Maersk Resilient

350ft high-efficiency jack-up
Simple to Be Safe

Maersk Drilling truly wants to bring our people Out Of Harm’s Way. We are challenging the way we work with safety, not only as a priority but as a commitment.

This starts with asking our frontline colleagues what they need to stay safe and efficient. We are thinking out of the box for ways to eliminate risk. Nobody should ever be in doubt as to how to perform a task safely.

We are removing complexity and reducing administration so we have more time for safety conversations. We are innovating new solutions to digitise and make our work processes more visible.

We want to make it Simple to Be Safe.
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### Delivering operational excellence with innovation

Maersk Drilling provides offshore drilling services to oil companies in major oil basins around the world.

We are a leader in the harsh environment sector and have a strong track record in deepwater drilling. Our fleet is one of the youngest and most advanced in the industry, comprising advanced drillships, deepwater semi-submersibles and high-end jack-up rigs.

For over 40 years, we’ve been working closely with our customers to deliver safe and efficient drilling campaigns. Our highly skilled and committed workforce of on- and offshore professionals is recognised for their technical skills, operational excellence and for solving complex problems.

Today, we’re increasingly providing third-party services and partnering with our customers on innovative technologies and new commercial models. Together, we’re reducing the complexity, cost, and risk of drilling campaigns to improve the competitiveness of offshore oil and gas for our customers.

**Jørn Madsen**  
CEO, Maersk Drilling
“Our fleet is one of the **youngest** and most **advanced** in the industry, comprising advanced drillships, deepwater semi-submersibles and high-end jack-up rigs.”
Smarter Drilling for Better Value
Offshore oil and gas is in a race to produce the most competitive barrel of oil. With dozens of different suppliers and multiple interfaces involved, the process of delivering a well safely, on time and within budget has become more complex for operators than it needs to be.

Every hour spent on a well counts – there’s a lot to play for

Smarter Drilling for Better Value is Maersk Drilling’s response to this. It combines innovative technologies with new commercial models to reduce waste and inefficiency across all the activities delivered on a well.

We provide solutions that plan, orchestrate and integrate the services involved in a drilling campaign. By improving coordination and simplifying interfaces across the supply chain, we aim to reduce overall NPT, increase efficiency and improve safety for our customers.

We’re also building new types of alliances with our customers that take a longer-term time horizon, align incentives and create value for the partners. Together, we’re lowering the cost per barrel and improving the competitiveness of offshore oil and gas.

Our joint challenge:

60+ suppliers

It can take over 60 suppliers and 6,000 invoices to drill an offshore well

20–25% NPT

Non-productive time (NPT) is often 20–25% across all suppliers on a well
Rig capabilities

The Maersk Resilient is a 350ft, Gusto-engineered MSC CJ50 rig with design optimisation inputs from Maersk Drilling.

A completely flat main deck, raised cantilever box and forklifts improve material handling efficiencies. The XY cantilever ensures quick skidding between well locations, requires no rig up or rig down and allows for full drilling loads irrespective of movement from centre line to port or starboard.

The MHWirth drilling package enables offline handling of all tubular types and incorporates automated sequencing of operations as well as anti-collision systems. Specifically designed material handling capabilities allow for deployment of XMTs and the ability to handle HP risers.
Main features

**POB 120**

- **Up to 6,500MT**
- **variable deck load**

**350ft**

- **479ft legs**
- **give a maximum operating water depth capability of up to 350ft**

**7,500psi**

- **circulating system**

**Plus...**

- **15,000psi** BOP with shear boost, 10,000psi annular preventer and 15,000psi choke and kill manifolds
- **King posts** for burner booms, sprinklers and fixed lines for oil/gas, seawater and air pre-installed at the dedicated testing area
- **6 x Swaco BEM 650** high-performance shale shakers and two Swaco vacuum degassers
- **Wirth GH 4500 EG-AC 4,500HP** draw-works grooved for 1¾" drill-line
- **Fully automated** (CADS) pipe handling and provision for offline activities
- **Harsh environment** (North Sea, HPHT, H2S) jack-up rigs
- **Subsea operations** capability with 75MT skidding load on Texas deck

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**30,000ft**

- **Maximum drilling depth**

**2,100m²**

- **Enlarged deck space**
- **by up to 2,100m²** due to innovative placement of accommodation and vents

**6,290bbls**

- **liquid mud capacity**

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**74.8ft (22.8m)**

- **diameter octagonal helideck suitable for Sikorsky S-61 helicopters**
- Maersk Reacher has a 93.5ft

**3.50ft**

- **Raised XY cantilever with a drilling envelope 70ft x 45.9ft** (21.3m x 14m).
- No drop-off of hook load when skidded off centre line. No impact to deck space when cantilever retracted
Two perfect HSE periods

Operating for Maersk Oil (now Total), Maersk Resilient has been granted a safety award by the customer for two years in a row (2017 and 2018) for ‘A Perfect HSE Period: Accomplished for Outstanding Safety Performance’.

