Rig Performance Analytics
The Integrated Approach

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18th September 2019
PDO Operational Dimensions
Well Engineering Digitalization Vision
HSE & Operation Performance
The integrated approach
electronically Delivering the Limit (eDtL)
RigHour in PDO, Value for Business
Key KPIs and visualizations dashboards
If you can measure it, you can improve it!
Impact of Integrated Approach
Way Forward
PDO Operational Dimensions

- **8500+ Employees**
- **70+ Nationalities**
- **70000+ Contractor**
- **4 Women Directors**

Other key figures:
- > 8,000 active wells
- > 30,500 km of pipelines and benefactions
- 22,400 completion and well intervention activities (highest ever with this same mechanism)
- Capital expenditures (CAPEX) US$5.5 billion
- Operating expenditure (OPEX) US$1.9 billion
- 19 mcf/MBM, less than what it was in 2010
- 36, 365, 4140, 70, 4140, 25,000
Well Engineering Digitalization Vision

By 2030 We will Safely Deliver our Wells at HALF the Current E2E Delivery Time and Lifecycle Cost while Maximizing Well Availability and the Value of our People and Technology and creating a Self Assuring mindset
Achieved the best ever cost/meter, through very efficient operation with an improvement of 4% time to drill a meter and lowest NPT record of 8.5%.
Create competition at all levels in Wells: Team; units, contractor and crew

Embed GtP concept into day to day activity and performance improvements

Create a self-monitoring culture

Data Quality check
eDtL is an automated electronic method of automatically detecting and analysing time-based rig activities based on actual historical data.

**Objective**
Performance improvement by reducing Non Productive and Invisible Lost Time.

**ILT = Actual Time – Technical Limit Time – NPT**

- **Actual Time**
- **Technical Limit Time**
- **ILT**
- **NPT**

**RigHour**
Automatic Rigstate detection, KPI generation and visualization.
eDtL Journey

- **2010**: eDtL kick off 13 KPI's
- **2012**: Enhanced Operations Code
- **2014**: Enhanced KPI's for more accuracy
- **2015**: RigHour Deployment 38 KPI's, Bit Performance Module, More automation
- **2018**:...

Graph showing timeline and data points:
- 2010: 29
- 2011: 34
- 2012: 38
- 2013: 40
- 2014: 46
- 2015: 52
- 2016: 52
- 2017: 52
- 2018: 52

Graph indicates increasing numbers over time, with labels for Wells and Rigs.
RigHour in PDO, Value for Business

- **Data QC module**
- **NPT KPI**
  - 38 customized KPIs
- **ILT KPI**
- **Bit Performance Management**
- **46 Rigs**
- **+5000 Wells**
- **Automated data loading & KPI generation**
- **Flexible visualization & Reports**
  - Time vs. Depth with AFE & BCT

**Visualization**
- Multiple visualization options (Bar, Pie, Histogram etc.)
- Customized User defined targets, templates & reports
- View Performance by Rigs, Rig Types, Well Types, Contractor, operations Team, Department & any time line
- Minimum Admin Maximum Utilization

**Key Features**
- 46 Rigs
- +5000 Wells
- 38 customized KPIs
- Automated data loading & KPI generation
- Time vs. Depth with AFE & BCT
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KPIs visualizations

One KPI to know lost time from various activities

ILT KPI report is made of lost time calculated from 13 selected KPI’s (ILT does not contain NPT) & Rig move

ILT can be viewed by Rig, contractor, department, phase, and any time duration

NPT by %, days, Category and Sub categories

Nested NPT KPI to track invisible NPT (Normally ignored, but sometimes have significant cost impact)

NPT can be viewed by Rig, contractor, department, phase, and any time duration
**Active Well Status**

- **Status view of rig operations**
- **Rig list can be customizable for user preference**
- **Shows basic rig & well information**
- **Highlights rigs with NPT, and displays Total NPT**
Bit Performance Management

- Bit Performance management module built for the first time
- Identify the best performing bit based on formation type
- Evaluate Bits model, types and contractor products
- Enable bit selection for future wells based on historical data
- Helps ROP vs. Bit field study
Time vs. Depth Curves

Customized Time vs. Depth curve

Time vs. depth curve plots AFE Plan, WCC Plan, Best Composite Time and Actual

View current well progress against plan

Historical drilling performance analysis of well types, helps planning for the upcoming wells

Together with Bit Performance KPI, the selection of materials is simplified
Improve Data Quality Using RigHour

- Duplicate Entry
- Missing reports entry
- Incorrect reporting
- Zero or Negative duration
- Intersection of activity time

Simplify QC of DDR data
Better Data Quality = Better performance visibility
If you can measure it, you can improve it!

<table>
<thead>
<tr>
<th>#</th>
<th>Activity Type (Baseline)</th>
<th>Activity per Year</th>
<th>Time Saved Assumption</th>
<th>Annual Saving Potential (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gross Connection (14 min)</td>
<td>55,000</td>
<td>1 min</td>
<td>38</td>
</tr>
<tr>
<td>2</td>
<td>Nipple Up BOP (4.5 hrs)</td>
<td>935</td>
<td>30 min</td>
<td>19.5</td>
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<tr>
<td>3</td>
<td>Pressure Test BOP (3.5 hrs)</td>
<td>1,300</td>
<td>30 min</td>
<td>27</td>
</tr>
<tr>
<td>4</td>
<td>Rig Move (3 days)</td>
<td>500</td>
<td>1 day</td>
<td>45</td>
</tr>
<tr>
<td>5</td>
<td>NPT (10%)</td>
<td></td>
<td>1%</td>
<td>160</td>
</tr>
</tbody>
</table>

Estimated Saving Opportunity = 290 days with minimum improvement
Assumptions: above calculation based on 45 units & 355 working days/unit
Impact of Integrated Approach

Achieved the highest Top Quartile Percentage: 70%,

Best $/m ever and 5% better than 2018 performance

Lowest ever overall NPT% in PDO Wells history

4% improvement YTD in Drilling efficiency (Hr./m) compared to 2018
Going Forward

User Customized Dashboard

Operations Management Center

Hoist and Rig-less activities performance KPIs in RigHour

2019

Fully Automated Performance Management in the Operations Management Center (OMC)

2030