From Aker Solutions to MHWirth
Same excellent service, same quality products, new name

Our Products and Services
MHWirth - The Company

MHWirth delivers oilfield products, systems and services. Our knowledge and technologies span from reservoir to production, and through the life of a field.

MHWirth is a leading global provider of first-class drilling solutions and services designed to offer our valued clients with the safer, more efficient and reliable alternative. Our company vision is centered on an unparalleled commitment to quality and yielding economic advantages for our customers and stakeholders.

With a remarkable legacy founded more than a century ago, MHWirth has transformed into a new brand reflective of our robust company strategy and compelling ambitions. Our reputation is preserved through a winning combination of values, people and innovative technologies, proven by a respected track record and a vast collection of customer success stories.

MHWirth has a global span covering five continents with offices in more than 20 countries. Drawing upon our global market success, we continue to seize opportunities through an established strong regional presence in the Americas, Asia and West Africa. Our 4300 dedicated professionals consistently strive to enhance customer satisfaction and form meaningful collaborations by creating a personalized experience.

Performance with a Purpose

MHWirth's values are a testament to our commitment to each other, our customers and stakeholders to strive for excellence without compromising on integrity. These six values serve as a roadmap towards cultivating a positive workplace and fulfilling our corporate strategy with pride. Our brand proposition is empowered by you through the consistent adoption of these values.

Our Values

Customer First  HSSE Mindset  Employee Engagement  Customer Experience  Delivering Quality Results  Shareholder Value
Drilling Rig Packages

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Our Products and Services

Drilling Rig Packages

Complete derrick equipment sets (DES) and drilling support modules (DSM) can be provided on an EPC basis. We have extensive experience from these types of projects and execute the projects according to the MHWirth Project Execution Model (PEM).

MHWirth draws upon well-qualified and experienced in-house resources to participate in and/or provide the following services as part of the complete drilling facilities delivery:

- Project management
- Conceptual design/front-end engineering design
- Detailed engineering and procurement
- Supply of complete drilling equipment, mud equipment and third party equipment
- Fabrication, supervision and follow-up
- Installation supervision, commissioning and general site supervision and assistance
- Drilling lifecycle services

Drilling rig packages

MHWirth is the world leader in tender-assisted rig packages operating on tender barges and tender semi-submersibles all over the world. With over thirty years of experience, our tender rig packages are designed specifically for easy water transportation and quick rig-up and rig-down on multi-well platforms.

These rigs break down into small packages that can be designed to meet the size and capacities of a rig’s crane. Our tender-assisted packages are particularly suited for drilling on small platforms and designed to be outfitted for top drive systems. Features for these rigs include two-way skidding, low weight package lifts, wire line raised and vertically telescoped mast, fluid tanks in substructure and optional cantilevered.

Tender-assisted packages

Hoisting Systems
Derricks

A variety of derrick designs are offered, which typically range from 800,000 lbs to 3,500,000 lbs and above static hook load. MH Wirth has an in-house engineering group, capable of supplying a multitude of derrick designs, sizes, capacities and features. We design and fabricate custom derrick geometries that meet our customer’s unique specifications requirements. These custom geometries include asymmetrical derricks, offset well center derricks, and straight taper derricks. This flexibility allows our customers to decide which design would provide the most optimal scenario.

Dynamic derricks

Whether it is for semi-submersibles, drill ships, barges or floating vessel types, we can custom design and fabricate derricks to accommodate customer specific loading and operating conditions and parameters. Variables such as roll-pitch-heave, hook load, setback load, wind speed, top drive torque, list, and center of rotation are all analysed in combination with specific operating conditions and parameters.

We can design and fabricate bolted dynamic derricks, while offering a virtually unlimited variety of custom derrick sizes, capacities, design variables and conditions. These custom structures allow the customer a greater flexibility for the design criteria for the specific rig. We will build up the derricks in a 3D model for a smooth integration with the equipment.

Jack-up derricks

The jack-up derricks can be designed for new builds or to replace an existing derrick during a rig upgrade. These derricks are designed with the ability to make infill moves with partial setback, while accommodating a variety of other customer-supplied equipment.

Designs include vertical beam-leg bottleneck arrangement with vertical legs extending from the drill floor to above racking board elevation before sloping inward to the top of the derrick. This design expands the setback capacity, while improving driller visibility and increasing productivity. Straight tapered leg arrangement, common on many older jack-ups, where all four legs of the derrick gradually slope inward from the base to the top of the derrick is still available. This design occupies less space on the rig and reduces weight.

Offshore masts

We offer a variety of structures for offshore rigs. In addition to specific derrick designs, offshore masts and substructures are also available for specific rigs. The masts are designed according to customer specifications for tender-assisted, fixed platforms, spar platforms, submersible barges and semi-submersible rigs. Designs for offshore rigs include telescoping masts, vertical assembled masts and on-floor cantilever masts. These structures are customised according to specific customer requirements.

- Vertical assembled masts
- Telescoping masts
- On-floor cantilever masts

MH RamRig

MH RamRig represents state-of-the-art technology with a well proven and successful operational track record since 1998. It can be applied to fixed and floating drilling platforms. The concept’s inherent features make it especially competitive on deep water rigs. The concept is available with single, double, triple and quadruple stand rigs with capacities from 150 to 2,000 tons, and can easily meet future demands for higher hoisting capacity and setback capacity.

The MH RamRig solutions have successfully operated in international waters. This opens for drilling in harsh environment and in ultra-deep water areas. To operate in arctic waters it can be designed as winterised.

A dual MH RamRig is the ultimate deep water rig. This rig provides dual rig functionality at a lower total operational cost than a comparable conventional dual rig solution.

Features

- Less overhead operations gives higher safety
- Documented lower weight, reduced space requirements and improved safety compared to conventional drilling packages
- Lower centre of gravity increases variable deck load capacity
- Highly flexible and accurate integrated long stroke active/passive heave compensation and state-of-the-art control systems, improved operational efficiency
- The impressive accuracy and built-in automated drilling function results in a smoother well path, less weight on bit variations and optimisation of the rate of penetration
- No draw works, considerably increased braking capacity and minimal risk of dropping the BOP/riser

The third generation MH RamRig hoisting system

- The best features from its predecessors
- Gear shift within minutes
- Block retract function
- No cut and slip required
- High uptime
- State of the art control system
- High operational redundancy
- Extreme compensation capabilities with high accuracy
- Lifting capacity from 500shT to 2000shT and beyond
- Low noise emission
- High velocity

Key components

The hoisting system on the MH RamRig consists of two or more cylinders (depending on capacity requirements) instead of the conventional draw works and derrick. The hoisting lines are of fixed length, parallel lines with one end anchored at the drill floor, the other end at the top drive. The lines are run over the yoke sheaves, thereby transforming the push from the rams to upward lifting the force to the top drive. Subsequently, the travelling distance and speed of the top drive is double the stroking of the rams. The stroking velocity of the rams gives 2.5 m/s travelling speed for the top drive.
MH RamRig

The rams
The rams or cylinders are of the same type as those used in the well-known crown compensators. The cylinders are coated with a non-corrosive and durable ceramic layer extending the operating lifetime of the cylinders. The rams have a noncontact position measurement system with accuracy of 1/100 mm.

Equaliser assembly
The equaliser assembly at drill floor level absorbs uneven wire stretch and ensures even load stress of the wires during their lifetime.

Ram guides
The ram guides replace the derrick or mast used in a conventional drilling set-up, and are built for the purpose of guiding only, not for lifting. As the load is taken by the drill floor structure, and not from the top of a derrick structure, the MH RamRig concept provides a lower weight and centre of gravity. With ram guides installed, there is no need for crown block or travelling block.

Hydraulic system
The hydraulic system is used to power the hoisting, lowering and heave compensation operations. The system is comprised of a number of hydraulic pumps (normally 8) driven by diesel engines or constant speed AC motors, hydraulic reservoir, valves for mode selection and nitrogen accumulators. The system is highly flexible, modular and redundant in configuration. The heave compensation system has three modes of operation. In passive mode, the nitrogen bottles are directly connected to the rams. In this mode, the system may operate continuously without the use of electric power. In semi-active mode, the nitrogen bottles and the hydraulic system work together to reduce system friction. In the truly active mode, the hydraulic system is used to compensate for the heave.

Drawworks

Wirth gear-driven drawworks technology is supplied as state-of-the-art to the oil industry for on- and offshore applications to meet requirements from desert to arctic environmental conditions. It combines the different performance characteristics of a dynamic brake and a regenerative brake via the drive motors with an intelligent, automated drawworks control system.

A couple of years of successful operation have indicated the following advantages of the gear-driven design:

- High performance
- High availability
- Less weight
- Less noise
- Less vibration
- Four quadrant drive mode for regenerative braking
- Greater safety
- Longer service life and endurance
- Integrated autodriller
- Compact construction
- Less expensive than chain-driven drawworks
- Less maintenance than chain-driven drawworks
- Drive options: DC or AC
- Fully interchangeable to chain-driven drawworks (footprint and installation area)

MH Wirth has developed a gear-driven drawworks for refurbishment of existing installations on- and offshore. This version permits replacement of the existing chain-driven drawworks without major modifications on the drill floor.

MH Wirth offers three basic gear-driven drawworks concepts for different applications to suit various performance requirements:

- Multi gear drawworks
- Two gear drawworks
- Single gear drawworks
  - Conventional compensated type
  - Heave compensated type

Available in a range from 1 000 to 13 000 hp for hoisting capacities up to 1 500 sh.tons in conjunction with optimised hook speed.

Main features of the Wirth drawworks:

- Gear-driven design
- AC or DC main drive configuration
- Short or long version to suit every drill floor layout
- All necessary control systems

In addition to the standard solutions, MH Wirth manufactures customized drawworks in accordance with project requirements.
## Technical details – offshore applications

### Drawworks with 4Q drive type

|---------------|------------------|---------------|---------------|-------------------|

**Power rating approx.**
- 2500
- 2500
- 3500
- 4500
- 6900
- 9500

**Max. hook load**
- 1166
- 1788
- 3000
- 4722
- 5189
- 5788

**Max. hook speed**
- 860
- 1268
- 420
- 1499
- 1210
- 776

**Max. power**
- 2500
- 3250
- 6500
- 9260
- 12800
- 17400

**Max. production**
- 342
- 588
- 1370
- 2230
- 3340
- 4830

**Max. production speed**
- 582
- 1162
- 297
- 848
- 1296
- 1968

**Eddy current brake type**
- WN72
- WN72
- WN72
- WN72
- WN72
- WN72

### Drawworks with 4Q drive type

<table>
<thead>
<tr>
<th>GH 2000 EG</th>
<th>GH 3000 EG</th>
<th>GH 6000 EG-AC</th>
<th>GH 8000 EG-AC</th>
</tr>
</thead>
</table>

**Power rating approx.**
- 2500
- 3250
- 6900
- 9500

**Max. hook load**
- 1166
- 1788
- 3000
- 4722

**Max. hook speed**
- 860
- 1268
- 420
- 1499

**Max. power**
- 2500
- 3250
- 6500
- 9260

**Max. production**
- 342
- 588
- 1370
- 2230

**Max. production speed**
- 582
- 1162
- 297
- 848

**Eddy current brake type**
- WN72
- WN72
- WN72
- WN72

## Technical details – onshore applications

### Drawworks with 4Q drive type

<table>
<thead>
<tr>
<th>GH 1250 EG</th>
<th>GH 1500 EG</th>
<th>GH 2000 EG</th>
<th>GH 2300/3000 EG</th>
<th>GH 4000 EG</th>
</tr>
</thead>
</table>

**Power rating approx.**
- 1250
- 1500
- 2000
- 2150
- 3750

**Max. hook speed**
- 1.81
- 1.81
- 1.54
- 1.32
- 1.32

**Max. hook load**
- 2776
- 2953
- 4356
- 5189
- 5248

**Max. power**
- 6004
- 6940
- 7490

**Max. production**
- 1659
- 1787

**Max. production speed**
- 1.25
- 1.25
- 0.84
- 1.25
- 1.04

**Eddy current brake type**
- WN55
- WN55
- WN64/WN72
- WN72
- WN72

### Drawworks with 4Q drive type

<table>
<thead>
<tr>
<th>GH 1500 EG</th>
<th>GH 2000 EG</th>
<th>GH 2000/3000 EG</th>
<th>GH 3000 EG</th>
</tr>
</thead>
</table>

**Power rating approx.**
- 1500
- 2000
- 2150
- 3300

**Max. hook load**
- 3500
- 3905
- 4905
- 5640

**Max. hook speed**
- 1.25
- 1.12
- 1.12
- 0.89

**Eddy current brake type**
- WN64
- WN64
- WN72
- WN72

### Drawworks with 4Q drive type

<table>
<thead>
<tr>
<th>GH 1000 EG</th>
<th>GH 1500 EG</th>
<th>GH 2000 EG</th>
<th>GH 3000 EG</th>
</tr>
</thead>
</table>

**Power rating approx.**
- 1000
- 1500
- 2000
- 3000

**Max. hook load**
- 1656
- 2042
- 2366
- 3016

**Max. hook speed**
- 1.51
- 1.21
- 1.34
- 0.84

**Eddy current brake type**
- WN64
- WN64
- WN72
- WN72

### Drawworks with 4Q drive type

<table>
<thead>
<tr>
<th>GH 1000 EG</th>
<th>GH 1500 EG</th>
<th>GH 2000 EG</th>
<th>GH 3000 EG</th>
</tr>
</thead>
</table>

**Power rating approx.**
- 1000
- 1500
- 2000
- 3000

**Max. hook load**
- 1656
- 2042
- 2366
- 3016

**Max. hook speed**
- 1.51
- 1.21
- 1.34
- 0.84

**Eddy current brake type**
- WN64
- WN64
- WN72
- WN72

### Active heave compensated gear-driven drawworks

<table>
<thead>
<tr>
<th>HG 4000 EG-AC-1G</th>
<th>HG 4000 EG-AC-1G</th>
<th>HG 10000 EG-AC-1G</th>
<th>HG 10000 EG-AC-1G</th>
</tr>
</thead>
</table>

**Power rating**
- 4500
- 6000
- 9000
- 11000

**Max. hook load**
- 4574
- 6892
- 9149
- 10320

**Max. hook speed**
- 298
- 298
- 298
- 298

**Active heave compensated gear-driven drawworks**

<table>
<thead>
<tr>
<th>HG 4000 EG-AC-1G</th>
<th>HG 4000 EG-AC-1G</th>
<th>HG 10000 EG-AC-1G</th>
<th>HG 10000 EG-AC-1G</th>
</tr>
</thead>
</table>

**Power rating**
- 4500
- 6000
- 9000
- 11000

**Max. hook load**
- 4574
- 6892
- 9149
- 10320

**Max. hook speed**
- 298
- 298
- 298
- 298
Drill line drum

The MH drill line drum provides safe and reliable drill line handling in a heavy duty offshore working environment.

