Risk

Analyzing Petrobras DP Incidents

Marcelo Santa Rosa Costa and Gilberto Behuhn Machado

Petrobras

October 17-18, 2006
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Marcelo Santa Rosa Costa
Gilberto Beduhn Machado
E&P-SERV/US-SS/CPSE
Petrobras Scenario

• 80% of the Brazilian oil and gas production is extracted from the sea.

• Different working environments - some of them specific to the Brazilian offshore fields.

• DP rigs, a successful tool used to drill, complete and carry out workovers in sub sea wells.
• Situation before 1992:
  ✓ Poor operational procedures and lack of contingency plans;
  ✓ Inappropriate operational safety limits;
  ✓ Engineers were unfamiliar with DP rigs details.

• Petrobras started carrying out DP vessel studies.

• 1992 => DPPS (Dynamic Positioning Safety Program) is created in partnership with contractors - to avoid incidents or, at least, to minimize their consequences by using a proactive policy.

• 1996 => The number of DP vessels started increasing rapidly.
Projects being developed by DPPS

01 - Weather Forecasts
02 - DP Incidents Data Bank (BDIP)
03 - Restrictions Diagram
04 - Procedure Prior to Arrival on Location
05 - Position Reference System
06 - EDS and Degraded Status Criteria
07 - Contingency Plans for Uncontrolled Drift (blackout situation)
08 - DP Rig Audit
09 - Non-conformities Data Bank (SPS)
10 - Bid Requirements
11 - Key DP Personnel Log Book
12 - DP Training for Petrobras Representative on board
13 - New Projects
02 - DP Incidents Data Bank (BDIP)
Objectives:

• to avoid repeating occurrences - an useful and practical tool to improve **reliability** on DP Vessels;

• to keep an updated source for contracts renewals and

• for DPPS risk management purposes.
BDIP

Banco de Dados de Incidentes em Posicionamento Dinâmico
Definition of Incident

**NORMAL STATUS**

- **NO OFF SETS**
- **DEGRADED STATUS**

**YELLOW ALARM STATUS**
- 3% WD

**RED ALARM STATUS**
- 6% WD

**DISCONNECTION**

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>EFFECTS</th>
<th>CONSEQUENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of Redundancy</td>
<td>Degraded</td>
<td>Without loss of position - Possible cease of operations (Critical Operation)</td>
</tr>
<tr>
<td>Progressive loss of station keeping capability</td>
<td>Yellow Alarm/ Red alarm</td>
<td>Loss of position under control – preparing for disconnection =&gt; disconnection</td>
</tr>
<tr>
<td>Sudden loss of station keeping capability (ex: black out)</td>
<td>Straight Red Alarm</td>
<td>Loss of position without control =&gt; Immediate disconnection</td>
</tr>
</tbody>
</table>
DP Incidents 1992 - 2005

- Degraded Status: 305
- Yellow: 69
- Red: 105
- Blackout: 45

Total: 479

- Red: 105
- Rig Connected: 76
- Rig Disconnected: 29
- Unsuccessful Disconnections: 7
Blackout - Type of Incident - 1992/2005

Total: 45

- Straight Red Alarm: 27
- Red Alarm: 14
- Yellow Alarm: 4

Total incidents: 45
Yellow Alarm vs. Working Hours

1985-2005

[Bar chart showing data for years 1985 to 2005]
Disconnections vs. Working Hours

1985-2005
Blackouts vs. Working Hours
1985-2005
Failure Root Causes

&

Trigger Systems and Points

Total: 105

- Power System: 51
- Environment: 19
- DP: 17
- Propulsion System: 12
- PRS: 3
- Sensors: 2
- Others: 1
Trigger Point

Total: 51

Total: 50

- Power System: 29
- Environment: 6
- DP: 6
- Propulsion System: 6
- PRS: 1
- Sensors: 1
- Others: 1

Total: 50
Trigger Point

Total: 29
Red Alarm - Root Cause - 2000/2005

- Human Error: 15
- Poor/Lack Maintenance: 8
- Prot Syst C & S: 6
- Environment: 6
- Lack of Procedures: 4
- Software: 4
- Project and Commissioning: 4
- Technological Limitation: 2
- Component Failure: 1

Total: 50

Total: 15

- Power System: 10
- DP System: 2
- Propulsion System: 2
- Sensors (Gyro): 1

- Bus Bar
- Fuel System
- PMS
- Thrusters - Electrical
- Protection System
- Cooling System
- DP Software
- DP Hardware
- Sensors - (Gyro)
DP Incidents 1992 - 2005

Total: 479

- Degraded Status: 305
- Yellow: 69
- Red: 105
- Blackout: 45
Blackout - Trigger Point -1992/2005

Protection System: 12
Generator: 10
Bus Bar: 6
PMS: 5
Diesel Engine: 4
Fuel System: 3
Control System: 3
Cooling System: 1
UPS: 1

Total: 45
**Blackout - Root Cause - 1992/2005**

- **Total: 45**
  - Protection System: 14
  - Human Error: 12
  - Poor / Lack of Maintenance: 9
  - Project and Commissioning: 7
  - Lack of Procedures: 3
Human Error: 10
Protection System: 6
Poor / Lack of Maintenance: 4
Project and Commissioning: 4
Lack of Procedures: 2
Total: 26
Objective: to look for root causes for incidents classified as human error on DP-operated vessels suggesting an action plan to avoid them to happen.

Components: Petrobras + Schahin + Diamond + Transocean + Noble + Pride + Ventura
1. Ineffectiveness of on-job-training for DPO / SDPO as well as for new DPO Certification
2. High turnover among companies or even within the same company
3. Few opportunities for practicing or not enough time to be familiar with the system
4. Inadequate supervision
   ✓ *Theoretical training for DP/ECR personnel*
   ✓ *Practical training on board for DP/ECR personnel*
   ✓ *Training on DP/VMS simulators*
   ✓ *Make DP/ECR a worthy team*
   ✓ *DP personnel hiring as part of a bigger process*
5. Poor handover causing incidents due to the lack of details about ongoing operations.

✓ *Improve handover*

6. Poor communication process among departments (DP / Rig Floor and DP / ECR).

✓ *Improve communication process among DP/ECR/RIG FLOOR by cross training.*

7. Stressful situations caused by less experienced operators combined with more activities/responsibilities.

8. Long time in front of the console (DP, VMS, etc).

9. High noise, lack of attention, amusement for chatting in close coffee shops (Bridge, ECR).

✓ *Improve work conditions for DP/ECR personnel*
10. Poor motivation or attitude
11. Experienced people’s overconfidence
12. Lack of specific procedures
   ✓ Improve confidence/motivation by HR programs.
   ✓ Create procedures making them available
13. Poorness/Absence of manuals especially after upgrades
   ✓ Organize and update technical documentation
14. Poor automation asking for human interference
   ✓ Automate non-critical DP/ECR systems
Thank You!
Questions?

You can send your questions or comments to:

gbeduhn@petrobras.com.br