Fire and Gas Detection ESD Design Philosophy and its Impact on Asset Management

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Lloyds Register
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Energy - Drilling

Fire & Gas Detection – ESD
Design Philosophy Changes and
their impact on Asset Management

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Agenda

• Introduction
• F&G systems; first alarm and monitoring systems, now more acting system, shutting down systems automatic
• Philosophy of what we do in worst case scenario
• Other threats for station keeping
  – 1 Water-mist in 11kV switch boards and DP control rooms
  – 2 Experience level going down on the bridge
  – 3 Lock to Bottom mode
  – 4 AVS to exclude or better protection
• During commissioning phase to test AVS do not kill power of the control systems (see website links)
• Request for one name for AVS
SHI building 61 drill ships
DSME building 22 drill ships
HHI building 16 drill ships
Introduction

Harry van Rijswijk born in 1954

• Electrical Engineering 1966 till 1977 (incl. army)
• Geology 1977 – 1979 University of Amsterdam
• Physiology 1984 – 1986 University of Utrecht
• In Brazil 10 years of operation on 3 DP vessels and 5 years as support engineer for 4 DP vessels from 1992 till 2002
• Sins 2007 working on 19 new build DP vessels and 6 older DP vessels for LR /WEST
Comparison three accidents

• 15 Mar 2001, P36, 11 persons killed

• 28 Nov 2007, NRE, 6 persons injured

• 20 Apr 2010, Deepwater Horizon, 11 persons killed, 17 persons injured
Case Study 1

• F&G systems; first alarm and monitoring systems, now more acting system, shutting down systems automatically

• See examples

• 1. Thrusters drives / Thrusters

• 2. Engine rooms / Engines
## Fire Zone ZP1 - Stbd Fwd Thruster Rm

### Description

<table>
<thead>
<tr>
<th>Description</th>
<th>Sensor Tag</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoke Detector Thr Rm S2 SF Pontoon</td>
<td>811BS_A42</td>
</tr>
<tr>
<td>Smoke Detector Thr Rm S1 SF Pontoon</td>
<td>811BS_A43</td>
</tr>
<tr>
<td>Confirmed Alarm</td>
<td></td>
</tr>
<tr>
<td>Manual Call Station Thr Rms S1 &amp; S2 SF Pontoon</td>
<td>811BM_A41</td>
</tr>
<tr>
<td>Watermist Vent Stop MS8, Thr Rm Stbd Fwd</td>
<td>WM_VSTP_MS_8</td>
</tr>
</tbody>
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### Legend:
- **Confirmed Alarm**: 2 out of (n) Smoke Detectors in Alarm, or one Smoke Detector in Alarm and un-acknowledged for more than two minutes.
Case Study 2

• Philosophy of what do we do in worst case scenario?

• After gas kick we need to secure the well first by actuating EDS = emergency disconnect sequence

• See example A of incident on 28-Nov-2007 on old drill ship (1977) in Brazil

• See example B of incident 28-Dec-2011 in Angola with Samsung new build (2010) HN 1702
Accident Analysis – 28 November 2007 – Lost Time Incident (LTI)
Recommendations

1. Whenever string falls into the well, management of change may be provided, considering the possibility of loss induction by “surge” effect and hydrocarbon inflow, by reduction of the well hydrostatic.

2. Whenever a operation with the pipe rams closed is performed, hang off if the operation allows it. Always close the hang off ram, which must be, by preference, the upper one.

3. Always control the hydraulic seal pressure while circulating through the atmospheric separator, preventing it to break and gas leak. If this is not possible, reduce the gas flow rate in the separator by closing the choke, due to the formation fracture pressure, return must be aligned straight with the burner and the gas must be burned.

4. Whenever running the BOP, circulate fluid through the separator to check if there is any obstruction on the auxiliary line. If so, discontinuous flow will happen, type “gush”, on the output.
5. Whenever running the BOP, carry out a test on the hydraulic seal pressure sensor of the atmospheric separator to check if it is operational.

6. Whenever installation change happens, provide a management of change, qualifying and quantifying the risks so that appropriate mitigate measures are adopted.

7. Always identify the basic cause and actuate, with the purpose of preventing repetition of the problem.

8. It is only possible to restart an operation where gas leak has happened after blocking the basic cause and being sure that the total dissipation of what leaked has already happened. Before complete dissipation, all possible ignition source must be neutralized.

9. The flow line valve, between the separator fluid line output and the gumbo box, and the trip tank intake valve must have a remote actuation in the dog house and be interlocked, so that they can be actuated in a fast way and prevent that they are open or closed at the same time.
10. Whenever alteration of the schedule happens or the well situation, management of change and risk analysis must be provided.

11. There must always be a meeting before the operation, with all the involved ones, in which a risk preliminary analysis must be done.

12. Combustible material must not be stored inappropriately in a classified area.

13. Closed places in classified areas must be isolated and have positive pressure not allowing gas to enter.

14. In case of gas leak, the minimum it seems to be, the danger exists, the explosion risk must be considered and actions taken to eliminate the leak and reduce the explosion risk concerning the accumulated gas.

15. It is only possible to stay in an area where gas leak has happened if the measurement on all possible places that accumulation can happen indicates concentration lower than 10 % of LII (Inflammability Lower Limit) and all possible ignition source is neutralized.

16. The PPE must always be used in a correct way, in order to provide, effectively, all the necessary protection.
Case Study 3

• Other threats for station keeping in the future
  – 1 Water-mist in 11kV switch boards and DP control rooms
  – 2 Experience level going down on the bridge
  – 3 Lock to Bottom mode (AH-Drawworks)
  – 4 AVS to exclude or better protection
Case Study 4

• During commissioning phase to test AVS do not kill power of the control systems (see website links)
Case Study 5

- Request for one name for AVS
- Examples of different names for AVS
  - 1 AVS = abandon vessel shutdown (ABS)
  - 2 APS = abandon platform shutdown (DNV)
  - 3 ESD = emergency shutdown zero (LR)
  - 4 CSD = catastrophic shutdown (Converteam)
ABANDON PLATFORM SHUTDOWN
APS-66004
Conclusion

1. In 2009 in the MTS paper of Mr. Gilberto Beduln; he made an proposal for IMO to make changes in the Modu-code: In 2012 the latest Modu-code did show a different layout but no changes as above. They made the changes in 2009 but with small difference in wording.

2. Implement mandatory simulator training for DPO’s and Drillers; USCG Marine Safety Alert 17 June 2013 See

3. Operators need to demand time for the annual DP trials to implement two blackouts each year, one time for each crew a year. This will make the client and DPO’s and their maintenance crew more confident with their unit. To show the automatic recovery time of the system including thrusters back in DP. (At this time we stop the time when one fwd thruster is in DP and one aft thruster is in DP. This is used to compare all DP vessels). It is used as a fitness test of all systems. Also it has nothing to do if you run in a single or double split configuration.

4. The DP alert system is also using network A and B, in the past this was always an independent hard wired system.

5. More vessels need better WSOG and training between parties involved with the WSOG.

6. More and more DP vessels installing a Weather Doppler Radar to have a better response on bad weather. It will give the DPO’s an extra “eyes and ears”.

7. Implement one name that is used by the complete industry and class. Now we have ESD zero or 3 (LR), Abandon Platform Shutdown (APS from DNV), Catastrophic Shutdown (Converteam) and Abandon Vessel Shutdown (AVS from ABS).
23 new builds in 2014