**Key features**
- Designed for optimum performance, quality and reliability
- The hydraulically driven MH drill line drum provides safe and reliable drill line handling in a heavy duty offshore working environment
- For quick and easy operation during cut and slip of the drill line wire is installed in a cradle equipped with hydraulic motor(s) and gearbox with brakes, intended for spooling of wire
- Can be delivered with drill line diameters in the range 1 3/8 - 2 in (34.9 – 50.8 mm), and also 56 mm (approx. 2 3/16 in) drill line wire
- Can be equipped with weather cover for protection against salty and damp environments if required

### Technical data

<table>
<thead>
<tr>
<th>Model</th>
<th>Drill line capacity</th>
<th>Drill line size</th>
<th>Max line pull (1.2 kN)</th>
<th>Max wire delivery speed (20 m/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG81</td>
<td>10.000 - 16.000 ft (3.000 - 5.000 m)</td>
<td>1 3/8 - 1 3/4 in</td>
<td>11.2 kN (2.520 lbf)</td>
<td>(6 ft/min)</td>
</tr>
<tr>
<td>BG82</td>
<td>10.000 ft (3.000 m)</td>
<td>2 in</td>
<td>30 kN (8740 lbf)</td>
<td>(18 m/min)</td>
</tr>
<tr>
<td>BG83</td>
<td>10.000 ft (3.000 m)</td>
<td>56 mm</td>
<td>30 kN (8740 lbf)</td>
<td>(18 m/min)</td>
</tr>
</tbody>
</table>

### Travelling block

**Key features**
- Designed for optimum performance, quality and reliability
- Hook load capacity ranges from 350 to 1,350 sh. tons
- Drill line wire capacity in the range 1 1/2 - 2 3/16 in (56 mm). The wire sheaves are grooved for the specified drill line wire size
- The equipment is designed in accordance with API 8C

### Technical data

<table>
<thead>
<tr>
<th>Model</th>
<th>Hook load (564 mT)</th>
<th>Drill line size</th>
<th>Lifting lug capacity (55 mT)</th>
<th>No of sheaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>BX34</td>
<td>500 shT (454 mT)</td>
<td>1 1/2 - 1 5/8 in</td>
<td>55 shT (50 mT)</td>
<td>6</td>
</tr>
<tr>
<td>BX35</td>
<td>650 shT (590 mT)</td>
<td>1 1/2 - 1 3/4 in</td>
<td>55 shT (50 mT)</td>
<td>7</td>
</tr>
<tr>
<td>BX36</td>
<td>750 shT (880 mT)</td>
<td>2 in</td>
<td>55 shT (50 mT)</td>
<td>7</td>
</tr>
<tr>
<td>BX38</td>
<td>1,000 shT (907 mT)</td>
<td>56 mm</td>
<td>88 shT (80 mT)</td>
<td>7</td>
</tr>
<tr>
<td>BX42</td>
<td>1,350 shT (1,220 mT)</td>
<td>56 mm</td>
<td>132 shT (120 mT)</td>
<td>8</td>
</tr>
</tbody>
</table>

Deadline anchor

The MH deadline anchor is used as anchor for the drill lines coming from the crown block and is bolted to the drill floor or to the Derrick leg.

**Key features**
- Designed for optimum performance, quality and reliability
- Used as an anchor for the drill line and is bolted either to the drill floor or to the Derrick leg
- Supports drill line diameters in the range 1 3/8 - 2 in (34.9 – 50.8 mm), and also 56 mm (approx. 2 3/16 in) drill line wire
- The bit weight is measured using either hydraulic tension, hydraulic compression or electric tension load cells
- MH deadline anchor can be manually rotated for easy cut and slip of drill line

### Technical data

<table>
<thead>
<tr>
<th>Model</th>
<th>Max line pull (150,000 lb, 68 m. tons)</th>
<th>Drill line size</th>
<th>Mounting</th>
<th>Manual rotation</th>
<th>Load cell type</th>
</tr>
</thead>
<tbody>
<tr>
<td>BX81</td>
<td>150,000 lb (68 m. tons)</td>
<td>1 3/8 - 1 3/4 in</td>
<td>Floor-mounted</td>
<td>No</td>
<td>Hydraulic/electric tension</td>
</tr>
<tr>
<td>BX82</td>
<td>160,000 lb (73 m. tons)</td>
<td>1 3/4 - 1 5/8 in</td>
<td>Leg-mounted</td>
<td>Yes</td>
<td>Hydraulic compression</td>
</tr>
<tr>
<td>BX83</td>
<td>140,000 lb (64 m. tons)</td>
<td>1 1/2 - 1 3/4 in</td>
<td>Floor-mounted</td>
<td>Yes</td>
<td>Electric tension</td>
</tr>
<tr>
<td>BX84</td>
<td>140,000 lb (64 m. tons)</td>
<td>1 1/2 - 1 3/4 in</td>
<td>Floor-mounted</td>
<td>Yes</td>
<td>Hydraulic compression</td>
</tr>
<tr>
<td>BX85</td>
<td>200,000 lb (91 m. tons)</td>
<td>2 in</td>
<td>Floor-mounted</td>
<td>Yes</td>
<td>Hydraulic compression</td>
</tr>
<tr>
<td>BX86</td>
<td>200,000 lb (91 m. tons)</td>
<td>56 mm</td>
<td>Floor-mounted</td>
<td>Yes</td>
<td>Hydraulic compression</td>
</tr>
</tbody>
</table>

### Technical data

<table>
<thead>
<tr>
<th>Model</th>
<th>Max line pull (200,000 lb, 91 m. tons)</th>
<th>Drill line size</th>
<th>Mounting</th>
<th>Manual rotation</th>
<th>Load cell type</th>
</tr>
</thead>
<tbody>
<tr>
<td>BX81</td>
<td>200,000 lb (91 m. tons)</td>
<td>1 1/2 - 1 3/4 in</td>
<td>Floor-mounted</td>
<td>Yes</td>
<td>Hydraulic compression</td>
</tr>
</tbody>
</table>
Top Drives

MHWirth delivers reliable and flexible top drive solutions. Since 1982, our top drives have been in daily operations around the world. Our systems are designed for rough conditions and comply with the strictest approvals for the drilling industry. We provide solutions ranging from portable land rig applications to extreme deep water applications.

Motors
AC, DC and hydraulic motors are offered. All our drive motors are designed specifically for optimum variable speed performance and certified for operation in hazardous area.

Gear boxes
The top drives are equipped with high quality gear boxes. We use the highest quality selection of gears and bearings to maximise machine uptime.

Pipe handlers
The top drives include a remote controlled, multifunctional pipe handler. Pipe handlers can rotate freely, and are equipped with automatic positioning to ensure safe, easy and accurate orientation. Our knuckle link pipe handler is a well proven design with unique handling capabilities.

Efficient directional drilling
Standard AC top drives include tool face orientation system for controlling the direction of the down-hole motor. Accuracy of the deviation is easily maintained, as the direction only has to be adjusted every 90 ft (27 m).

Control system and operator interfaces
The top drives are delivered with MH control system for optimal operation and lifecycle support. We deliver a range of different equipment/solutions for operator environments, from the simplest stainless steel panels to the state-of-the-art MH DrillView operator environment. We also deliver interfaces to third party operator systems.

VFD/AC drives
Our standard delivery is ABB drives. We can also deliver interfaces to other drive types on request.
Overview of models

Top drive (TD)
Performance oriented and cost efficient provides:
- Market leading torque
- Highly competitive on weight, length and footprint
- High performance
- Reliability and cost efficiency
- Modularity for critical components

Portable top drive (PTD)
Compact and light design provides:
- Portability and flexibility
- Cost effectiveness on smaller rigs
- Suitability for land rigs
- Few requirements for interface to derrick

Derrick drilling machine (DDM)
The broadest range provides:
- Wide operational performance
- High performance
- Motor range: AC, DC or hydraulic
- Conventional and MH RamRig drilling

Modular derrick drilling machine (MDDM)
High performance modular design provides:
- Maximum uptime
- Extreme performance and low failure rate
- Easy maintenance and overhaul
- Limited noise

Technical data

<table>
<thead>
<tr>
<th>Top drive (TD)</th>
<th>Portable top drive (PTD)</th>
<th>Derrick drilling machine (DDM)</th>
<th>Modular derrick drilling machine (MDDM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifting capacity</td>
<td>1,250 - 1,500</td>
<td>500 - 1,000</td>
<td>1,050 - 1,250</td>
</tr>
<tr>
<td>(in link hanger)</td>
<td>1,150 - 1,356</td>
<td>454 - 907</td>
<td>907 - 1,130</td>
</tr>
<tr>
<td>Drilling torque range</td>
<td>30,100 - 43,000</td>
<td>25,490 - 34,100</td>
<td>34,100 - 46,230</td>
</tr>
<tr>
<td>Torque at max speed</td>
<td>48,188</td>
<td>30,000 - 39,675</td>
<td>39,670 - 53,790</td>
</tr>
<tr>
<td>Max speed</td>
<td>350</td>
<td>200 - 240°</td>
<td>287 - 282</td>
</tr>
<tr>
<td>Power output</td>
<td>2,600</td>
<td>1,100 - 2,300</td>
<td>1,270 - 2,540</td>
</tr>
<tr>
<td>Weight</td>
<td>39,000</td>
<td>16,000 - 29,000</td>
<td>44,000 - 85,000</td>
</tr>
<tr>
<td>Length</td>
<td>23</td>
<td>18.8 - 19.3</td>
<td>29.2 - 30.1</td>
</tr>
</tbody>
</table>

*Higher speed upon request*
Our Products and Services

Top Drives

The top drive (TD) design is based on years of experience from MDDM and DDM design and operation. TD is optimizing reliability and availability within frames of cost and size targets, and use modularity of critical components for improved maintenance. The MH TD 1500 offer market leading lifting capacity and torque, and has low height and weight for low center of gravity in derrick.

The TD features continuous main shaft from power swivel through gearbox and pipe handler. Weight of drill string is transferred from link hanger to main shaft by means of a load hang-off nut. The TD is equipped with remote controlled multi-functional pipe handler, enabling 360° continuous rotation capability. It is also equipped with auto positioning to ensure safe, easy and accurate orientation.

The back up wrench is of multi jaw design and is used to clamp on the drillpipe tooljoint. The drive motors are used to produce the required torque for make up and break out. The link tilt system with knuckle links (bi-directional) excludes manual handling as the unit can be lowered flush to drill floor (depending on length of elevator links).

A link tilt float system provides possibility to lower the elevator by gravity or stop the elevator in any position for safe and easy drill pipe handling. Modularized assembly of main components simplifies maintenance and overhaul, and enables RHS/LHS installation of mud pipe (S-pipe) and service loop.

Top drive modularity
The new TD family is able to incorporate the modularity experience from the MDDMs, and have chosen to introduce modularity of critical components. Modularity has advantages regarding configuration, production optimisation, and maintenance.

Focusing on reliability, availability, maintainability and safety
Reliability, availability, maintainability and safety (RAMS) analysis is used to verify availability on component level, and is introduced early during the design process to enable implementation of corrections and improvements. RAMS analysis focus on component mean time between failure and test results for improved availability, and is optimising maintenance access for components with highest risk of failure. The TD use well-proven technology and have limited technology novelty.

There is standardisation of components throughout our top drive portfolio, and extensive testing is used when new combinations have been introduced. All lubrication points are easily accessible, several components are easy replaceable and we have increased availability of special tools for fast and easy maintenance. And throughout the company - we never compromise on safety.

Top drive family - a compact and cost efficient base design

Drillfloor Equipment
Hydraulic roughneck

The mainstream hydraulic roughneck portfolio contains three models:
- Model 1898 - manually operated
- Model 1899 - automatically operated
- Model 4160 - lightweight version of model 1898

Key features
- Designed for optimum performance, quality and reliability
- Designed to spin in/make up and break out/spin out drill pipe and drill - in a pre-defined sequence if equipped with automatic controls
- Make up/break out stabilisers, crossover subs and other bottom hole assemblies
- Performs mousehole connections
- Minimise the possibility of personnel injuries, equipment damage and interruption of operations
- Possibility to run all functions from the driller’s controls room or from radio remote panel

Handling capabilities
- Diameter range: 2 7/8” - 9 3/4”
- Vertical and inclined tubulars (inclined as in tilted mouseholes)
- Various tools: BHA/drill bit, stabilizers, strainers and subs.

We can adapt the machine to various rig systems (e.g. skiddable, hinged, bolted). Models 1898 and 1899 are also available on extension arm.

