



**TOTAL**  
COMMITTED TO BETTER ENERGY



## OFFSHORE & ONSHORE RELIABILITY DATA (OREDA) COLLECTION – SNAPSHOTS FROM AN OREDA JIP MEMBER COMPANY

*- Development of an internal  
data collection process in Total E&P -*

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# 1. OREDA JIP IN FEW POINTS



[www.oreda.com](http://www.oreda.com)

- JIP established in 1983.
- Main objective: Build and maintain a high quality reliability database on offshore, onshore and subsea equipment used in oil and gas E&P.
- All data collection activities fully in line with ISO 14224.  
*Note: The first version of this International Standard has been issued more or less starting from the OREDA Data Collection guidelines.*
- Current members: Eni, BP, Petrobras, Gassco, Engie, Statoil, Shell and Total.
- Current Project Manager: DNV GL.
- Equipment population in the OREDA computerized database = About 18,000 topside units (Offshore and Onshore) and about 2,500 subsea units.
- 2 steering committee meetings per year.
- 3 Work Groups (WG): Subsea, Method and Downstream (2 meetings/WG/year).



## 2. TOTAL'S DIFFICULTIES WITH REGARD TO OREDA IN 2014

### Context in 2014:

**Total's commitment to OREDA for the Data Collection Phase 12 period (i.e. from 2015 to 2017):**

- Provide our own data set for Phase 12;
- Reimburse Statoil in terms of reliability data for Phase 12 - Statoil provided a data set for us for Phase XI (agreement Total - Statoil - OREDA JIP).

**If one of these objectives is not met, Total will have to leave the JIP and will have no more access to both Phase 11 and Phase 12 data.**

### Objective defined by Total's managers:

**Develop and implement within 2 years an internal data collection process in order to build a data set equivalent to a minimum of 6 years of commitment in terms of data delivery to OREDA that would allow Total to stay in the JIP.**



## 2. TOTAL'S DIFFICULTIES WITH REGARD TO OREDA IN 2014

### Why staying in the OREDA JIP?

- OREDA = **Main reliability data source for SIL/HIPS studies and Production Availability Studies (PAS)**: large equipment population, database built with experts of other Majors, diversity, work started more than 30 years ago, database fully in line with the international standard ISO 14224, etc.
- **Access to the computerized database.**
- Possibility of using the **OREDA Data collection and Data analysis software to manage our own reliability database.**
- **Benchmarking** between our reliability data and the entire database.
- **Multiple exchanges with reliability experts of other major petroleum Companies** (reporting, data management strategy, Reliability/Production availability studies...).
- Other users in Total:
  - Maintenance teams to...
    - *“Get the failure rate, reliability, unavailability, etc. of certain type of eq. (for reference purpose);*
    - *Comparison between equipment design and model => Consideration for equipment selection;*
    - *To know the type of failure => Decide emphasize of improvement.”*
  - HSE for Risk analyses;
  - Subsea engineers for comparisons between failure frequencies...;
  - HSE and Maintenance teams in our subsidiaries.



### 3. SELECTED STRATEGY

#### Main principles:

- Focus our efforts on a small number of equipment types in order to limit the number of interlocutors.
- Select equipment types considered as “high value-added” by the JIP according to the value model defined at the beginning of each data collection phase.
- Use as far as possible existing reporting tools.
- Work with subsidiaries that are best in class in terms of maintenance operations, monitoring and reporting.
- Clearly identify all the stakeholders and request them to commit to a roadmap previously approved by our managers.



