

# OREDA News

ESRA Seminar

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January 2015

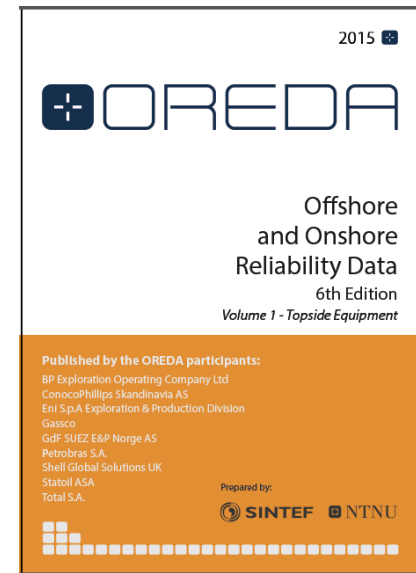


# Intro

- ✦ **Joint Industry Project of Oil & Gas Companies since 1983**
- ✦ **Collect and exchange Reliability Data among members**
- ✦ **Publish Data Handbook (6<sup>th</sup> edition in 2015)**
- ✦ **Establish suitable means for Reliability Data Collection (initiated ISO 14224)**
- ✦ **Implement and maintain database of all collected OREDA Data**
- ✦ **Usage of Reliability Data in (development) projects**
- ✦ **Use OREDA Database in research projects together with a member**

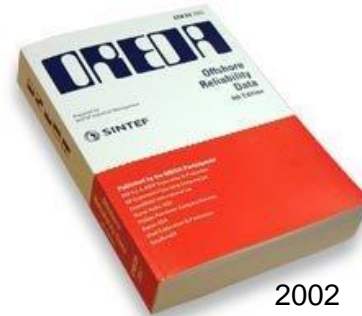
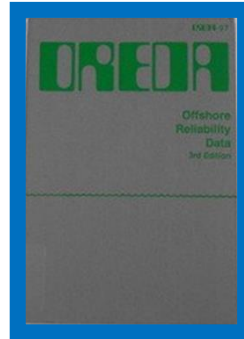
# Handbook overview

- In-service reliability data from offshore and onshore petroleum installations
- Planned release in March 2015
- Data from ca. 2000–2009
- Data on 25 equipment classes
- Two volumes: *Topside* and *Subsea*
- A collaboration project:



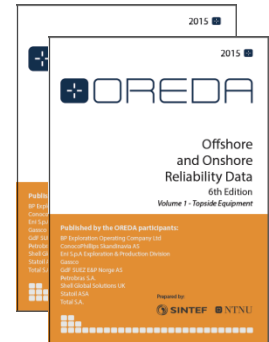
# History

1992

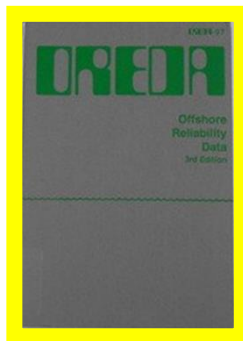
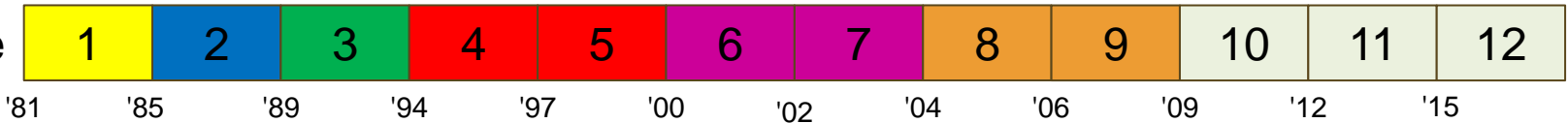


2002

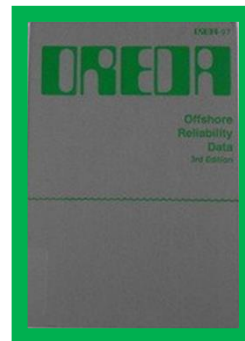
2015



Phase



1984



1997



2009



# OREDA equipment classes

SYSTEM	EQUIPMENT CLASS
1. Machinery	1.1 Compressors
	1.2 Gas Turbines
	1.3 Pumps
	1.4 Combustion Engines
	1.5 Turboexpanders
	1.6 Steam Turbines
2. Electric Equipment	2.1 Electric Generators
	2.2 Electric Motors
	2.3 Battery and UPS
	2.4 Power Transformers
3. Mechanical Equipment	3.1 Heat Exchangers
	3.2 Vessels
	3.3 Heaters and Boilers
4. Control and Safety Equipment	4.1 Fire & Gas Detectors
	4.2 Input Devices
	4.3 Control Logic Units
	4.4 Valves (described by application code)
	4.5 Valves (described by taxonomy code)

SYSTEM	EQUIPMENT CLASS
5. Subsea*	5.1 Control Systems
	5.2 Flowlines
	5.3 Manifolds
	5.4 Pipelines
	5.5 Risers
	5.6 Running Tools
	5.7 Templates
	5.8 Wellheads and X-mas Trees

## Additional classes in the OREDA database:

- \* Cranes
- \* Fire water systems
- \* Frequency converters
- \* HVAC systems
- \* Loading arms
- \* Nozzles
- \* Subsea power cables
- \* Switchgear
- \* Swivels
- \* Turrets
- \* Wellhead & X.mas tree (dry)
- \* Winches
  
- \* Subsea control system
- \* Dry tree riser
- \* Electrical power distribution
- \* Subsea pumps
- \* Subsea vessels
- \* Common components

# Data table: Reliability

✦ Failure rates

✦ Failure mode distribution

✦ Repair times

✦ ...