Optional features
- Revolving pipe spinner assembly (improves utilisation range and service access)
- Automatic lubrication system
- Inverted main frame
- Various rig systems (e.g. skiddable, hinged, bolted)
- Remote operated box end washer and doping unit
- Special jaws for odd tooljoints/size/shape/material
- Control panel on machine
- Wireless remote control (radio)
- High friction spinner rollers available upon request

Technical data

<table>
<thead>
<tr>
<th>Models 1898 and 1899</th>
<th>Standard</th>
<th>Optional</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>TW min. make-up torque</td>
<td>11 500 [2 590]</td>
<td>5 425 [9 900]</td>
<td>Nm [lb ft]</td>
</tr>
<tr>
<td>TW max. make-up torque</td>
<td>135 000 [30 000]</td>
<td>Nm [lb ft]</td>
<td></td>
</tr>
<tr>
<td>TW max. break-out torque</td>
<td>169 000 [36 000]</td>
<td>Nm [lb ft]</td>
<td></td>
</tr>
<tr>
<td>TW min. stick-up height</td>
<td>700 [27.6]</td>
<td>mm [inch]</td>
<td></td>
</tr>
<tr>
<td>TW max. stick-up height</td>
<td>1 500 [59]</td>
<td>2 200 [86]</td>
<td>mm [inch]</td>
</tr>
<tr>
<td>SP max. speed (w/5 ½” D.P)</td>
<td>0.40</td>
<td>rpm</td>
<td></td>
</tr>
<tr>
<td>SP max. torque (w/5 ½” D.P)</td>
<td>2 750 [2 028]</td>
<td>Nm [lb ft]</td>
<td></td>
</tr>
<tr>
<td>SP travel height</td>
<td>500 [19.7]</td>
<td>900 [35.4]</td>
<td>mm [inch]</td>
</tr>
<tr>
<td>Mousehole lift</td>
<td>0-5” [127]</td>
<td>mm [inch]</td>
<td></td>
</tr>
<tr>
<td>Rail span (outside/inside)</td>
<td>1 850 [72.8]</td>
<td>1 200-2 614 [44.1-102.9]</td>
<td>mm [inch]</td>
</tr>
</tbody>
</table>

Weight will vary from 5 900 (13,000 lb) to 6 300 kg (13,900 lb) depending on configuration and options.

Hydraulic roughneck

with three grip torque wrench

The recently developed three grip torque wrench is now available with the 1898/1899 roughneck system. The new design incorporates the efficiency and handling capabilities of the original MH torque wrench, into a new higher performance tong. Designed for making up and breaking out the most resilient drill pipe and collar connections, the new three grip tong features up to 136 000 ft.lbs torque capacity and 60° rotation.

Three grip torque capacity
Three grip configuration secures 36% higher torque capacity compared to a two-grip tong with equivalent clamp force. In addition, reduced clamp force provide less wear on tool joint and reduced risk of radial deformation of box end. Rotational force is applied through chains, securing an optimal radial bearing around the rotating tong’s circumference.

Upgrade
The hydraulic roughneck (HRN) with three grip torque wrench is suitable for any new build or upgrade project. The new tong utilises the same framework and rails as the MH 1898/1899 machines, and is therefore suitable for installation on rigs where a MH roughneck is currently installed. As there not have been incorporated any new instruments, a new machine can be installed in existing MH roughneck interface.

Improved safety
The tong also incorporates a new jaw design for improved safety and efficiency. Worn-out dies are easily removed by disengaging a socket cap bolt, no need for hammer and chisel. Less time required to change dies, means less time spent in the “red zone” on rig floor.
MH DRN 200

The MH DRN 200 is a patented machine made for making up and breaking out drill pipe, drill collars and casing. The clamping range is from 2 3/8" to 20" with a torque capacity of 203 000 Nm (150 000 ft-lbs). It is based on two tongs that can be separated and is thereby also capable of handling stabilizers and bits. In addition, the MH DRN 200 has a make up and break out torque capacity of 68 000 Nm (50 000 ft-lbs) between its main tong and drill floor and between the top drive and its backup tong, giving a unique operational freedom.

Integrated into the design is also a spinner, casing guide, thread washing and lubrication system. The MH DRN 200 travels on rails welded or bolted to the guide, thread washing and lubrication system. The integrated washing and pipe doping (on box end) makes this a hands free operation as well, and removes people from the most dangerous area. Since the casing tongs are integrated into the machine, the need for rigging up and down heavy casing tongs are eliminated, which in turn removes the risk for incidents related to drill floor handling. Reduced number of machines on drill floor necessary for drilling operations.

Improved HSE
- The spinner stabbing feature and casing stabbing guide ensures hands-free operation of drill pipe and casing.
- The upper and lower tongs can be elevated separately, allowing the machine to act as rig tongs, and to make up and break out odd pieces such as stabilizers and bits.
- Integrated washing and pipe doping (on box end) makes this a hands free operation as well, and reduces cost.

Saved cost
- No need for hiring casing tongs. The cost of hiring or purchasing casing tongs is removed.
- Ordinary drilling crew can operate the casing tong.
- The acceptance or rejecting of pipe connections can be done onshore, as the control system is prepared for remote transfer of data. Reduced cost for casing crew and supervisor.
- No need for separate drill pipe doping devices.
- Enabling more compact drill floor installations.

Technical data

<table>
<thead>
<tr>
<th>Design data</th>
<th>Technical data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society of classification</td>
<td>Acc. to DnV (Det norske Veritas)</td>
</tr>
<tr>
<td>Equipment classification</td>
<td>II</td>
</tr>
<tr>
<td>Design temperature</td>
<td>-20 / +45 °C (-4 / +113°F)</td>
</tr>
</tbody>
</table>

Max. makeup torque 203 000 Nm (150 000 ft-lbs).
Max. breakout torque 203 000 Nm (150 000 ft-lbs).
Max. MU/BO torque between MT/DF & TD/BUT 68 000 Nm (50 000 ft-lbs).
Bit brake plate - Lower locator square 345 mm (13 5/16").
Spinning range 60-245 mm (2 3/8" – 9 5/8").
Guiding range 60-508 mm (2 3/8" – 20").
Max. spinning torque (5" DP) 2300 Nm (1700 ft-lbs).
Max. spinner rpm (5" DP) 0-100 rpm.
Vertical independent spinner travel 600 mm (23 1/2").
Min. distance center MT- center roller 1150 mm (45").
Max. tong rpm 15 rpm.
Max. travel speed 500 mm/s (20 in/s).
Max. vertical travel (tong/spinner) 1500 mm (59").
Handing range pipe/casing " 60-508 mm (2 3/8" – 20").
Min. MU/BO stick up 540 mm (21 1/2").
Max. MU/BO stick up 1900 mm (75").
Our Products

Drillfloor Equipment

Drillfloor manipulator arm

The MH drillfloor manipulator arm (DFMA) is designed to guide tubulars on drillfloor level. The DFMA is used for guiding drill pipes, collars and risers from chute to well-center, or to setback area. The control of the DFMA is accomplished from a remote control panel on drill floor. The operator has full control of all functions.

Key features

- Designed to guide tubulars on drill floor level. It is used for guiding and tailing in drill pipes, collars and risers.
- The DFMA is either mounted on drill floor by a sub frame that is welded to drill floor, or it is mounted in an inverted position, normally suspended from underneath the support structure for the drilling machine guide rails.
- A lifting lug can optionally be installed underneath the racker head in order to use the DFMA for lifting of different objects on the drill floor.

If a control system is included in the delivery, this system allows:

- Control from operators chair in drillers cabin
- An optional radio panel allowing full control of all functions of the manipulator arm
- Possibility to integrate with rig's anti-collision system.

Multi manipulator arm

The MH multi manipulator arm (MMA) is designed to guide tubulars on drill floor level. The MMA can be delivered in three different designs:

MMA variant 1 and 2 are specifically designed to lift subs, bottom hole assemblies and other special items on drillfloor level. They are also suitable for guiding tubulars between the V-door and the well center/setback area.

MMA variant 3 is designed to guide risers, collars and other tubulars on drillfloor level.

Key features

- The MMA is a compact, pedestal mounted guide arm designed for minimum operating/guiding radius.
- A lifting lug can optionally be installed underneath the racker head in order to use the MMA for lifting of different objects on the drill floor.

If a control system is included in the delivery, this system allows:

- Control from operators chair in drillers cabin
- An optional radio panel allowing full control of all functions of the manipulator arm
- Possibility to integrate with rig's anti-collision system.

Casing stabilizing arm

The casing stabilizing arm (CSA) by MHWirth is designed to eliminate the need for a person to be elevated for tubular makeup. It is part of an integrated casing handling system for easier, safer, and faster guidance of tubular that is utilized on all types of offshore and land rigs.

The CSA 100 is designed for normal operating conditions and is mounted by the adapter plate in the derrick, normally suspended between the drilling machine guide rails at approximately the 33ft (10.1 m) level. It is designed to guide tubulars and is used for guiding drill pipes, collars and casing to assist in stabbing.

Three hydraulic cylinders are used to position and actuate the pipe jaws. A lifting cylinder raises the arm into horizontal operating position, and then an extension cylinder extends the arm to a designated extension. It can also be tilted down 90 degrees from the storage position when not in use.

Designed to be a stabilizing (non-load bearing) mechanism. An internal hydraulic cylinder extends and closes the padded jaws utilizing a radio remote control pendant. The initial grasping action calibrates the size of the jaw opening and using programmable settings, this allows the gripper jaw functions to relax and close the padded jaws utilizing a radio remote control pendant.

Operated by a radio remote control pendant panel for full flexibility.
- Single button activation for alignment to well centre and return to stowed position.
- Equipped with an audible operating alarm when moved from the stowed position.

Technical specifications

- Slewing type: +/- 15 degrees
- Mounting location height above floor (approx.): 33 ft (10.1 m)
- Max. travel: 24 in (610 mm)
- Tubular range: 2 7/8 - 22 in.
The portfolio covers complete stand-alone and package integrated winch units/systems designed with special emphasis on safe, efficient and reliable operations:

- MH utility winch
- MH manriding winch
- MH guideline winch
- MH podline winch

**Description**

The winches are delivered as complete units, fully tested and ready for horizontal mounting by means of bolting to substructure and connection to hydraulic ringline systems.

**Typically comprise**

- Gearbox
- Drum
- Failsafe brake system
- Hydraulic motor
- Counter balance valve
- Local control panel

Short-time installation is achieved as no special tools are required for this operation. All winches are fitted with lifting lugs for safe and easy handling. Safe, smooth and user friendly operation and control are performed from the local control panel. Due to high reliability, maintenance is briefly limited to periodic lubrication and filter replacements.

**Optional features**

- Hydraulic remote control panel (portable or fixed)
- Portable wireless control panel
- Hydraulic power unit
- Wire spooling system
- Snatch block

An extensive range of alternatives and options completes our portfolio with the intention to suit any specific or special requirement.

### Mud bucket

The MH mud bucket is designed for safe and smooth leading of drilling mud to tank whilst:
- increasing safety
- improving working environment
- reducing mud costs

The MH mud bucket is suspended to the foundation via the extension arm. The foundation comprises a pedestal suspension with guiding column, bolted to a foundation plate welded to the drill floor. The extension arm enables extension and retraction of the bucket between parked position and the well centre by means of a hydraulic cylinder with stainless steel rod, piping and bearings.

The bucket latches on to the drill string by means of three hydraulic cylinders with stainless steel rod, piping and bearings. It then leads the mud through the drain hose terminating in the exit interface, located on drill floor and connected to the mud tank. When the mud has been drained from the bucket, the bucket clamps off and the extension arm retracts the bucket to parked position.

#### Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. travel length</td>
<td>2 800 [9.2] mm</td>
</tr>
<tr>
<td>Extension length (guide column c/c - bucket c/c)</td>
<td>4 300 [14.1] mm</td>
</tr>
<tr>
<td>Flange, pipe seals</td>
<td>2 7/8&quot;-3½&quot;-4&quot;-5½&quot;-5&quot;</td>
</tr>
<tr>
<td>Time cycle (extension arm - retract)</td>
<td>8-10 [Sec.]</td>
</tr>
<tr>
<td>Drain hose size</td>
<td>6&quot; [Inch]</td>
</tr>
<tr>
<td>Retraction length (guide column c/c - bucket c/c)</td>
<td>1 700 [5.6] mm</td>
</tr>
<tr>
<td>Slewing sector (manual for parking pos.)</td>
<td>4.33 [Degr]</td>
</tr>
<tr>
<td>Time cycle (bucket open - close)</td>
<td>2-3 [Sec.]</td>
</tr>
<tr>
<td>Time cycle (extension arm - extend)</td>
<td>8-10 [Sec.]</td>
</tr>
<tr>
<td>Drain hose length</td>
<td>6 000 [19.7] mm</td>
</tr>
</tbody>
</table>

### Winches

#### MH utility winch

#### MH manriding winch

#### MH podline winch

#### Technical data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH UW - 5mT</td>
<td>5mT (11 020 lbf)</td>
</tr>
<tr>
<td>MH UW - 10mT</td>
<td>10mT (22 050 lbf)</td>
</tr>
<tr>
<td>MH MW - 150 kg</td>
<td>0.15mT (330 lbf)</td>
</tr>
<tr>
<td>MH GLW - 10mT</td>
<td>10mT (22 050 lbf)</td>
</tr>
<tr>
<td>MH GLIVS-7.5mT</td>
<td>7.5mT (22 050 lbf)</td>
</tr>
</tbody>
</table>

#### Technical data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWL</td>
<td>mm</td>
</tr>
<tr>
<td>Rope dia. x length</td>
<td>mm</td>
</tr>
<tr>
<td>Weight (incl. rope)</td>
<td>kg</td>
</tr>
<tr>
<td>5mT (11 020 lbf)</td>
<td>19 mm (0.74&quot;)</td>
</tr>
<tr>
<td>10mT (22 050 lbf)</td>
<td>26 mm (1.02&quot;)</td>
</tr>
<tr>
<td>0.15mT (330 lbf)</td>
<td>15 mm (0.59&quot;)</td>
</tr>
<tr>
<td>10mT (22 050 lbf)</td>
<td>26 mm (1.02&quot;)</td>
</tr>
<tr>
<td>7.5mT (22 050 lbf)</td>
<td>19 mm (0.74&quot;)</td>
</tr>
<tr>
<td>150 kg (330 lb)</td>
<td>1 500 kg (3300 lb)</td>
</tr>
<tr>
<td>5070 lb</td>
<td>2 300 kg (5070 lb)</td>
</tr>
<tr>
<td>4925 lb</td>
<td>2 000 kg (4925 lb)</td>
</tr>
<tr>
<td>21 150 lb</td>
<td>9 600 kg (21 150 lb)</td>
</tr>
</tbody>
</table>
Hydraulic cathead

The MH hydraulic cathead is a hydraulic tool for making up and breaking out drill pipe and drill collar. It is normally used together with a wire and a rig tong.