The achievements have been a result of actively engaging the crew in the safety goals, e.g. by letting crew members take turns hosting the Toolbox Talk. Such initiatives were key to encouraging the ownership mindset that resulted in the outstanding performance; an entire year without recordable incidents.

Setting new benchmarks for completing workovers

Performing workovers for Total offshore Denmark, Maersk Resilient saved our customer both time and costs by introducing improved procedures supporting various parts of the operation.

By changing the procedures, the total time for rigging up and pressure testing the coil tubing equipment was decreased by more than 50%.

The Maersk Resilient team also introduced a new, safer and faster procedure for handling the surface Xmas trees, by utilising the XY cantilever’s ability to skid while being attached to the Xmas tree.

These achievements were highly praised by customer Total, who expressed that the team had set new benchmarks for the completion of a workover programme.
<table>
<thead>
<tr>
<th>Built in:</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Built in:</td>
<td></td>
</tr>
<tr>
<td>Countries operated in:</td>
<td>Denmark</td>
</tr>
<tr>
<td>Customers worked with:</td>
<td>Dubai Petroleum</td>
</tr>
<tr>
<td>Operational experience:</td>
<td>HPHT</td>
</tr>
<tr>
<td></td>
<td>Workovers</td>
</tr>
<tr>
<td></td>
<td>H2S</td>
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## Main dimensions

<table>
<thead>
<tr>
<th>Main dimensions</th>
<th>Imperial</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hull length overall</td>
<td>229.7ft</td>
<td>70m</td>
</tr>
<tr>
<td>Hull width overall</td>
<td>223ft</td>
<td>68m</td>
</tr>
<tr>
<td>Hull depth</td>
<td>31.2ft</td>
<td>9.5m</td>
</tr>
<tr>
<td>Length of legs</td>
<td>479ft</td>
<td>146.3m</td>
</tr>
<tr>
<td>Cantilever (max reach aft of stem)</td>
<td>70ft</td>
<td>21.3m</td>
</tr>
<tr>
<td>Transverse (STB/PS)</td>
<td>23.6/22.3ft</td>
<td>7.2/6.8m</td>
</tr>
<tr>
<td>Equivalent spudcan diameter</td>
<td>52.4ft</td>
<td>16m</td>
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</tbody>
</table>
# Maximum design limits

## Operational capabilities

<table>
<thead>
<tr>
<th></th>
<th>Imperial</th>
<th>Metric</th>
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</thead>
<tbody>
<tr>
<td>Max water depth</td>
<td>350ft</td>
<td>106m</td>
</tr>
<tr>
<td>Wind speed</td>
<td>100 knots</td>
<td>51.4 m/sec</td>
</tr>
<tr>
<td>Drilling depth</td>
<td>30,000ft</td>
<td>9,150m</td>
</tr>
<tr>
<td>Max wave height</td>
<td>55ft</td>
<td>17m</td>
</tr>
</tbody>
</table>

## Variable load capacity

<table>
<thead>
<tr>
<th></th>
<th>Imperial</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable load (jacking condition)</td>
<td>7,716,180lbs</td>
<td>3,500MT</td>
</tr>
<tr>
<td>Variable load (elevated) pending site assessment</td>
<td>1,433,004,000lbs</td>
<td>6,500MT</td>
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</table>
# Storage capabilities