### 3. SELECTED STRATEGY

#### Selected equipment:

##### Topside:

- Objects** : 36 turbo-machines
- 14 gas turbine driven centrifugal compressors;
  - 22 gas turbine driven alternators;
  - 36 gas turbines.
- Observation period** : 4 years on average

##### Subsea:

- Objects** : about 100 X-mas trees
- Observation period** : 4 years on average



### 3. SELECTED STRATEGY

## Reliability data acquisition for internal use and for OREDA JIP: ROADMAP

	2015				2016				2017
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
R&D Budget	Equivalent days for 2015 = <b>72 days</b>				As per 2015 + <b>About 20 k€ of DE for mission(s)</b> (to be confirmed)				Unknown
<b>Data collection on Topside equipment</b>	- Identification of needs.	- Identification of the different data source(s) and post-treatment to perform.		Data collection (from HQ)		- Conversion into OREDA format. - QA/QC.		➔	
<b>Data collection on Subsea equipment</b>	- Needs vs. data available in HQ.	- Selection of equipment types and assets.		Data collection (missions in affiliate).				➔	
<b>Main deliverables:</b>	<ul style="list-style-type: none"> <li>- <b>End of March 2015:</b> Roadmap for guaranteeing data acquisition.</li> <li>- <b>Early April 2015:</b> List of items on which the data collection will focus on.</li> <li>- <b>Q2 2015:</b> Issue of a SoW for mission(s) in affiliates.</li> </ul>				<ul style="list-style-type: none"> <li>- <b>Q4 2015:</b> Issue of templates (e.g. Excel files to fill in) for the mission(s) in affiliates.</li> <li>- <b>Q3 2016:</b> Data set on Topside equipment (in OREDA format).</li> <li>- <b>Q3 2017:</b> Data set on Subsea equipment (in OREDA format).</li> </ul>				





# 3. SELECTED STRATEGY

Excel templates for data acquisition (1 file to fill in per item):

Inventory data		Back to "MAIN"	
Code:	GI		
Status of data:			Mandatory (M)
Mandatory	0%		
Mandatory w/o "Unknown"	0%		Recommended (R)

  

Failure event	FE_1	dd/mm/yyyy	Back to "MAIN"
Status of data:			Mandatory (M)
Mandatory	0%		
Mandatory w/o "Unknown"	0%		Recommended (R)
Mandatory + Recommended	0%		

  

General	PARAMETER TO REPORT	State of data	Sources (for traceability only - not requested by OREDA)	Clarifications on the requested parameter
Failure detected date	dd/mm/yyyy	✗		Date when failure was detected. Use date when Work Order was issued if date of detection is not known. This date shall be in the interval [01/01/2000 - 31/12/2016].
Work order #	Number	✗		Company internal work order number related to a failure/maintenance event.
Failure mode	Select a Failure mode (drop-down menu)	✗		The effect by which a failure is observed on the failed equipment unit.
Severity class	Select a Severity class (drop-down menu)	✗		<p><b>Critical (C):</b> A failure which causes immediate and complete loss of the capability of a system, being defined within the equipment class boundary, of providing its output.</p> <p><b>Degraded (D):</b> A failure that does not cease all function, but compromises that function. It may result in e.g. output deviation or erratic output. Such a failure would usually, but not necessarily, be gradual or partial, and may develop into a critical failure in time if not being corrected.</p> <p><b>Incipient (I):</b> An imperfection in the state or condition of an item which has no immediate effect on function. An incipient failure may develop to a degraded (or critical) failure in time if not being corrected.</p> <p><b>Unknown (U):</b> Failure severity was not registered or could not be deduced by the data collector.</p>
Failure mechanism	Select a Failure mechanism (drop-down menu)	✗		Apparent, observed cause of a failure (not mandatory).
Failure cause	Select a Failure cause (drop-down menu)	✗		Initiating event ("root cause") in the sequence leading up to an equipment failure (not mandatory).
Subunit failed	Select a Subunit (drop-down menu)	✗		The subunit where the failure occurred.
		✗		The method or activity by which a failure is discovered (not

  