Key features
- Designed for optimum performance, quality and reliability
- Equipped with integrated tong post and back-up post
- Can be either electrically or pneumatically controlled
- Can be equipped with an optional low torque functionality enabling making up and breaking out delicate tubulars

Technical description
- The cathead is a hydraulic tool for making up and breaking out drill collar and drill pipe. It is a floor mounted self-contained unit, bolted to the drillfloor with 6 bolts
- The cathead unit consists of a base, cylinder, sheaves, and wire
- A combined tong post and back-up post bracket is mounted on the cathead
- The electrically controlled cathead comes with a control valve cabinet (CVC). The CVC can be electrically connected to an electrical control system. The CVC is designed to control one or two catheads, and is normally placed on drillfloor
- The pneumatically controlled cathead comes with a control valve unit (CVU) and a pneumatic operator panel. The operator panel is normally installed on drill floor. Each cathead requires a separate operator panel and control valve unit (CVU)

Technical data

<table>
<thead>
<tr>
<th>Control</th>
<th>Pull regulation</th>
<th>Low torque pull regulation</th>
<th>Catheads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumatic</td>
<td>12 - 140 kN (2.7 - 31.5 kip)</td>
<td>0.85 - 13.6 kN (0.2 - 3.1 kip)</td>
<td>1</td>
</tr>
<tr>
<td>Electrical</td>
<td>12 - 140 kN (2.7 - 31.5 kip)</td>
<td>4.0 - 44.0 kN (0.9 - 10.0 kip)</td>
<td>1 or 2</td>
</tr>
</tbody>
</table>

MH hydraulic cathead in operation

Hydraulic Power Units
Hydraulic power unit

A reliable power source forms the core in every hydraulic system and is essential to ensure operability of the various connected equipment and systems. The industry has been provided with more than 200 MH hydraulic power units (HPU) of different sizes and configurations during the last decades, spanning from small single equipment units to large multiple ringline units, all designed with special focus on reliability, safety, maintenance and environment.

Key features
- The HPU's are designed for optimum performance, quality and reliability
- All maintenance areas are easily accessible
- Submerged (wet) designs are compact increasing flexibility with respect to installation area
- External (dry) designs have external pumps which are easily maintainable
- Working pressure is 207/3000 bar (3,000 psi)
- Design pressure is 227 bar (3,290 psi)

Technical data

<table>
<thead>
<tr>
<th>Pump arrangement</th>
<th>Submerged</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating zone</td>
<td>Safe area</td>
<td>HPU for operation in safe area.</td>
</tr>
<tr>
<td></td>
<td>Hazardous area</td>
<td>HPU for operation in hazardous area.</td>
</tr>
<tr>
<td>Cooler type</td>
<td>Air oil cooler</td>
<td>The air oil cooler is located on the HPU and consists of a radiator cooling element and an AC motor driven fan. The air cooler is not dependent on water supply. This makes it easy to install the HPU anywhere on the platform.</td>
</tr>
<tr>
<td>Fresh water cooler</td>
<td>The high-performance plate cooler is very efficient with regards to space requirement and water consumption. The plates are made of stainless steel (Alloy 316 material).</td>
<td></td>
</tr>
<tr>
<td>Sea water cooler</td>
<td>The high-performance plate cooler is very efficient with regards to space requirement and water consumption. The plates are made of titanium material.</td>
<td></td>
</tr>
<tr>
<td>Cooling capacity</td>
<td>Normal</td>
<td>Plate cooler is sized with a water inlet temperature of max. 32°C (90°F).</td>
</tr>
<tr>
<td></td>
<td>Extreme</td>
<td>Plate cooler is sized with a water inlet temperature of max. 38°C (100°F).</td>
</tr>
</tbody>
</table>

Performance - submerged pumps

<table>
<thead>
<tr>
<th>Number motors ea.</th>
<th>Total power kW</th>
<th>Capacity (50Hz) L/min</th>
<th>Capacity (60Hz) L/min</th>
<th>Reservoir L</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>94</td>
<td>220</td>
<td>240</td>
<td>900</td>
</tr>
<tr>
<td>2</td>
<td>188</td>
<td>440</td>
<td>480</td>
<td>1500</td>
</tr>
<tr>
<td>3</td>
<td>282</td>
<td>660</td>
<td>720</td>
<td>2100</td>
</tr>
<tr>
<td>4</td>
<td>376</td>
<td>880</td>
<td>960</td>
<td>3500</td>
</tr>
<tr>
<td>5</td>
<td>470</td>
<td>1100</td>
<td>1200</td>
<td>3850</td>
</tr>
</tbody>
</table>

Performance - external pumps

<table>
<thead>
<tr>
<th>Number motors ea.</th>
<th>Total power kW</th>
<th>Capacity (50Hz) L/min</th>
<th>Capacity (60Hz) L/min</th>
<th>Reservoir L</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>94</td>
<td>220</td>
<td>240</td>
<td>1000</td>
</tr>
<tr>
<td>2</td>
<td>188</td>
<td>440</td>
<td>480</td>
<td>2200</td>
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<tr>
<td>3</td>
<td>282</td>
<td>660</td>
<td>720</td>
<td>3400</td>
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<tr>
<td>4</td>
<td>376</td>
<td>880</td>
<td>960</td>
<td>4500</td>
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<tr>
<td>5</td>
<td>470</td>
<td>1100</td>
<td>1200</td>
<td>5400</td>
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<tr>
<td>6</td>
<td>564</td>
<td>1320</td>
<td>1440</td>
<td>6700</td>
</tr>
<tr>
<td>7</td>
<td>658</td>
<td>1540</td>
<td>1680</td>
<td>7700</td>
</tr>
</tbody>
</table>

Options

- Pressure transmitter
  The pressure transmitter allows remote monitoring of the HPU supply pressure.

- Oil heater
  The oil heater consists of a heating element and junction box located on the oil tank in order to maintain an oil temperature of 20°C (68°F) in the tank if the HPU is to be shut down/idle for a period.

- Noise protection
  The HPU is equipped with noise absorbing cover/panel(s) around main pump(s) and flexible curtain(s) in front in order to reduce the noise level.

Noise hood container
  The HPU is located inside a noise hood container fully insulated with perforated zinc-coated sheet inside. The container is equipped with an AC motor driven fan which is controlled by an adjustable thermostat preset to 35°C (95 °F). One of the long sides can be fully opened in order to maintain the HPU. The container is designed for outdoor location.

Drip pan
  The drip pan is located under the HPU in order to collect oil spill during service/maintenance.
The MH VPR 135 and MH VPR 90 by MHWirth provides the most flexible and efficient racking and stand building configuration in the market. The MH VPR 135 is designed for handling triples (R3) and quadruples (R2) stands while the MH VPR 90 is designed for handling doubles (R3) and triples (R2) stands. A crane modus allows the use of the machine for general lifting operation inside the derrick.

The VPR handles stands between finger boards and mouse hole/well centre. A stand building tool is used when picking up laying down single tubulars from/to the tubular feeding machine, and during stand building and brake down operations. The VPR also features a thread saving function.

The main structure is a column connected to the upper and lower carriage. The column features hydraulic arms which are used to guide and grip the tubular. Guide and grip heads exists in different sizes and is easily replaceable by a quick connection system.

The VPR may be delivered in a dual installation with two machines on the same upper/lower track.

The MH VPR 135 and the MH VPR 90 are designed to be used on drill ships, semi submersibles, jack-ups and fixed rigs. The VPR has a compact design and can either be installed on new builds, or retrofitted to rigs with an existing pipe handling system installed.

- Heads may be replaced in less than 15 minutes
- Each stand building tool handles its range of tubular size without any inserts
- Robust modular design with simple interconnections
- Optimised cross section of column for maximum stiffness an minimal oscillation
- Closed flush drill floor for safe working environment

### Operational requirements

<table>
<thead>
<tr>
<th></th>
<th>Fixed rig product platform</th>
<th>Fixed and dynamic rig product platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand handling range</td>
<td>MH VPR 135</td>
<td>MH VPR 90</td>
</tr>
<tr>
<td>Racking configuration</td>
<td>Triples and quadruples</td>
<td>Doubles and triples</td>
</tr>
<tr>
<td>Stand building capabilities</td>
<td>Parallel</td>
<td>Parallel</td>
</tr>
<tr>
<td>Pick up and lay down</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Tubular handling range</td>
<td>2 7/8&quot;-10&quot; (69-255mm) or 2 7/8&quot;-10&quot; (89-255mm) or 3½&quot;-14&quot; (89-355mm)</td>
<td>3½&quot;-14&quot; (89-355mm)</td>
</tr>
<tr>
<td>Hoist capacity, max reach</td>
<td>7T @ 4,7m</td>
<td>7T @ 4,7m</td>
</tr>
<tr>
<td>Hoist capacity, max</td>
<td>15T @ 2,7m</td>
<td>11,5T @ 2,7m</td>
</tr>
<tr>
<td>Rotation</td>
<td>270°</td>
<td>270°</td>
</tr>
<tr>
<td>Operating envelope</td>
<td>1,8m</td>
<td>1,8m</td>
</tr>
<tr>
<td>Weight from drill floor to upper track</td>
<td>44,0</td>
<td>34,0</td>
</tr>
<tr>
<td>Redundancy</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>AC drive</td>
<td>Hoist, travel and slew</td>
<td>Hoist, travel and slew</td>
</tr>
<tr>
<td>Weight VPR</td>
<td>49,2T</td>
<td>33,2T</td>
</tr>
<tr>
<td>Weight upper track (12m)</td>
<td>9T</td>
<td>7,5T</td>
</tr>
<tr>
<td>Weight lower track (12m)</td>
<td>5,3T</td>
<td>5,3T</td>
</tr>
<tr>
<td>Weight SBT</td>
<td>1,2T (incl hang-off bracket)</td>
<td>1,2T (incl hang-off bracket)</td>
</tr>
<tr>
<td>Option extra head</td>
<td>14°-22°</td>
<td>14°-22°</td>
</tr>
<tr>
<td>Option drag chain</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
</tr>
</tbody>
</table>
Bridge crane

MHWirth has a comprehensive range of vertical MH pipe handling equipment which can be delivered as complete systems or individual, tailor made machines. Typical fingerboard capacity: Up to 550 stands of drill pipe and 14 stands of drill collar.

Key features
- The MH bridge crane (BRC) is a part of the pipe racking system. The pipe racking system forms an integrated pipe handling system for easier, safer, and faster handling of tubular on every type of rigs
- Designed to lift the stand between the fingerboards, mousehole and well center
- Mounted on or below runway beams in the derrick above fingerboard level
- Can be electronically synchronized with the lower guiding arm and both run in predefined paths, thus giving a very simple operators interface
- Can alternatively be controlled with an electrical or hydraulic control stand

Main data

<table>
<thead>
<tr>
<th></th>
<th>Medium-sized</th>
<th>Large-sized</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gripper head</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity, min.</td>
<td>2 7/8 in</td>
<td>3 1/2 in</td>
</tr>
<tr>
<td>Capacity, max.</td>
<td>9 3/4 in</td>
<td>14 in</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (approx.)</td>
<td>Depending on runway beam span</td>
<td></td>
</tr>
<tr>
<td>Width (approx.)</td>
<td>Depending on bridge span</td>
<td></td>
</tr>
<tr>
<td>Height (approx.)</td>
<td>11,000 mm (433 in)</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (excluding runway beams)</td>
<td>14.3 m.tons (16.7 shT)</td>
<td>30 m.tons (33.1 shT)</td>
</tr>
<tr>
<td>Weight, runway beams</td>
<td>Depending on runway beam span</td>
<td>Depending on runway beam span</td>
</tr>
</tbody>
</table>

2-arm system

The MH 2-arm system is a derrick mounted pipe handling system. Typical racking board capacity of the 2-arm system is up to 420 stands of drill pipes and 14 stands of drill collar. Available with and without robotic motion control (RMC).

Intermediate racking arm
The intermediate racking arm is installed between the set-backs at approximately 30 ft above the drillfloor. The arm is telescopic and slewable through approx. 180 degrees, and is mounted on a trolley that travels in or out in track beams. Designed to lift and guide drill pipe and drill collars between centre well and setbacks or vice versa. The rackerhead is mounted on an approximately 5.5 m (18 ft) long track beam for vertical guiding during lifting of the stands. The upper end of the track beam has a guide sheave for the standlift wireline.

Upper racking arm
The upper racking arm is installed in between the fingerboards. It is telescopic and slewable through 180 degrees and mounted on a trolley that travels in and out in track beams. Designed to handle and guide tubulars up to 9 1/2” o.d. between centre well to racking boards or vice versa.
Mousehole

The MH mousehole is highly automated and specially designed for offline standbuilding of drill pipes, casings and collars.

Key features
- The MH mousehole is suspended from the drillfloor with a lower support towards the substructure. It is equipped with a watertight flange. It is hydraulically powered, supplied from the rig ringline and operated through a control system from the assistant drillers chair in driller’s cabin
- The portfolio includes both standard and telescopic type with different lengths and max. tubular diameters depending on the context of application
- The centralizer automatically closes and centralizes the tubular of different diameters

Main models

Type
- Standard
- Telescopic

Length
- 32 ft
- 45 ft
- 60 ft

Max. tubular diameter (Pipe dimensions, not tool joint)
- 9 3/4 in
- 13 5/8 in
- 20 in

The MH mousehole is in principle a long pipe consisting “outerbox”, “innerbox” and a “rabbit”. The main purpose of the telescoping innerbox is to reduce the mousehole length when retracted for not colliding with the rig structure when the derrick is skidding or during handling of BOP.

