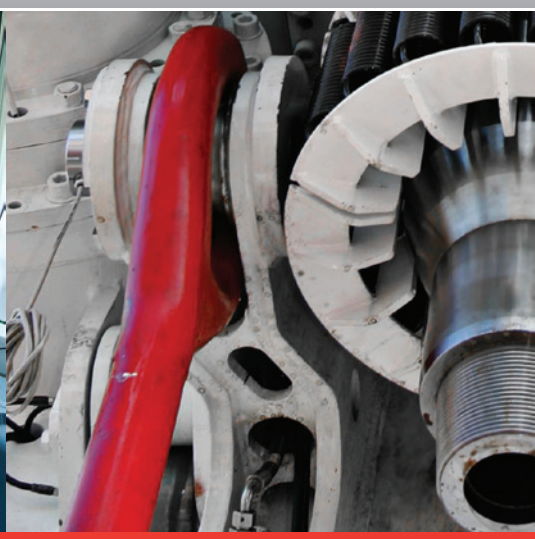
- CCTV System Integration
- Drilling Data Acquisition and Processing System
- WinCC Stations or Process Data Server Operate Completely Parallel
- Field Sensor Available as Hardwired or with Profibus PA
- Hazardous Area Certified PC with 21" TFT Monitors
- TCP/IP Interfaces for Data Transfer to Mud Logger or Geologists
- Display and Monitoring of 8 CCTV Cameras (More on Request)
- Integrated in the Overall PROFINET Network
- Designed as Redundant System
- In Ring Topology

Optional

- Optional Display Clients
- Optional Implementation of Video Camera Pictures
- Optional Implementation of Status or even Control from other EQ
- Optional Implementation of Fire and Gas Screens
- Satellite/WEB communication
- Remote & Diagnostic Service

"I-DRILL" Advantages

- Real-Time PC Based Drilling Instrumentation
- Redundant Server, Data Archiving Topology
- Flexibly Extendable, Adjustable to your Requirements
- Intuitive Operation Philosophy
- Various User Languages Available
- Service always Available via Internet, on Demand
- Operation in Hazardous Area Zone 1 or 2
- Automation Possibilities
- Increased Functional Safety
- Enhanced Diagnostics
- Log-Book Function



STREICHER Operator Chairs

The STREICHER Operator Chair station is designed to optimize drilling control and monitoring operations. This advanced operator control station features an ergonomic design. The control station is optimized for 24/7 drilling operations from inside the driller's cabin. The sophisticated system provides full control of the working environment to the operator with all controls and monitoring functions within range. In addition, the operator chair station accommodates the "line-of-sight" requirements to the drilling areas outside the driller's cabin. The STREICHER Operator Chair station provides high-end technology on a very competitive price level.

Driller's Cabin

- Optimised View
- Ergonomic Place of Work and Control Panel
- Comfortable Seating
- Available in Touch Screen or "Traditional Style" Technology
- Integrated Roller-Ball/Joystick Mouse
- Emergency Stop Switches
- Integrated Microphone for PA/UHF
- Control and Monitoring of all Utility Systems
- Operation in Hazardous Area 1 or 2

Optional

- Offshore Application
- Non-Ex Design
- Remote & Diagnostic Service
- Plug/Socket and Quick Connectors
- Electrically Adjustable Seating for Heights, Angles and Positions
- Wireless Keyboard
- Deck Rail for Backward/Forward Movement

Technical Information

- High Quality Leather Seat
- Vibration Dampers and Shock Absorbers
- Adjustable Lumbar Support
- Adjustable Foot Rest

STREICHER Load/Torque Cell System

The STREICHER Load and Torque Cell is an instrumented sub attached to the main shaft of the top drive unit. The location of the load and torque cell enables accurate and direct measurement of the load without any perturbations like friction caused by wires or rollers. Wireless power supply to the instrumented sub, wireless signal output as well as digital data transfer to the driller's cabin assure wearless and reliable operation. The system enables easy conversion and installation on various types of top drive units. The STREICHER system combines torque and load measurement in one unit. Enhanced capsuled strain gauge technique also allows measuring during push operations. The measurement system includes an integrated temperature and pressure compensation system to reduce measuring inaccuracy. The field proven STREICHER Load and Torque Cell is designed for sophisticated torque-turn-records – essential for operating casing running tools. During directional drilling operations, the system enables torque measurement while top drive deadlock. In addition, two load measuring pins, located between elevator links and top drive unit, serve as an independent load measurement system while tripping operations.

STREICHER Load/Torque Cell

- Instrumented Sub on Main Shaft
- Accurate and Direct Load Measurement
- Combined Load and Torque Measurement
- Precision of Measurements: ± 2 %
- Integrated Temperature and Pressure Compensation
- Torque-Turn-Measurement and Records
- Torque Measurement while Top Drive Deadlock
- Measurement of Push Forces
- Additional Load Measurement System

Cell Sub

- Instrumented Sub
- 2 Channel Measurement
- Temperature Range: -20°C to +125°C
- Max. Torque Measurement: 73,800 ft.-lbs. (100 kNm)
- Max. Force Measurement: 800,000 lbs. (3,567 kN)
- Enhanced Capsuled Strain Gauge Technique
- Standard Quill Inside Diameter: 3 3/4" (95 mm)
- Standard Thread Connection: API 6 5/8" FH (Others on Request)

Pick-up

- Ex-Coupler Multichannel System
- Digital Data Transfer to Driller's Cabin
- Wireless Power Supply to Rotating Sub
- Wireless Signal Output from Rotating Sub

Load Measuring Pin

- Outside Diameter: 5" (127 mm) – Depending on Nominal Load
- Precision of Measurements: ± 2%
- Temperature Range: -20°C to +70°C

Evaluation Unit

- 19" Module Rack
- Multichannel Receiver
- Precision of Measurements: ± 2%
- Supply Voltage: 90 to 270 V AC, 50/60 Hz
- Temperature Range: -10°C to +70°C
- Number of Channels: 2 Channels + 1 Channel

STREICHER

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