THE HORSE SHOE RIG
A Semi-Sub for Tender Assisted Drilling
Presentation Outline

• Overview of the Horse Shoe Tender Assisted Drilling Rig
  – The difference of the Horse Shoe compared to existing tenders
  – Simplified Rig Up
  – Detailed drawings of the Horse Shoe Semi Sub Tender
  – Derrick Set, Drill Floor and BOP Floor
  – General specifications

• Advantages
  – Time savings - rig up/rig down
  – Waiting on weather
  – Economical advantages
  – Safety
  – Maintenance
The Difference with Existing Tenders?

- Horse Shoe
- Semi-sub Tender
- Barge Tender

46 m
The Difference with Existing Tenders?
The Difference with Existing Tenders?

- Larger deck space
- Larger mud tank volume
- Living quarter capacity increased
- More stability - less Waiting on Weather
- Offline capacity for make up and break out – faster drilling
- Decreased rig up / rig down time
- Enhanced Safety – Less heavy lift
- Operations in deeper waters
The Difference with Existing Tenders?

Horse Shoe Tender  VS.  Semi Sub Tender

• Both Rigs are large with large storage capacity
• Both Rigs stable in severe weather conditions.

HORSE SHOE ADVANTAGES:

➢ FAST RIG UP DUE TO SINGLE LOAD LIFT!
➢ Enhanced Safety – Less heavy lift – Simplified Maintenance
1. TENDER APROACHING THE PLATFORM
Simplified Rig Up – Step 2 and 3

2. LIFT DRILLING PACKAGE TO CLEAR PLATFORM

3. TENDER APROACHING AND ‘SWALLOW’ PLATFORM IN THE ‘HORSE SHOE’
Simplified Rig Up – Step 4 and 5

4. SET DRILLING PACKAGE ON JACKET BY BALLASTING DOWN

5. TENDER PULLING CLEAR TO DRILLING POSITION.
Simplified Rig Up – Final Step

6. RIG READY FOR DRILLING
Final Drilling Position

- **Sea Level**: 13 m
- **Level 4**: 46 m
- **Level 3**: 24 m
- **Level 2**: 80 m
- **Level 1**: 80 m
- **Level 0**: 80 m
- **Bottom**: 46 m

Dimensions:
- **Width**: 80 m
- **Height**: 46 m
Overall Arrangement Top View
Drilling Configuration Top View
Overall Arrangement Deck Level 1
Overall Arrangement Deck Level 3
Overall Arrangement Deck Level 4
Derrick Set Overall Arrangement
Derrick Set Drill and BOP Floor
General Description

• **Rig type:** New design – Horse Shoe Semi Sub
  The semi sub is able to place the **DERRICK SET in ONE GO!**

• **Operating water depth:**
  – Maximum water depth 150 m (mooring can be adapted to deeper waters)
  – Minimum water depth 20 m

• **Classification category:** Det Norske VERITAS (DNV).

• **Hull:**
  – Length 80.0 m
  – Width 46.0 m
  – Height at bow (incl. helideck) 40.2 m
  – Height at stern 21.0 m
  – Draft (Transit) 7.8 m
  – Draft (operation) 13.0 m
  – Horse Shoe opening width 30.0 m
  – Horse Shoe opening length 26.5 m
  – Variable load capacity 7500 mT
General Description

• Derrick set, commissioned on-shore “once and for all”

• Double Standing Pipe Rack for tubing and casing.

• 1200 m² extra available storage deck during operation.
  – Innovative solution with foldable / skiddable deck
  – Total deck approximately 3000 m²

• Option to make the semi-sub self-propelled.

• Can be fitted with a dynamic positioning system.

• Can be adapted to install a derrick set with load limitation on the Jacket.

• Can be used as Multipurpose Services vessel for:
  – Coiled tubing operations
  – Drilling associated logistics operations
General Description

• Automatic ballasting and bilging system
  – Permitting the tender semi-sub to remain horizontal under variable load.

• Derrick lifting system based on jacks (800 mT)
  – Jacks range of elevation 20 meters.
  – Proved and used design by Dietswell – RCR-2000 drilling rig.

• Living quarters for 144
  – 12 double bed rooms.
  – 30 4-bed rooms.

• Helideck adapted for Sikorsky S61.
Time required for Rig-up/Rig-Down

- Flat bottom tender rig: ~8 days
- Semi-sub with onboard crane: ~4 days
- Horse shoe tender rig: 1 day

The above required rig-up / rig-down time assumes that the weather conditions are good and allow for crane operations from a tender assisted drilling barge.

Under more severe weather conditions, the difference in rig-up / rig down time between the Horse Shoe Rig and a normal semi-sub or tender assisted drilling barge will be even more important.
Weather Down Time During Drilling Operation

- Flat bottom tender rig: 10%
- Semi-sub with onboard crane: 2%
- Horse shoe tender rig: 2%
**Economical Advantage – Reduced NPT**

**NUMBER OF EXTRA DRILLING DAYS PER YEAR BY USING THE HORSE SHOE SEMI-SUB DRILLING RIG**

<table>
<thead>
<tr>
<th></th>
<th>HORSE SHOE TENDER RIG</th>
<th>SEMI-SUB TENDER RIG</th>
<th>FLAT BOTTOM TENDER RIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumption: 10 Moves/Year</td>
<td>10 days</td>
<td>40 days</td>
<td>80 days</td>
</tr>
<tr>
<td>Weather Down Time (Yearly)</td>
<td>2% -&gt; 7 days</td>
<td>2% -&gt; 7 days</td>
<td>10% -&gt; 28 days</td>
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<tr>
<td>Total Non Productive Time (NPT)/Year</td>
<td>17 days</td>
<td>47 days</td>
<td>108 days</td>
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<tr>
<td>Drilling Days / Year</td>
<td>348</td>
<td>318</td>
<td>257</td>
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**CONCLUSIONS:**

- 91 Extra Drilling Days/Year compared with Flat Bottom Tender Rig
- 30 Extra Drilling Days/Year compared with Semi-Sub Tender Rig
Safety Advantages

- Minimized intervention during the lift-up.
  - The lift-up of the derrick set is done using 4 jacks instead of a crane.
  - During the lift-up, the derrick set is secured to the 4 jacks.
  - No swinging of hanging objects.

- Minimized number of people involved in the lift-up of the derrick set
  - Computer assisted and remote controlled movements of the derrick set.
  - No manhandling of lifting gears.

GLOBAL SAFER OPERABILITY
Maintenance Advantages

• Derrick set placed on the well-head platform in ONE GO!
  – Derrick set transported “ready-to-use” and not in modules.
  – No need for assemble/dismantling of the derrick set.
  – No welding required.
  – Minimized risk of structural damage compared with derrick set build from modules (repeated assemble/dismantling).
  – Umbilical permanently connected: no leaks, no pollution….

• “Once and for all” derrick set commissioning.
  – Top Drive.
  – BOP Control Lines
  – Flow Lines
  – Drawwork cable
  – …
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DIETSWELL CONTACT DETAILS:
Frederik Nilsson, Ph. D.
Business Development Manager

Address: Actipole - 134 Ave. Joseph Kessel
78960 Voisins le Bretonneux

Phone (office): +33 1 39 30 21 60
Phone (direct): +33 1 39 30 13 95
Fax: +33 1 39 30 21 61
Mobile: +33 6 86 32 07 27
e-mail: frederik.nilsson@dietswell.com