Main data

Dimensions
- Depth: 1,000 – 10,000 mm (39.4 – 394 in)
- Width: 1,000 – 10,000 mm (39.4 – 394 in)

Tubular capacity
On a 10x10m fingerboard for quad. stands optimized for one of the following tubular sizes (this calculation assumes only one type of tubular, the max. capacities cannot be combined). Infinite variations and combinations may be configured.
- Max length of 5 1/2” – 5 7/8” drill pipe: 176,400 ft (53,800 m)
- Max length of 6 5/8” drill pipe: 127,710 ft (38,900 m)
- Max length of drill collar: 66,960 ft (20,400 m)
- Max length of casing: 95,760 ft (29,200 m)

Fingerboard

The MH fingerboard is fully customizable and allows for the size of the board to be adapted to the available space. Based on the selected combination of rows for drill pipes, casing and drill collars tubulars virtually any setback capacity is attainable – given enough space.

Key features
- The MH fingerboard is designed to safely lock stands in the derrick by a remotely operated system
- Drill collar stands are fixed in position by an individual locking finger for each stand. This prevents the load from the full row of drill pipe acting on one single locking finger
- Each locking finger is connected to a pneumatic cylinder by a link mechanism. All bushings are maintenance free and do not require lubrication. The operation of the pneumatic cylinder is through pneumatic valves mounted in the pneumatic power valve cabinet
- The cylinders are pneumatic operated and have spring return to close position. The locking fingers are bolted assemblies with the actuating cylinder protected within the fingerboard structure. The polyamide hoses are also well protected, running inside the fingerboard structure
- In order to simplify the inspection and maintenance access, the locking finger assemblies are made as separate units that are accessible from the top of the fingerboard. The complete locking finger assembly can be lifted out of fingerboard finger
- The remote control of the fingerboard is integrated into the control system for the racking machines
- Option: can alternatively be controlled with a remote electrical panel
- Option: can alternatively be controlled with a remote pneumatic control panel
- Option: row adapters. In order to use one row for two or more different OD-sizes, mechanical row adapters can be added for specific rows
- Option: A special bottom-hole-assembly slot can be integrated in the fingerboard. This is typically mounted in a dedicated holder for quick access
- Option: Noise reducing rubber flaps. These wire-mesh reinforced rubber plates also dampen the stand movement in fingerboard

Main data

Dimensions
- Depth: 1,000 – 10,000 mm (39.4 – 394 in)
- Width: 1,000 – 10,000 mm (39.4 – 394 in)

Tubular capacity
On a 10x10m fingerboard for quad. stands optimized for one of the following tubular sizes (this calculation assumes only one type of tubular, the max. capacities cannot be combined). Infinite variations and combinations may be configured.
The MH pipe deck pipe handler (PDPH) is located at pipe deck and its main purpose is to transport tubulars from pipe deck to the MH tubular feeding machine. It is controlled by a radio remote control panel, either located in a dedicated chair in drillers control room, or operator standing outside of drillers control room. The PDPH have hydraulic oil supply from the rig ring-line system. Hydraulic hoses are drawn to the PDPH through the pedestal and electrical cables are connected in the interface junction box outside the pedestal. Jib cylinders and gears are operated through the control panel.

When the PDPH is not in use, it shall be parked with the gripper yoke resting on the deck or in the jib rest located next to the derrick. This is to be used during sea voyage, bad weather or when the PDPH will not be in use for long periods. In addition, there is a parking position for the yoke, on the heavy tool landing platform.

### Technical data

<table>
<thead>
<tr>
<th>Main data</th>
<th>Length x width x height</th>
<th>39.9 x 8.4 x 15.2 (m)</th>
<th>Total weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>41770 kg (ex/cabin)</td>
<td>52044 kg (ex/cabin)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Design data</th>
<th>Design pressure</th>
<th>257 (3000) Bar (Pa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation temp. (amb.)</td>
<td>Project specific</td>
<td></td>
</tr>
<tr>
<td>Area classification</td>
<td>Safe area/Zone 2</td>
<td></td>
</tr>
<tr>
<td>Design category (class)</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>Certifying agency (3rd party)</td>
<td>DNV/ABS</td>
<td></td>
</tr>
</tbody>
</table>

### Design data

- Design pressure: 257 (3000) Bar (Pa)
- Design temp. (amb.): Project specific
- Area classification: Safe area/Zone 2
- Design category (class): I
- Certifying agency (3rd party) standard: DNV/ABS

### Technical data

- **Lifting capacity grippers (SWL)**: 4.0 T. @ 25 m.
- **Lifting capacity pad eye (SWL)**: 9.0 T. @ 25 m.
- **Lifting capacity utility winch (SWL)**: 5.0 T. @ 25 m.
- **Maximum load eccentricity**: ± 0.5 m
- **Max. working radius**: 25 m.
- **Min. working radius**: 2.93 m.
- **Slew angle**: ± 180°
- **Slew speed**: 0.8 rpm
- **Tubular length**: Range 2 (30')
- **Tubular length**: Range 3 (45')
- **Tubular diameter**: 3.2 m.
- **Rotation of gripper**: ±/− 180°

### Main data

- **Length x width x height**: 30.9 x 6.4 x 15.2 (m)
- **Total weight**: 47770 kg (wo/cabin)
- **Total weight**: 52004 kg (w/cabin)

---

The MH gantry crane is designed for safe transportation of tubulars from the pipe deck to the catwalk machine and vice versa. It is a self-contained unit with operator's cabin, hydraulic power unit, power distribution and control system, all located on the crane.

**Equipped with**:
- 2 riser forks for handling riser, pup joints and casing
- 2 magnet yokes for handling drill pipes and other tubulars

### Gantry crane

#### Technical data

- **Lifting capacity (SWL)**: 2 x 23 mT (2 x 25 tons)
- **Gantry speed**: 0.4 m/sec (16.9 in./sec)
- **Trolley speed**: 0.25 m/sec (9.84 in./sec)
- **Hoisting speed**: 0.25 m/sec (9.84 in./sec)
- **Max lifting height**: 11.9 m (39.04 ft)
- **Electrical power requirements**: 3 x 480 VAC 60 Hz (3 x 100 kW)
- **Total weight**: 116 mT (128 tons)

---

The MH piperrack crane is designed for safe transportation of tubulars from the pipe deck to the catwalk machine, and vice versa. The crane is a cantilever type crane, controlled from a cabin or platform located on the crane trolley. Remote control from the drill floor is also available. MH piperrack crane is delivered with twist gripper as handling device. The control system ensures that the yoke is always kept horizontal during a sequence.

**The twist gripper yoke is designed to pick up tubulars out of centre, but the load will always be kept horizontal. MH piperrack crane with telescope is mainly used on rigs with small elevation differences. The telescope increases the hook up flexibility.**

### Piperrack crane

#### Technical data

- **Travelling speed**: 30 m/min (98 ft/min)
- **Lifting speed**: 20 m/min (65 ft/min)
- **Tongue speed**: 20 m/min (65 ft/min)
- **Travelling length**: 41.3 m (135 ft/min)
- **Telescopic length**: 4.8 m (15 ft/min)
- **Lifting capacity**: 6.0 mT x 11.4 m (±+ 0.5 m eccentric)
- **Height**: 37.4 (± + 1.8 ft eccentric)
- **Height**: 2.9 m (± + 3 ft eccentric)
- **Height**: 2.83 m (± + 0.10 ft eccentric)
- **Distance from center line**: 6.6 m (21.6 ft)
- **Tubular length**: 3.5 m (11.5 ft)
- **Tubular diameter**: 7.35 (in)
- **Rotation of gripper**: 360°

### Installation weight

- **Approx.**: 30 mT (incl. rail, gripper)/35 tons
The riser handling system is a complete solution for vertical storage and handling of marine riser. The riser handling crane is designed for vertical handling of risers from the riser fingerboards to the riser chute machine where risers are conveyed to the drill floor. In addition, the crane can be designed to handle and rack the slip joint. The crane is powered from a rig main power unit with hydraulic working pressure of 210 bar (3000 psi). Hydraulic and electric power are supplied by a drag chain, allowing the crane to travel on rails port/stb. along the fingerboards.

### Technical data

- **Lifting capacity**: 40 mT (44 tons)
- **Gantry speed**: 0.25 m/sec (9.84 in/sec)
- **Trolley speed**: 0.25 m/sec (9.84 in/sec)
- **Hoisting speed**: 0.1 m/sec (3.9 in/sec)
- **Hoisting height, max.**: 3.5 m (11.5 ft)
- **Total weight**: 74 mT (84 tons)

---

The MH catwalk machine transfers tubulars between piperack crane and V-door/drill floor. It is designed for remote controlled mechanical handling of tubulars from 2 7/8” to max. 30” outside diameter. Riser and slip joints are handled by trolleys. The machine can be delivered with or without feeding arrangements, tailor-made to suit the actual rig.

### Technical data

- **Range**: 2 7/8”–30”
- **Drillpipe**: 40–60 joints/hour
- **Working pressure**: 210 bar (3045 psi)
- **Hydraulic flow**: Depends on speed and operational requirements. Typical 150–300 l/min (40–80 gallon/min)
- **Size incl. service platform**: Typical 1500x400x1500 mm (5x1x5 ft)
- **Weight**: Varying 25–30 mT (55–66 tons)

Options: Kit for riser handling.
Due to the special design, the top mounted compensator addresses hook load variations directly to the crown block. The unique angle approach of the MH drillstring compensator keeps the vertical force virtually constant, thereby decreasing weight-on-bit fluctuations to a minimum.

System
- Single unit top structure
- Two compensator units (including cylinder, accumulator and control valve block)
- Dual rocker-arm system
- Crown block
- Air pressure vessels
- MH hydraulic power units
- Control system

### Technical data

<table>
<thead>
<tr>
<th>Type</th>
<th>Max. compensating (pull/push)</th>
<th>Max. static load (pull/push)</th>
<th>Stroke incl. cushioning zones (m)</th>
<th>Gas volume required (APV’s)</th>
<th>Max. design pressure (bar/psi)</th>
<th>Max. design speed (stroke 5m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type: 270 - 20</td>
<td>270 mT (595 kips)</td>
<td>580 mT (1300 kips)</td>
<td>6.1 m (20 ft)</td>
<td>7 x 1,000 lb (265 ps)</td>
<td>210 bar/3000 (psi)</td>
<td>1.31 m/s</td>
</tr>
<tr>
<td>Type: 270 - 25</td>
<td>270 mT (595 kips)</td>
<td>580 mT (1300 kips)</td>
<td>7.62 m (25 ft)</td>
<td>8 x 1,000 lb (265 ps)</td>
<td>210 bar/3000 (psi)</td>
<td>1.31 m/s</td>
</tr>
<tr>
<td>Type: 454 - 908 - 25</td>
<td>454 mT (1,000 kips)</td>
<td>908 mT (2,000 kips)</td>
<td>7.62 m (25 ft)</td>
<td>13 500 lb (62250 lb)</td>
<td>207 bar 3000 (psi)</td>
<td>1.31 m/s</td>
</tr>
<tr>
<td>Type: 454 - 1135 - 25</td>
<td>454 mT (1,000 kips)</td>
<td>1135 mT (2500 kips)</td>
<td>7.62 m (25 ft)</td>
<td>13 500 lb (62250 lb)</td>
<td>207 bar 3000 (psi)</td>
<td>1.31 m/s</td>
</tr>
<tr>
<td>Type: 1500 - 2500 -25</td>
<td>680 mT (1500 KIP)</td>
<td>1135 mT (2500 KIP)</td>
<td>7.62 m (25 ft)</td>
<td>13 500 lb (62250 lb)</td>
<td>207 bar 3000 (psi)</td>
<td>1.31 m/s</td>
</tr>
</tbody>
</table>

### Active heave compensator

The MH active heave compensator is designed for installation on semi-submersibles and drillships with top (crown block) mounted MH drill string compensator. The active heave cylinder is mechanically connected to the crown block ensuring minimum load and relative motion variations. It is mainly used when landing BOPs, subsea trees, during under-reaming and during other downhole operations requiring a minimum of motion. The MH active heave compensator system enables the passive system to handle subsea equipment in an extended weather window. Drilling and wire line mode is also available.
The MH through tubing drilling compensator should be used when the MH RamRig hoisting system is running in high speed active compensation mode. This mode will reduce the MH derrick drilling machine vertical movement to an estimated ± 20 cm. The compensator is a passive system, with an adjustable preload functionality around mid stroke. Movement of the bottom hole assembly is given directly by the MH derrick drilling machine position, unless the load is changed above/below the preload limits.

**Pistontrack**

Sensing the accumulator piston position will increase safety significantly in virtually all kinds of compensator systems, enabling warning signals to prevent fatal failure. MHWirth has developed a patented stand alone sensor system based on alternating magnetic fields technology to detect piston position.

- Standard sensor applicable for all kinds of accumulators
- Easy to mount, strap on
- Minimum rig downtime
- Modularised concept

Sensors will normally be supplied in sensor bars of 100 cm length, each with 3 sensor units. One 12mm cable per sensor bar is connected to the Eex-d junction box for interfacing to standard industrial display units. The mounting is strapped on the outside of the accumulator, using either a steel band or a fibre band, finalising the mounting by sealing the sensor off using silicone at the perimeter of the sensor. The central processing unit can be interfaced to most industrial standard interfaces. One central processing unit covers up to 24 sensors in a rack, making it possible to get semi-continuous measurement when desired.

**Technical data**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length x width x height (op.)</td>
<td>1 000x67x37 mm</td>
</tr>
<tr>
<td>Weight (dry) approx.</td>
<td>5.0 kg (11.0 lb)</td>
</tr>
<tr>
<td>Weight (op.)</td>
<td>5.0 kg (11.0 lb)</td>
</tr>
<tr>
<td>Sensor response</td>
<td>6 Hz</td>
</tr>
<tr>
<td>Ex-rating</td>
<td>Eex-d</td>
</tr>
<tr>
<td>Max. wall thickness accu.</td>
<td>60 mm (2.36 in)</td>
</tr>
<tr>
<td>IP-grade</td>
<td>68</td>
</tr>
<tr>
<td>Max. distance to sensor CPU</td>
<td>15 m (50 ft)</td>
</tr>
<tr>
<td>Ex-rating CPU</td>
<td>Safe area</td>
</tr>
</tbody>
</table>

**Wireline riser tensioner for drilling risers**

The MH wireline riser tensioner system is installed on the floating drilling rig to maintain a pre-selected vertical tension in the riser. When the vessel is heaving and rolling due to waves, and wind, the wireline tension system will work as a pre-tensioner spring and keep tension in the marine riser.