<table>
<thead>
<tr>
<th>Storage capabilities</th>
<th>Imperial</th>
<th>Metric</th>
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<tbody>
<tr>
<td>Liquid mud (active)</td>
<td>6,290bbls</td>
<td>1000m³</td>
</tr>
<tr>
<td>Base oil storage</td>
<td>1,572bbls</td>
<td>250m³</td>
</tr>
<tr>
<td>Brine storage (heavy brine accepted e.g. bromide)</td>
<td>3,145bbls</td>
<td>500m³</td>
</tr>
<tr>
<td>Drill water</td>
<td>5,500bbls</td>
<td>875m³</td>
</tr>
<tr>
<td>Potable water</td>
<td>2,768bbls</td>
<td>440m³</td>
</tr>
<tr>
<td>Fuel oil</td>
<td>3,396bbls</td>
<td>540m³</td>
</tr>
<tr>
<td>Bulk cement</td>
<td>7,050cu-ft</td>
<td>200m³</td>
</tr>
<tr>
<td>Bulk barite/bentonite</td>
<td>10,550cu-ft</td>
<td>300m³</td>
</tr>
<tr>
<td>Maximum operational variable load</td>
<td>9,920klbs</td>
<td>6,500MT</td>
</tr>
<tr>
<td>Cantilever pipe rack</td>
<td>1,102 kips</td>
<td>500MT</td>
</tr>
<tr>
<td>Max cantilever load (combined)</td>
<td>2,822 kips</td>
<td>1,280MT</td>
</tr>
<tr>
<td>Storage capabilities</td>
<td>Imperial</td>
<td>Metric</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------</td>
<td>----------</td>
</tr>
<tr>
<td>Max hook load</td>
<td>1,510 kips</td>
<td>685MT</td>
</tr>
<tr>
<td>Max rotary load</td>
<td>1,510 kips</td>
<td>685MT</td>
</tr>
<tr>
<td>Max setback load</td>
<td>1,322klbs</td>
<td>600MT</td>
</tr>
<tr>
<td>Sack storage</td>
<td>5,000 sacks</td>
<td>5,000 sacks</td>
</tr>
</tbody>
</table>
Equipment

Well control equipment

The R-rigs have been designed to ensure that well control equipment handling and operations have minimum impact on the well delivery and time schedule. Subsea handling systems and hoses remain connected, minimising installation time.

- BOP: Hydril compact 18 ¾” 15,000psi BOP consisting of one 10,000psi annular and two 15,000psi double ram preventers (standard for all R-rigs)
- 15K BOP hoses and control hoses that are permanently rigged up to reduce nipple up/down time
- NT2 connector rather than bolted flange connection for reduced nipple uptimes
- BOP carrier meaning no man-handling, allowing for safer and faster transportation
- BOP can be tested offline to full working pressure as hoses are connected at all times
- Glycol unit installed at the choke manifold
Drill floor

Maersk Resilient is fitted out with an MHWirth topside and driller’s cabin. The design allows for offline handling of tubulars whilst main well centre operations are carried out, and incorporates anti-collision systems.

- Maritime Hydraulic DDM-750-AC, 680MT capacity, with pipe handler, link-tilt and block retract system
  - Max continuous torque 64,400ft-lbs at 100rpm
  - Intermittent torque 84,800ft-lbs
- Maritime Hydraulic “Drill view” drilling instrumentation with the ability to read and store casing make-up graphs
- Driller and AD in the same driller’s cabin enables better communication
- Redundancy within controls since driller and AD chair are identical
- 1,500,000lbs capacity Wirth GH 4,500hp draw-works grooved for 1¾” drill-line
- Dual pipe handling. While one string is working at the main well center, offline casing, tubing, drillpipe and bottom hole assembling can be built or laid out from the mouseholes, reducing the time spent on the critical path
- Derrick Max setback load: 600MT.
  Dimensions: 210ft x 45ft x 45ft (64m x 14m x 14m)
- Torque-Master (Maritime Hydraulic iron roughneck) make up/breakout torque 150,000ft-lbs
- Torque-Master sits on a turntable and can service both the main well center and the mouseholes
- Maritime Hydraulic auto iron roughneck MH 1899 tubular size range: 3½”–9½” DC. Fitted with automatic MUD Bucket system
- Pipe racking system consisting of bridge crane, lower guiding arm, adjustable casing fingerboard, DP/DC fingerboard and bellyboard with tubular capacity of 4”–14”
- Pipe transfer system consisting of tubular feeding machine and Eagle Light pipe handling machine to transfer tubular to vertical position at well centre and mousehole
- Smart zone management system
Fluids system

Three high-efficiency gear-driven mud pumps, fitted with p-quip type fastening, provide a high-quality working environment.