Clarifications on the requested parameter	
Equipment name. Avoid using names that identifies location as this field will not be anonymized.	
Main system in which the equipment unit serves. With a green spot is the most common systems for	
Equipment unit type (design).	
Operational mode.	
The equipment unit manufacturer. If not known, the name may be used.	
Date of unit, or date of production start.	
When the unit is replaced (scrapped) at the end of the life cycle, this shall be stated.	
Equipment unit model/type.	
The climatic and other impacts that may affect the equipment. Both the geographical and local conditions shall be recorded. Please note, however, that the location is specified in the installation data part (installation data).	
The environmental impact may be many and often difficult to evaluate. Therefore, a separate evaluation is therefore chosen. In this table, major parameters that may influence on reliability and the total sum of this impact categorised.	
Bring.	
Bring.	
Bring period where the equipment unit has been in operation.	
Please select from the DDDW. If calculated: State the value in Comments field.	
Please include such as:	
M + R	0%



# 3. SELECTED STRATEGY

## Conversion into OREDA format:

Excel macro in VBA  
(developed by a  
trainee in March-  
August 2016)

Excel templates (about 170 files)

OREDA Excel format (1 file)

Use of the function  
"Import from an  
Excel file" of the  
OREDA DC SW

OREDA Data collection SW

The screenshot displays the OREDA Data collection SW interface. It features several panels: 'Equipment/unit name' and 'Tag No' at the top; 'Step 1: Inventory data' with a 'Fill in Inventory data' button; 'Step 2: Failure & Maintenance events' with buttons for 'Create a new Failure event', 'Remove a Failure event', 'Create a new Maintenance event', and 'Remove a Maintenance event'. Below these are 'Status of data' tables for both 'Failure events' and 'Maintenance events', each with columns for 'M' (Mandatory), 'M w/o "Unknown"', and 'M + R' (Recommended), and target percentages (100%, 85%, No target). A 'Data Analysis' menu is visible. The main area shows a table of equipment data:

Row	Inst Id	Inv Id	Inst name	Equip. Class	Tag No	Equipment unit name	System	Equipment Type
1	2	6	Installation 4041993 GAS TURBINES (NEW)	TE-8150	Turbine Engine	Gas export	Industrial	
2	2	8	Installation 4041993 GAS TURBINES (NEW)	TE-8250	Turbine Engine	Gas export	Industrial	
3	3	2	Installation 4041994 GAS TURBINES (NEW)	4-KT-0220	Gas Compressor Turbine	Gas export	Aeroderivative	
4	3	4	Installation 4041994 GAS TURBINES (NEW)	4-KT-0320	Gas Compressor Turbine	Gas export	Aeroderivative	
5	3	9	Installation 4041994 GAS TURBINES (NEW)	4-TE-9620	Turbine Engine	Main power	Industrial	
6	3	11	Installation 4041994 GAS TURBINES (NEW)	4-TE-9620	Turbine Engine	Main power	Industrial	
7	3	13	Installation 4041994 GAS TURBINES (NEW)	TE-6210	Turbine Engine	Main power	Industrial	
8	3	15	Installation 4041994 GAS TURBINES (NEW)	TE-6220	Turbine Engine	Main power	Industrial	
9	4	17	Installation 4041995 GAS TURBINES (NEW)	5-TE-9610	Turbine Engine	Main power	Industrial	

On the right, a portion of an OREDA Excel file is visible, showing columns for 'Equip. Class', 'State of data', 'Date', 'Work order', and 'Ma'.



## 4. CONCLUSIONS AND PERSPECTIVES

- Size of the data set collected equivalent to 12 years of commitment in terms of data delivery to OREDA.
- ISO 14224 requirements regarding inventory data are difficult to fulfil, especially for subsea equipment for which there are many parameters to collect.
- ISO 14224 requirements regarding failure events are also quite difficult to fulfil as an analysis is necessary for each event, even for incipient and degraded failures.
- The strategy “Excel templates + Conversion via VBA” is suitable/efficient for a small number of equipment types but not for a long term solution that would have to focus on all equipment types.
- This data collection performed in Total E&P over the last 2 years is a 1st step of a long term solution for the continuous development of an internal reliability database.