**Main data**

- Wire travel: 50 feet
- Maximum pulling force for each cylinders: 200 KIPS
Our Products and Services
Compensators and Tensioners

Conductor tensioner system for drilling risers

The MHW conductor tensioner system provides tension in the conductor and compensates for vertical conductor motions due to waves, currents, seabed settlements and temperature expansion.

One tension system consisting of
- Four hydraulic tension cylinders
- One accumulator skid, consisting of four hydraulic nitrogen accumulators
- One local control panel

Common for all system
- Hydraulic power unit

Main data
- Stroke: 1125 mm
- Maximum pulling force each cylinder: 854 KN

Other tensioners

MHWirth provides all kinds of tensioners for drilling rigs, including guideline tensioners, podline tensioners and utility tensioners, including winches behind the tensioners.

Technical data

<table>
<thead>
<tr>
<th>Weight</th>
<th>Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.3 tonnes</td>
<td>16 kips</td>
</tr>
<tr>
<td>11.3 tonnes</td>
<td>25 kips</td>
</tr>
<tr>
<td>Line travel</td>
<td>40 ft</td>
</tr>
<tr>
<td>Line travel</td>
<td>50 ft</td>
</tr>
</tbody>
</table>

Direct acting riser tensioner for drilling risers

- Tension capacity up to 5 000 000 lbs
- Do not occupy working deck space as traditional wireline tensioners
- Advanced and proven riser anti recoil system
- Piston rods made from carbon steel with stainless steel weld overlay
- Can be integrated with a trip saver
- Low weight and low centre of gravity
- Designed to operate with two cylinders out of operation
- Maintenance work reduced to a minimum due to few moving parts
Drilling Risers

Drilling risers

Enhanced technology for drilling wells in the world’s deepest waters.

MHWirth offers complete deep water marine riser systems. Being at the forefront of deepwater offshore riser technology we offer a full range of drilling riser solutions, including associated equipment.

Deep water riser for marine drilling operations

Features
The deep water riser by MHWirth provides minimised stress concentrations, excellent connector fatigue resistance as well as optimal profile design and steel quality due to its CLIP connector design.

The riser offers a secure connection with fully opened or fully closed positions and eliminates the need for threading, bolting and preloading. This safe and reliable operation allows for hang off during bad weather and a very high strength-to-weight ratio.

Our deep water riser are well proven and has a simple trouble free design. Its high fatigue resistance also reduce the need for maintenance. Other benefits include field-proven short tripping time and field replaceable peripheral lines pins.

A key feature of our drilling riser is the deep water CLIP connector technology, a unique system that provides both time and cost saving features
- Connection can be made up in less than 11 seconds
- Significant time savings in deep waters compared to conventional connectors reducing tripping time by hours and up to several days in ultra-deep water
- Reduced manpower requirements
- Safer operation involving less people with simpler tools
Managed Pressure Operations
Managed pressure operations

MHWirth is, through our latest acquisition, Managed Pressure Operations, a provider of next generation continuous circulation and managed pressure drilling (MPD) systems, which will become a critical component to the drilling process going forward.

We provide MPD systems that are

- Cost effective, allowing use on the whole well on long term contracts
- Reliable, enabling maximum up time and significant cost savings
- Fully automated and simple to operate, needing few people to run the equipment

Riser safety systems, riser gas handling
The deepwater riser safety system (RSS) has been developed to enable safe handling of gas entry into the riser.

In order to allow for easy installation on the rig, the RSS is designed to be installed below the tension ring. The two main components are the quick close annular and the flow spool, both of which will pass through a 49.5” rotary table. With this system in place, an influx can be safely routed from the riser, through the RSS manifold and out the ultra mud gas separator with no discharge to the environment.

Riser drilling device, below tension ring pressure
The riser drilling device (RDD) is designed to overcome physical limitations of current rotating control device designs. Its principle function is to maintain an active seal on the drill string, while drilling or tripping operations are being performed. The RDD is designed to comply with API 16A for both the housing and packer elements. It complies with API 16RCD design verification standards for seal sleeve.

Deepwater kick detection
The conventional methods of kick and loss detection and subsequent well control procedures are inadequate for today’s ultra deepwater drilling requirements. Well control event detection and subsequent control measures are time critical. The longer the event detection time, the greater the consequential problem especially in the increasing risks of pre-salt drilling with fractured carbonates and higher pressure reservoirs.

The deepwater kick detection and riser safety system used together is what we call an open system. This system protects the rig 24 hours per day during every operation from when the riser is run until the riser is pulled and offers instant closure of the well once influx has been detected. The system can reduce kick volumes by a factor of 5.

Total control driller, automated MPD systems
The total control driller (TCD) apply surface back pressure on the well bore using custom designed pressure control valves instead of conventional chokes. Mass flow rate, pressure, density and temperature are measured, processed and stored by the control and data acquisition system. The manifold then diverts all returned well bore fluid flow at atmospheric pressure, either directly to the shakers, or the drill through mud gas separator and then onto the shakers, the TCD manifold also incorporates a programmable dual overpressure protection system.

Non stop driller, continuous circulation systems
The non stop driller (NSD) is a sub-based constant circulation system which enables the continuous circulation of drill fluids downhole while making or breaking drill pipe connections. The system has been designed to address operator concerns including drilling efficiency, operational safety, hole condition and equipment integration.

Benefits of the non stop driller sub
- Fully actuated valves controlled by a dedicated HMI system incorporating multiple safeguards and system interlocks
- Proprietary locking mechanism eliminates the possibility of release during operations
- Integrated pressure relief valve provides additional independent pressure protection for NSD system
- Primary metal-metal seal rated for 30,000 psi, and protective cap provides secondary barrier to wellbore fluid
- NSD sub retains access for ball drop tools and wireline services

BOP Handling Equipment
BOP handling system

The MH BOP handling system is designed to suit the customer’s requirements/rig limitations, is tailor-made to any specification and built from one or more standard products:

- BOP transporters/trolleys
- Subsea tree transporters/trolleys
- Overhead cranes
- Baseplate trolleys
- Skidding systems
- Over/underhull guiding systems

Upon receipt of information we can give a system proposal, and suggest additions that can be made to give the most efficient handling system. Systems can be delivered with capacities up to 1000 mT. The prime function of the BOP/subsea tree handling systems is to safely transport, lift or guide the equipment from the parked or stored position to the well centre, or vice versa.

BOP transporter

The BOP forklift transporter can be used for a two stack system with the main frame design allowing a skidding system to be adopted for placing the BOP stack(s) alongside the transporter on the cellar deck storage area. Capacities for the equipment range from 170 mT to 400 mT (187 - 440 tons) with lifting heights from 3.0 m to 10.0 m (10 - 33 ft).

The BOP trolley allows the stack to be transported from the parked position to the well centre along the moonpool or vice versa and is generally used together with an overhead crane of the same capacity as the trolley to allow the stack to be lifted to the storage position.

Overhead crane/gantry crane

The MH overhead crane/MH gantry crane are designed to suit the clients’ requirements and are available both as electric and hydraulic cranes. The latter option includes an onboard power unit. Most units can be designed with transverse travel. The controls are usually cabin mounted or pendant. The MH gantry crane can be delivered with capacities ranging from 5.5 mT (0.1 tons) to 250 mT (275 tons).

BOP guide system

The guide systems provide guidance and horizontal restraint for the BOP when being lifted by the drawworks. Guide systems can be adapted to either transporter or overhead crane systems, and mounted on deck, under deck, or connected to the transporter. The systems can be fixed, hinged or sliding. Both conventional tube spear type systems and rubber buffer roller type systems are available.

Base plate trolley

The MH base plate trolley is designed as auxiliaries to most systems, and the main function is to handle temporary and permanent guide bases. The trolleys are strong enough to support the lower marine riser package. Their unique design allows the unit to enter within the guide lines, making trolleys ideal as a service platform at the drill string centre. The trolleys can be adapted for handling BOPs and subsea trees with capacities ranging from 30 mT to 300 mT (33 - 330 tons).
Mud pumps

Product lines
Wirth mud pumps are available in two different product lines. The exact specifications of the product depend on customer requirements. Proven, standardised products characterise the “classic line” mainly used for onshore applications. The products of the “premium line” guarantee the highest quality and a tailor-made solution to suit all customer requirements.

We offer a full line of triplex high pressure mud pumps to handle any drilling requirements. These tough field proven models cover input horsepower ratings between 800 to 2 200. These are available with rear or top mounted belt, chain or gear driven, AC or DC drive motor configurations with an operating pressure between 5 000 up to 10 000 PSI.

Main features of the Wirth mud pumps
- Optimal smoothness of operation
- Compact design, less weight
- Pump drive units for permanent load operation, with a high degree of stability
- Gear wheels and drive shaft of wear-resistant heat treated steel
- Hydraulic quick release system
- Independent lubrication system
- Long lifespan of consumables items
- Surveillance and control elements for early recognition of failures
- Full material traceability as standard
- Fluid ends in stainless steel (optional) for increased lifetime

Gear-driven mud pump
The Wirth gear-driven mud pump completes the existing product range and replaces chain or belt drive configuration.

Main features of the gear-driven mud pump
- Powered by single top-mounted AC motor
- Increased service life
- Reduced maintenance work
- Lower service costs
- Less vibration
- Lower noise emission
- Weight reduction

The Wirth gear-driven high pressure mud pump (type TPK) is the most compact design, powered by a state-of-the-art AC water jacket motor solution for offshore and onshore applications for tight mud module layouts. In addition, it is also suitable for the upgrade market.

The water jacket motor features
- Lower noise emission (< 85 dBA)
- Protection against corrosion
- Reduced height (approximately 400 mm)
- IP 56 and Ex-d as standard, ATEX as option

Hydraulic quick release system
Wirth mud pumps premium line products are equipped with a fully integrated, originally patented hydraulic quick release system. This enables safe and easy maintenance of fluid end parts, i.e. fast-change tensioning system for fluid ends, for liner retention, changing valves and easy opening of valve covers.

<table>
<thead>
<tr>
<th>Mud pumps</th>
<th>TPK 7 ½&quot; x 8 ½&quot;</th>
<th>TPK 7&quot; x 10&quot;</th>
<th>TPK 7 ½&quot; x 12&quot;</th>
<th>TPK 7 ¼&quot; x 12&quot;</th>
<th>TPK 7 ½&quot; x 14&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge flow max.</td>
<td>l/min</td>
<td>2 761</td>
<td>2 838</td>
<td>3 127</td>
<td>3 127</td>
</tr>
<tr>
<td></td>
<td>US. gal. p.m.</td>
<td>730</td>
<td>750</td>
<td>826</td>
<td>826</td>
</tr>
<tr>
<td>Operating pressure max.</td>
<td>bar</td>
<td>345</td>
<td>345</td>
<td>517</td>
<td>517</td>
</tr>
<tr>
<td></td>
<td>psi</td>
<td>5 000</td>
<td>5 000</td>
<td>7 500</td>
<td>7 500</td>
</tr>
<tr>
<td>Input power requirement</td>
<td>kW</td>
<td>597</td>
<td>969</td>
<td>1 193</td>
<td>1 193</td>
</tr>
<tr>
<td></td>
<td>hp</td>
<td>796</td>
<td>1 300</td>
<td>1 600</td>
<td>1 600</td>
</tr>
<tr>
<td>Input number of revolution</td>
<td>min⁻¹</td>
<td>626</td>
<td>594</td>
<td>484</td>
<td>484</td>
</tr>
<tr>
<td>No. of strokes max.</td>
<td>min⁻¹</td>
<td>160</td>
<td>150</td>
<td>120</td>
<td>120</td>
</tr>
</tbody>
</table>
Mud mixing and treatment equipment

Drilling fluid (mud) equipment
MHWirth supplies high quality systems for drilling fluid applications.

Mud mixing equipment
- Sack cutting units
- Lifting tables
- Mud hoppers
- Liquid chemical skids
- Barrel holders
- Rapid barite mixers
- Caustic mixing units
- HP shear units
- LP shear units
- Big bag units
- Centrifugal pumps
- Bulk surge tanks
- Surge tank feeders

Treatment equipment
- Degasers
- Agitators
- Mud guns
- Tank cleaning machines
- Chemical injection units

Control systems and interfaces
- Automated processes
  - Heave/tilt panels
  - Auto density
  - Auto bulk transfer
  - Auto mud transfer
  - Monitoring, start/stop of equipment
  - Centrifuge control
  - Instrumentation and monitoring
  - Automated valves
  - Density signals from pits and mixing lines
  - Pressure signals from pumps and bulk storage tanks
  - Hi level switches
  - Level transmitters in mud pits and storage tanks
  - Load cell signals

Solids control equipment
- Gumbo conveyors
- Flow dividers
- Shale shakers
- Desanders
- Desilters
- Mud cleaners
- Screw conveyors
- Centrifuges
- Cuttings dryers
- Cuttings transport
- Slurfilication units
- Cuttings re-injection

Bulk equipment
- Bulk storage tanks
- Rock catchers
- Dust cyclone and collectors
- Pressure reducing stations
- Sampling units
- Supply vessel bulk systems
High pressure manifolds and well control

MHWirth offer manifolds and accompanying equipment that satisfies ABS and DNV requirements as well as API recommendations.

This equipment is designed to reduce the amount of valves, piping and spools, in order to limit the overall weight and footprint of the system. At the same time the manifolds ensure that required flexibility is maintained as well as optimum operability, performance and access for service and maintenance.

High pressure and well control equipment is delivered with control systems. Controls can be included in the overall drilling control system or as stand alone systems. Local control panels are normally located by the choke and kill manifolds.

Our high pressure and well control equipment ensures that well control operations can be performed in a controlled and safe manner, thus reducing the potential hazard to personnel and equipment.

Cuttings re-injection system

MHWirth’s cuttings re-injection system (CRI) is an advanced system that is based on well proven and reliable technology.

The unit produces slurry suitable for subsea re-injection, and is controlled from a user friendly control system.