- 3 x Wirth 7½" x 14" 2,200 HP triplex pumps rated for 7,500psi with anti-sync mode, which obtains better signals from downhole tools back to surface.
- Mud mixing system consisting of:
  - Mud system partially auto/remote operated
  - Dust collector/recirculation system for bulk system
  - Cell feeders and controls for automatic dosing from surge tanks
  - Sack cutting machine with dust extraction
  - Mud mixing hopper with manual sack table, venture mixer
  - Big bag station with dust extraction, metering screw for automatic dosing
  - Liquid skid for automatic dosing of liquid additives to mixing system
  - Roller table for internal handling of sacks to manual sack table
- 6 x Swaco BEM 650 high-performance shale shakers located in the cantilever deck to minimise the flow distance from the well centre with up to 1,800gpm capacity
- 2 x Swaco vertical degassers
Material handling

Resilient is designed with two distinct handling zones. The cantilever, equipped with a pipe deck pipe handler (PDPH), allows for drilling equipment to be handled by the drill crew while the rig cranes and forklifts accommodate the rest of the equipment.

**Cranes:**
- Maritime Hydraulic BB451 pipe deck pipe handler (PDPH) with a lifting capacity of 4.5MT to transport tubulars from pipe deck to the tubular feeding machine (TFM). The PDPH can supply the drill floor during heavy weather, as most equipment is stored in the cantilever, reducing dependence on deck cranes. It also has a greater operability criteria than a lattice boom crane (up to 70 knots)
- 2 x Favelle Favco deck cranes with 155ft (47m) boom, 80MT maximum hoist capacity
- 1 x knuckle boom crane with 82ft (25m) reach, 12MT load, 5MT winch. Can lift 2¾” to 20” casing
- Forklift on main deck can lift up to 3MT (one extra 4MT forklift for mud skip handling)

**Texas deck:**
- 18.3m x 10.1m hinged drive pipe support deck for conductor support – 75MT capacity both stationary and while skidding
- Capacity: 2MT/m² without BOP load and 0.5MT/m² with BOP load
- 2 x hydraulic skidding cylinders with capacity: push 22MT, pull 18MT
Cantilever

Resilient is designed with an XY cantilever. This means the entire box section moves in both directions rather than having the drill floor skid port/starboard independently. As a result, no drop-off of combined load occurs off the centre line, and extremely efficient skidding can be achieved between well slots with no rig up or rig down required.

- Cantilever with XY transverse skidding creates a large drilling envelope and therefore more flexibility. It can skid with a full setback load
- Max reach: 70ft/21.3m (prepared to 82ft)
- 685MT combined load (hook, rotary, setback, BOP and conductor tensioning load) at 70ft outreach (see operations manual)
- Total transverse skidding: 45ft/14m
- Higher drilling loads are available at extremes of skidding envelope
- Cantilever raised 9ft above main deck allowing more available deck space for equipment
- 4 x 5MT guideline winches in Moonpool area for subsea operations
- Enclosed cellar deck and BOP area create a good working environment

Power supply

Maersk Resilient’s diesel engines and generators are split into two rooms for improved maintenance conditions, and equipped with black-out prevention.

- 4 x Wärtsilä 8L26 diesel engines and AVK 3508B generators each 2,340kW
- The power management system has prioritisation and increased black-out prevention built into it
- 4 x large, powerful engines enable flexibility and redundancy
Accommodation

Maersk Resilient’s accommodation is wrapped around the forward leg to create more deck space, as well as being divided into two blocks, one for work and one for accommodation.

- Port block is a quiet area with cabins, while starboard block holds all offices, recreation rooms and service facilities
- Maximum POB of 120 persons
- The layout allows separation between offices and accommodation, leading to better working and sleeping environment for the rig crew

- Moving accommodation around the leg leaves more deck area for operator equipment (2,000m²)
- Small cargo lift installed to service all floors of the accommodation block

Third-party service stations

The following service stations are provided:

- Wire line well logging unit and tool house
- Mud logging unit
- ROV unit and tool house
- Slurry unit
- Well test areas

Each service station is arranged as follows:

- Power (440VAC) main and emergency supply as necessary, breaker size to be advised
- F&G connection
- PA/GA system connection
- Telephone connection
- PC connection for connection to the CN network
- ESD connections as appropriate
Rig drawings

Top view
Side view