Cuttings are fed directly into the crushing tank from the shale shakers/solids control system and blended with seawater with a high degree of circulation and shearing/crushing by specially designed grinding pumps.

The slurry is circulated within the cuttings tank and over the classifying shaker(s). Oversized cuttings are separated and returned to the cuttings tank, while the slurry that enters the slurry tank has the correct particle size distribution for subsea injection.

Pipe manifolds are used to give the operator as much flexibility as possible during the handling of large volumes of cuttings.

The system can be delivered skid mounted or integrated into the rig design. Additional equipment such as operator cabins, injection pump(s), slurry holding tank(s), etc. are also an optional part of the delivery.
Drill pipe elevator

The MH drill pipe elevator is DnV type approved and designed in accordance with API specifications. The well proven MH drill pipe elevator is pneumatically operated.

- **5” - rated to 350 tons**  
  - weight 550 kg (1220 lb)
- **3 ½” - rated to 350 tons**  
  - weight 570 kg (1270 lb)

Power slips frame

The MH power slips frame lifts ordinary drill pipe slips in and out of the rotary table. The frame pushes the slips down on the rotary table during operation. It rotates with the rotary table, but when more than one revolution is required, the hoses have to be disconnected. The hoses are connected to the cylinder with quick-disconnect couplings. The MH power slips frame is operated by a pedal, being placed in the driller’s house or somewhere else on the drill floor, with clear vision of the rotary table.

For pneumatic power slips frames, the arm has the capability to lift maximum two times the weight of the slips (approx. 200 kg) with a pressure of 7 bar (100 psi).

### Main data

<table>
<thead>
<tr>
<th>Main data</th>
<th>Pneumatic version</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensions</strong></td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>1,400 mm (55.1 in)</td>
</tr>
<tr>
<td>Width</td>
<td>600 mm (23.6 in)</td>
</tr>
<tr>
<td>Height</td>
<td>700 mm (27.6 in)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td></td>
</tr>
<tr>
<td>Dry weight</td>
<td>160 kg (353 lb)</td>
</tr>
<tr>
<td>Operating weight</td>
<td>160 kg (353 lb)</td>
</tr>
<tr>
<td><strong>Capability</strong></td>
<td></td>
</tr>
<tr>
<td>Fit master bushing size</td>
<td>27 ½” - 37 ½” - 49 ½” - 60 ½”</td>
</tr>
<tr>
<td>Adapter to fit slips for DP size, min.</td>
<td>3 1/2 in</td>
</tr>
<tr>
<td>Adapter to fit slips for DP size, max.</td>
<td>7 in</td>
</tr>
</tbody>
</table>
Wirth rotary tables are field proven, efficient and reliable. Two major model ranges are available: the traditional, independent electric rotary tables for conventional applications, and the more common hydraulic rotary tables for rigs fitted with top-drives.

Wirth rotary table – hydraulic driven
Hydraulic rotary tables type Wirth RTSS-H are available with openings from 27 ½" to 75 ½" and static load ratings up to 1 500 tons.

This type uses a hydraulic motor directly connected to the rotary drive gear, thus eliminating transmission and drive train, which results in smaller, lighter and more cost-effective design.

Features of the Wirth hydraulic-driven rotary tables
- High torque and variable speed
- Designed for high load
- Combined axial roller ball-bearing
- Less weight and reduced skid size
- Lower maintenance cost
- Hydraulic locking device
- External hydraulic control station for easy maintenance
- Independent centralised lubrication system to optimise lifespan
- Suitable for installation of various power slips
- Insert tools
- Optional: integrated rails for various iron roughneck types

Wirth rotary table – electric driven
Electric rotary tables type Wirth RTSS-E are available with openings from 27 ½" to 49 ½" and static load ratings up to 800 tons.

The independent rotary drive eliminates the necessity of selecting a drawworks transmission ratio to obtain the desired speed for both pumps and rotary. The optional installed two-speed transmission is suitable for use with either DC or AC drilling motors up to 1 000 hp at 1 200 rpm class with an output rating of high torque capacity.

Features of the Wirth electric-driven rotary table
- High performance
- Designed for high torque and high load
- Double row ball thrust bearing
- Mechanical locking device
- Optional two-speed transmission design includes helical gears, spline clutches, shifter lock mechanism, roller bearing and independent lubrication system with cooling system
- For use with DC or AC drilling motors up to 1 000 hp
- Insert tools

Additional pipe handling equipment suitable for all rotary tables, e.g. master bushings, insert bowls, split casing bushings, reducing bushings, lifting slings, etc., can be provided.
The MH access basket is designed for safe access when performing maintenance and/or working tasks in places that are hard to reach. The basket can easily be installed in the derrick, moonpool area or other areas, either directly with the mounting bracket, or by means of various optional interface kits.

All the basket controls, including emergency stops, can be operated from inside the basket and/or remote control stand:
- Special version can be delivered for BOP or subsea tree operations
- Rail mounting
- 180 degrees rotation

**Technical data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum free working height (m)</td>
<td>17.2 (56.4 ft)</td>
</tr>
<tr>
<td>Maximum permitted load (kg)</td>
<td>300 (660 lb)</td>
</tr>
<tr>
<td>Hydraulic power consumption (bar)</td>
<td>207 bar (3 000 psi)</td>
</tr>
<tr>
<td>(l/min)</td>
<td>50 (13 gal./min)</td>
</tr>
<tr>
<td>Tilt angle (°)</td>
<td>± 60</td>
</tr>
<tr>
<td>Rotating angle (°)</td>
<td>± 90</td>
</tr>
<tr>
<td>Max. weight (kg)</td>
<td>4 000 (8 800 lb)</td>
</tr>
<tr>
<td>Telescoping</td>
<td>3 400 mm (11.2 ft)</td>
</tr>
<tr>
<td></td>
<td>4 600 mm (15.1 ft)</td>
</tr>
<tr>
<td></td>
<td>5 600 mm (18.4 ft)</td>
</tr>
</tbody>
</table>

The access basket can be supplied with one or two-man basket.

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The MH casing stabbing boards are designed for safe travel within the drilling structure and have long standing, proven environments encompassing the globe. The MH casing stabbing board has a mono-rail track, which provides smoother carriage travel, better visibility and a greater freedom of movement, promoting efficiency of the rig. The boards are adjustable from 23 feet to 47 feet above the drill floor and are designed to be mounted in a customer specified location. The design allows for the carriage to be manually locked into any position for added safety.

Casing stabbing boards come with an ABS man riding certified winch with two automatic brakes to control travel. A deadman type control stops carriage travel when the operator releases the safety pull-cord. A dual over-speed device stops the carriage in the event of wireline failure. The casing stabbing board includes a full body harness which attaches to a retractable overhead safety block by cable. Space requirements for the system are reduced by the counterweight carriage platform that folds to storage position when not in use. The carriage platform provides a safe place for the operator to stand when the carriage is in the stored position.

**Features**

- Mono-rail track provides smoother carriage travel, better visibility, and greater movement
- Adjustable from 23'-0" to 47'-0" above drill floor
- Designed to be mounted at customer specified location
- Design allows carriage to be manually locked into any position for added safety
- Two (2) automatic brakes, air powered release, spring set
- Two (2) automatic over speed safety devices set
- One (1) ton man riding air winch; complete with air control valve
- Deadman type control; when operator releases safety pull-cord, carriage travel stops
- Carriage travel can be operated from drill floor
- Carriage platform access from the drillfloor via ladder
- Counterweighted carriage platform folds into storage position while not in use
- Upper and lower stops limit carriage travel
- Retractable overhead safety block attaches to operator’s full body harness
Drilling control and monitoring systems

A key element on a modern drilling rig is the control system. MHWirth is one of the largest suppliers of state-of-the-art drilling control and monitoring systems (DCMS). The building blocks and main features of these systems are:

- Local equipment controls/PLCs
- MHW DrillView, data acquisition, presentation and control system
- MHW configurable automatic drilling system (CADS)
- Necessary computer hardware
- Drilling control cabins (DCCs)

All the delivered equipment and third party equipment; i.e. drawworks, mud pumps, cementing unit, mud logger, mud control and BOP can be integrated into the DCMS and be monitored and/or controlled from the DCC. The DCMS is designed and manufactured according to industry standards and the highest standards related to HSE and human-machine interface. The MHW DrillView system can accommodate any level of automation;

- Remote control of equipment/systems
- Synchronisation of various equipment
- Fully automatic mode
- Fully automatic mode with synchronised CCTV operation and predefined drilling operation sequences (CADS)

The configurable automatic drilling system (CADS) was developed to create a user-friendly and superior control system with respect to efficiency and safety. The result is a highly flexible and user configurable system, accessible for the drilling contractor’s personnel for on site adoptions. The system includes predefined drilling operator sequences, thereby standardising operations and improving safety. Safe operation is an integral part of the system with smart zone management system. Necessary set-points, interlocks, anti-collision, fully automated CCTV controls and other safety features are built into the software. The MHW DrillView/CADS system is based on touch screens and a state-of-the-art computer system.

In order to reduce testing time on site, and ensure timely delivery, we integrate equipment tests with tests on the DCMS and operator’s chair. Prior to testing on site, the drilling control monitoring system (MHW DrillView) and operator’s chair are tested in the laboratory by means of simulation. During this extensive testing, we may give practical equipment training of the customer’s operators and service personnel.
Our Products and Services
Drilling Control and Monitoring Systems

Operator chair

Key features

- The MH operator chair is designed either for remote control single or multiple drillfloor equipment
- No escape restrictions
- Touch screen technology wellcoordinated with low force/low deadband joystick control
- Throttles and multifunction wheel for control of mud pumps and DDM speed/torque
- Full multi-user selection between different drilling operation modes and efficient/rapid installation due to “plug in” design
- Robust, modular and maintenance friendly design
- Designed for operation in non hazardous area

To enable active operator support, a fully integrated workstation with integrated closed circuit television station (MH CCTV) may be established in an onshore operation center. Design according to ergonomic standards offer a good working environment for the operator.

DrillView

Main models and data

<table>
<thead>
<tr>
<th>Main model</th>
<th>Hazardous area</th>
<th>Location</th>
<th>Multiple and single operation</th>
<th>Min. swing radius (mm)</th>
<th>Estimated weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator chair</td>
<td>Safe area</td>
<td>Control cabin</td>
<td>Multiple and single operation</td>
<td>650</td>
<td>100</td>
</tr>
<tr>
<td>Compact operator chair</td>
<td>Safe area</td>
<td>Small cabin</td>
<td>Single</td>
<td>688</td>
<td>100</td>
</tr>
<tr>
<td>Compact operator chair</td>
<td>Safe area</td>
<td>Small cabin</td>
<td>Multiple</td>
<td>688</td>
<td>100</td>
</tr>
<tr>
<td>Compact operator chair</td>
<td>Safe area - Zone 2</td>
<td>Small cabin</td>
<td>Single</td>
<td>675</td>
<td>80</td>
</tr>
</tbody>
</table>

E-tally

The electronic tally book system keeps track of all items passing through the V-door and it does not require any tagging of the pipe. The system uses the length measuring capabilities of the tubular feeding machine. The operator must give input regarding the pipe type. From this information the system calculates all information needed to replace the conventional tally book. In addition the E-tally system keeps track of the pipe’s location inside the fingerboard or its position in the drill string. The system is also capable of tracing casing.

Industry standard basis

The MH DrillView system is based on a number of industrial-type workstations in a client/server environment. Field level interface (sensors, actuators, and other automation systems) is by programmable logic controllers (PLCs), normally in a profibus type network.

Web server integrated

The MH DrillView system has a built in web server, which means that all data can be made available on the LAN/WAN/Internet as read only or full control instantly.

Interface your drilling equipment

MH DrillView contains all the mechanisms required to interface with drilling equipment for control purposes. Typical examples are control of pumps and valves on mud system schematics, control of hydraulic power units, control and priority setting of starters, assignment of SCRs and others.

Scaleable

MH DrillView is designed to suit all levels of complexity, from systems with small sensor package and one workstation, to large drilling control systems with multiple sensors, control systems, communication links, workstations and users. Decision support, trend monitoring, advanced alarms, interfaces, drilling data management, drilling equipment control, data distribution, easy to use and good graphics are keywords for a good drilling data system. MH DrillView covers these requirements. The MH DrillView system can be delivered to rigs independent of additional drilling equipment, and it is designed to facilitate interface between various types of equipment.

Get your rig connected

The MH DrillView system provides a user friendly interface for acquisition, logging, storage, distribution and display of drilling data, as well as set-up and remote control of drilling equipment. MH DrillView integrates your drilling systems into one common control and monitoring centre. Real time drilling data can be shared between the driller, rig offices, shorebase or other locations accessible by telecommunications.

Integration in practice

Based on drilling operational experience, the system offers a completely integrated platform designed for the entire drilling rig. User friendly screen arrangements cover all normal drilling operations, such as drilling, tripping, mud system storage, mudlogger interface and circulation, kicks, string and hole data, make-up torque logs and others. The user can monitor the status of the individual drilling equipment via “equipment status screens”. These form the basis for efficient trouble shooting, or planning of maintenance. Information is easily accessible due to the system’s versatility and flexibility. The user can easily set up trend charts from a large selection of direct and computed variables. All data stored from previous wells can be replayed for analysis, and all drilling data is available for off line reports using standard office tools like Microsoft Access or Excel. The drilling data is stored in an SQL real time database. A central alarm system provides the rig with distributed status information.
CCTV

The MH CCTV system (CCTV) gives an overview of the operation being performed and the area of operation. The drilling cameras of the CCTV system support the drilling operator in safe operation of the machines and give live TV picture coverage of the critical functions in the drilling sequence. All drilling cameras are ATEX approved.

In addition to the drilling cameras, we deliver marine cameras for video surveillance of the topside/marine areas as a part of the CCTV system. The system utilizes the newest CCTV technologies; including MPEG-4 for video transmission.

Main cubicle

This cubicle contains all required terminals, power supplies, fuses, network equipment and a complete CCTV system; a super micro computer with Milestone CCTV software installed. The cubicle is classified for use in a safe area.

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Main cubicle

This cubicle contains all required terminals, power supplies, fuses, network equipment and a complete CCTV system; a super micro computer with Milestone CCTV software installed. The cubicle is classified for use in a safe area.

Main features:
- View live videos from all cameras, one or more cameras at the same time.
- Setup different views for different users.
- Browse recordings from cameras with a selection of advanced navigation tools, including a highly intuitive timeline browser.

Key features:
- Recording of operations for training purposes, for analyzing the safety of operations, for reviewing of incidents, and for documentation for third parties
- Automatic storing and retrieving of CCTV pictures
- IP digital CCTV system
- Pan/zoom/tilt (PTZ) cameras and/or fixed cameras
- ATEX approved stainless steel housing
- Optional unique high-pressure washing
- Optional duplicated analog and digital system

Application software package for CCTV server

Milestone XProtect Enterprise provides a state-of-the-art IP video surveillance system, supporting the widest choice of network cameras and video servers, with the equipment connected to an office LAN or other TCP/IP network. All video will be stored on harddisk for a configurable number of days.

The optional MH Matrix Server and Panasonic SX650 Matrix Switcher make it possible to view analog video from drilling cameras.

Application software package for HMI

The cameras are controlled remotely by the driller using a MH DrillView screen, a standalone windows application (MH CCTV viewer), or Milestone smart client software. Analog video is available from the driller’s control cabin. Digital video is available from all PC’s connected to the Ethernet network.

MH DrillView interface

MH DrillView is MHWirth’s HMI system for controlling and monitoring of the drilling process. In MH DrillView, there is a dedicated CCTV screen. CCTV can be integrated in other screens as well.

MH CCTV viewer

MH CCTV viewer is an application for viewing the CCTV system independently of MH DrillView.

Milestone smart client

Milestone smart client can be used for viewing digital CCTV video.

Main features:
- View live videos from all cameras, one or more cameras at the same time.
- Setup different views for different users.
- Browse recordings from cameras with a selection of advanced navigation tools, including a highly intuitive timeline browser.

Key features:
- Recording of operations for training purposes, for analyzing the safety of operations, for reviewing of incidents, and for documentation for third parties
- Automatic storing and retrieving of CCTV pictures
- IP digital CCTV system
- Pan/zoom/tilt (PTZ) cameras and/or fixed cameras
- ATEX approved stainless steel housing
- Optional unique high-pressure washing
- Optional duplicated analog and digital system

Application software package for CCTV server

Milestone XProtect Enterprise provides a state-of-the-art IP video surveillance system, supporting the widest choice of network cameras and video servers, with the equipment connected to an office LAN or other TCP/IP network. All video will be stored on harddisk for a configurable number of days.

The optional MH Matrix Server and Panasonic SX650 Matrix Switcher make it possible to view analog video from drilling cameras.

Application software package for HMI

The cameras are controlled remotely by the driller using a MH DrillView screen, a standalone windows application (MH CCTV viewer), or Milestone smart client software. Analog video is available from the driller’s control cabin. Digital video is available from all PC’s connected to the Ethernet network.

MH DrillView interface

MH DrillView is MHWirth’s HMI system for controlling and monitoring of the drilling process. In MH DrillView, there is a dedicated CCTV screen. CCTV can be integrated in other screens as well.

MH CCTV viewer

MH CCTV viewer is an application for viewing the CCTV system independently of MH DrillView.

Milestone smart client

Milestone smart client can be used for viewing digital CCTV video.

Main features:
- View live videos from all cameras, one or more cameras at the same time.
- Setup different views for different users.
- Browse recordings from cameras with a selection of advanced navigation tools, including a highly intuitive timeline browser.

Key features:
- Recording of operations for training purposes, for analyzing the safety of operations, for reviewing of incidents, and for documentation for third parties
- Automatic storing and retrieving of CCTV pictures
- IP digital CCTV system
- Pan/zoom/tilt (PTZ) cameras and/or fixed cameras
- ATEX approved stainless steel housing
- Optional unique high-pressure washing
- Optional duplicated analog and digital system

Robotic motion control

The MH robotic motion control (RMC) makes it possible to move large machines safely and efficiently using a joystick handle. RMC moves the machines along paths.

Available for the following pipe handlers:
- Vertical pipe handling (bridge crane system and 2-arm system) - synchro control system
- Eagle/eagle light
- Pipe racking machine
- Triplex crane

Advantages
- Easy to use; joystick operated
- Efficient and safe movement
- Minimal crew training required
- Movement in narrow areas is done quickly and safely
- All cylinders and motors move in an optimal manner
- Controlled oil consumption
- Vertical pipe handling: The two racking arms and fingerboard are one-man operated allowing for simultaneous roughneck operation

Technology

RMC utilizes mathematics from the world of robot control to calculate the optimal movement of pipe handling systems. Cylinders and motors are equipped with absolute position sensors and the RMC uses these sensors to achieve the correct positioning. The RMC controlled machines move along calculated six axis paths. The first three axes (X, Y, Z) define the position of the load. The last three axes (a, b, l) define the orientation of the load. This gives a great flexibility with respect to requirements given by the rig layout.

Safety
- RMC ensures that no cylinders or motors are moved in such a manner that load can be dropped
- The path that is calculated considers all hindrances along the way to the destination
- The load is kept as low as possible above deck
- Running pattern repeated
- Vertical pipe handling: The two machines are synchronised, hence safer operation
- Eagle/eagle light moves outside working area of travelling assembly/top drive when transporting tubulars to vertical position
- Triplex crane: the yoke is under full control and is kept horizontal and correctly aligned at all times

RMC contains continuous monitoring of all sensors and of the control system itself. This well-proven system detects and reacts to a large number of critical situations:
- Sensor failures
- Computer failures
- Operator failures
- Valve failures
- Calculation failures

RMC can easily be included in a zone management system to ensure inter-machine safety.

User interface

RMC is integrated into the user interface of the control system.
Our Products and Services

Control Rooms and Cabins

Drilling control room

Each MH drilling control room (DCR) is designed to give an optimal solution for the individual drill floor. The DCR can be designed for 1, 2 or 3 operators.

The exterior
The DCR is a self supporting, welded steel construction mounted on vibration dampers. All windows are sun-filtered and contain laminated safety glass with protection grating above the top windows. A specially developed, mud-resistant washer/wiper system is used to enable efficient window cleaning.

The interior
The interior is designed to the highest standards with regard to view, noise reduction, air quality, light, reflections and colours. The DCR can be delivered fully explosion protected or safe by ventilation. The data floor has space for cabling and HVAC ducting.

Built to last
Built to the highest standards of workmanship, the DCR is the right choice for rigs that are competing for the advanced drilling operations of the future.

Interface cabling
When using DCR together with the MH Ex intelligent operator chair and the MH DrillView system, a minimum of interface cabling is required. Extensive use of fibre cabling makes connection in zone easy and inexpensive.

Instrument room
An instrument room adjacent to the DCR can be delivered. This is particularly useful in safe by ventilation installations.
Quality cabins are supplied for various drilling and pipe handling operations. The MH derrickman's cabin and MH assistant driller's cabin are designed and built as optimal, safe and comfortable workplaces to suit various operations. They are self-supported steel structures with suitable lifting arrangements. The operator is situated in an ergonomic chair with an unobstructed view of all necessary equipment and operations. All of the main windows have efficient wiper and washer facilities. The windows are made of tinted, laminated safety glass for optimal view and safety. The cabin interior is heated and ventilated with an efficient defrost/demist function on the windows. Both cabins are designed to meet the most stringent noise level requirements. Cabins for location in both safe and hazardous areas can be delivered.

The MH derrickman's cabin is, during normal operation, the main operation control position for the upper racking arm or bridge crane and the fingerboards.

The MH assistant driller's cabin is normally used as the secondary operating position for the pipe handling in the upper part of the derrick. It can also be used for operation of singular machinery such as a multi manipulator arm or equal.
MHWirth offers global drilling lifecycle services to all drilling equipment and systems customers around the world. The organisation serves customers through five strategic hubs in America, Brazil, Asia, MENA & Caspian and Europe.

MHWirth has been delivering products and solutions to drilling rigs for over 50 years. Drilling lifecycle services is one of the most important areas for our customers, as uninterrupted installation, commissioning and operations translate into financial gain. The ultimate goal is to contribute to the best rig performance on the market, by offering training of customer’s rig crew, personnel onboard the rig during installation and commissioning, and support throughout the operational phase.

The role is as diverse as our products, and we can deliver globally integrated service support standardised through our global service execution plan which includes:

- Recommendations for planning, preparations and purchase of spare parts
- Onsite installation support for our drilling solutions
- Equipment experts for the commissioning of installed equipment
- Spare parts supply through our global spare parts structure
- Access to highly competent service engineers and technical personnel
- Maintenance on delivered equipment
- Information and data collection from the rigs in operation
- Remote condition monitoring of equipment
- Upgrade of equipment in operation to meet the latest standards

Our customers can also access structured information related to their rigs through our interactive web portal, myDrilling™, which provides an effective way to stay on top of operation.

**Worldwide solutions**

MHWirth offers services to over 500 rigs around the world, 70 of this with full MHWirth topside package. These rigs are supported by a dedicated single point, known as a service account manager, located as close as possible to the customer’s onshore support centre. This ensures that we build necessary customer relations to understand the customer’s long term needs.

MHWirth offers lifecycle services for all drilling equipment and systems. Customers are served from our locations around the world, including five strategic hubs:

- America, head office in Houston, US
- South America, head office in Rio das Ostras, Brazil
- Asia, head office in Singapore
- MENA & Caspian, head office in Baku, Azerbaijan
- Europe, head office in Kristiansand, Norway

In addition, you will find our branch offices in Mobile (US), St.John’s (Canada), Luanda (Angola), Shekou (China), Okpo (South Korea), Mumbai (India), Dubai (UAE), Aberdeen (Scotland) and Stavanger (Norway).

**Global drilling lifecycle services**

We provide the full range of services required to ensure excellent performance and safe operation of drilling equipment and systems on rigs all over the world. From our strategic hubs, the global services provide 24/7 technical and operational support worldwide by our dedicated service account managers (SAM) and a large number of highly skilled service engineers.

Our global team of senior engineers support complex troubleshooting and provide a knowledgeable engineering capacity, covering all applicable disciplines, such as mechanical, hydraulic, electro, instrumentation, control system, software, structural and calculation.

In addition, distribution of alerts and bulletins serves to maintain a high standard of HSE and product quality on MHWirth drilling equipment.

**Offshore services**

Being a worldwide partner for the drilling industry, with spare parts offices and warehouses in Norway, UK, Singapore, Baku, Erkelenz, Houston and Brazil available for immediate support, we are professional providers of Original Equipment Manufacturer (OEM) parts and have a vision to be the preferred partner for spare parts supply.

**Spare parts**

MHWirth can provide:

- Efficient and reliable supply and logistics – delivering the right spare parts by the agreed time
- Parts supply for all our offices in Kristiansand, Horten, Erkelenz, Askøy and Fornebu
- Supply of high quality OEM and standard spare parts
- One customer contact for spare parts supply
- 24/7 spare parts support
- Spare parts in stock supplied globally within 48 hours (FCA Incoterms 2000)
- One global spare parts price list (FCA INCOTERMS 2000)
- Special stock of capital, critical, and long-lead spare parts
- Recommended spare part lists, per rig or equipment provided with user manual
Overhaul and modification

We offer professional overhaul and installation services, modifications and upgrades. Experienced and competent project managers and senior engineers plan and supervise the work.

The services are based on international industry standards, internal procedures, original manufacturing drawings and documentation. We ensure that all parts are original, and that the sub suppliers are certified according to our quality standards. DNV and ABS carry out these certifications on our behalf as part of our services.

Added value for the customers are warranty on all overhauls, updated original documentation, original parts, implementation of bulletins (HSE issues), overhauled equipment prepared for condition based maintenance, and a wide range of exchange components to reduce non-productive time during overhauls.

Training and drilling optimisation centres

High quality training is necessary to safely and efficiently operate advanced rigs. Consider the potential results of an untrained crew working with complex machinery and systems; poor performance, equipment problems, and serious incidents are just the beginning of a list of issues that can be greatly minimized with the correct training. Just as importantly, an extensive and realistic training program will increase the profit of the drilling rigs. A well performing crew will utilise the equipment in the best possible manner, resulting in increased uptime and reduced wear-and-tear on the machines.

The drilling equipment simulator (XfactorDES) is a multifunction 3D simulator that provides mathematically correct models of rigs. Each rig is meticulously recreated as a virtual asset, including all rig equipment and control systems. This offers the possibility of onshore training and detailed operational planning and optimisation in virtual environments that are identical to those offshore. Providing a clearer view of the offshore installations and functioning as a testing ground for upgrades and installations, the simulator has proven its value in terms of everything from HSE benefits to increased speed and efficiency of well drilling.

Area of use
- Design of drill floor, processes and control systems
- Quality assurance of entire process by 3D visualisation and simulation of actual equipment and control system
- Training of personnel
- Commissioning, by building the rig and applying the control system in the simulator. A log can be prepared virtually and off critical line, shortening the actual commissioning process
- Monitoring and optimisation of operating rigs
- Benchmarking of performance can be done at any given time, and possible deviations detected and handled
- Fault diagnostics of equipment
- Remote support for rigs in operation

e-Services

MHWirth offers several services aimed at providing better insight and understanding at both operational and managerial levels of the drilling operation.

Whether it comes to knowing the status of the equipment, administrative concerns related to the rig, the rig’s track record, or minimizing down time through effective troubleshooting – the right information, at the right time is the key to success.

Acknowledging this, our engineers and software developers are constantly working on new methods to address the need for this precise and relevant information. Our forefront in this respect is myDrilling™, Riglogger™ and remote diagnostics.
Respect for health, safety and the environment is one of MHWirth’s core values. This HSSE mindset is founded on the belief that all incidents can be prevented, and is the key to the company’s work within health, safety and environment.

An HSSE program has been introduced to emphasise the personal element of HSE, while a group wide HSSE operating system, HSSE training and focus on leading indicators, are all elements of MHWirth’s systematic efforts to achieve world class HSSE performance.
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