Taxonomy no 1.3.1.9		Item Machinery Pumps Centrifugal Oil export									
Population 4	Installations 2	Aggregated time in service (10 <sup>6</sup> hours)					No of demands 480				
		Calendar time * 0.1018		Operational time † 0.0792							
Failure mode		No of failures	Failure rate (per 10 <sup>6</sup> hours)					Active rep. hrs		Manhours	
			Lower	Mean	Upper	SD	n/τ	Mean	Max	Mean	Max
<b>Critical</b>		19*	121.72	186.12	261.64	42.80	186.58	14	45	23	90
		19†	144.86	238.62	351.32	63.30	240.00				
Breakdown		1*	0.04	9.67	36.47	13.45	9.82	18	18*	35	35*
		1†	0.06	12.21	44.87	16.57	12.63				
External leakage - Process medium		6*	0.35	60.58	214.15	79.09	58.92	8.6	16*	11	16*
		6†	0.44	81.27	291.26	107.62	75.79				
External leakage - Utility medium		10*	0.50	95.46	344.12	127.16	98.20	16	45*	29	90*
		10†	0.66	118.26	421.59	155.76	126.32				
Noise		1*	0.54	9.93	29.48	9.82	9.82	-	-	-	-
		1†	0.79	12.99	38.07	12.63	12.63				
Spurious stop		1*	0.04	9.67	36.47	13.45	9.82	8.0	8.0*	8.0	8.0*
		1†	0.06	12.21	44.87	16.57	12.63				
<b>Degraded</b>		12*	2.61	115.19	354.81	124.67	117.84	5.5	15	8.6	30
		12†	4.47	143.92	437.00	150.66	151.58				
External leakage - Utility medium		7*	7.90	67.69	176.19	55.26	68.74	4.7	15*	7.1	30*
		7†	13.04	85.56	211.15	64.53	88.42				
Vibration		5*	0.37	47.89	162.25	59.66	49.10	6.6	8.5*	11	17*
		5†	0.54	59.66	198.12	72.54	63.16				
<b>Incipient</b>		32*	100.04	310.91	616.58	162.23	314.24	3.4	12	3.7	12
		32†	152.50	395.56	731.12	180.34	404.21				
Abnormal instrument reading		25*	54.80	242.28	539.20	154.61	245.50	2.9	10.0	3.0	10.0
		25†	83.90	307.08	644.45	177.34	315.79				
External leakage - Utility medium		2*	3.49	19.65	46.60	13.89	19.64	7.0	12*	7.0	12*
		2†	4.52	25.31	59.98	17.86	25.26				
Minor in-service problems		1*	0.54	9.93	29.48	9.82	9.82	1.0	1.0*	1.0	1.0*
		1†	0.79	12.99	38.07	12.63	12.63				
Vibration		1*	0.04	9.67	36.47	13.45	9.82	5.0	5.0*	10.0	10.0*
		1†	0.06	12.21	44.87	16.57	12.63				
Other		3*	7.98	29.36	61.73	17.01	29.46	7.0	8.0*	7.0	8.0*
		3†	10.18	37.64	79.28	21.88	37.89				
<b>Unknown</b>		1*	0.04	9.67	36.47	13.45	9.82	-	-	-	-
		1†	0.06	12.21	44.87	16.57	12.63				
Unknown		1*	0.04	9.67	36.47	13.45	9.82	-	-	-	-
		1†	0.06	12.21	44.87	16.57	12.63				
<b>All modes</b>		64*	158.90	620.35	1330.15	372.09	628.49	6.6	45	10	90
		64†	238.75	786.19	1592.22	426.23	808.42				
Comments											
On demand probability for consequence class: Critical and failure mode: Fail to start on demand = 0											



# Data table: Maintainable item vs. failure mode

## Maintainable item versus failure mode, continued

### Item: Pumps - Centrifugal



	OTH	PDE	PLU	SER	STD	STP	UNK	UST	VIB	Sum
Actuating device	-	0.11	-	0.11	0.21	-	-	-	-	0.69
Bearing	-	-	-	-	-	-	-	-	0.05	0.16
Cabling & junction boxes	0.11	-	-	-	-	-	-	0.11	-	0.53
Casing	-	-	-	-	-	-	0.11	-	-	0.43
Control unit	0.21	0.32	-	-	-	0.11	0.11	0.21	0.11	5.28
Cooler(s)	-	-	-	-	-	-	-	-	-	0.89
Cooling/heating system	-	-	-	0.21	-	-	0.21	-	-	1.07
Coupling to driven unit	-	-	-	-	-	-	-	-	0.64	0.75
Coupling to driver	0.21	-	-	0.11	-	-	-	0.05	-	0.69
Diaphragm	0.21	-	-	-	-	-	-	-	-	0.21
Filter(s)	-	0.11	0.43	-	-	-	-	-	-	0.64
Gearbox/var. drive	-	-	-	0.11	-	-	-	0.05	0.11	0.96
Impeller	-	-	-	-	-	-	-	-	0.11	0.78
Instrument, flow	-	0.21	0.53	-	-	-	-	0.05	-	4.80
Instrument general	0.11	0.21	-	-	-	-	-	0.53	0.11	2.56

# Data table: Failure mechanism vs. failure mode

## Failure mechanism versus failure mode, continued Item: Pumps - Centrifugal

	OTH	PDE	PLU	SER	STD	STP	UNK	UST	VIB	Sum
Blockage/plugged	-	-	2.67	0.43	-	-	-	0.11	-	5.34
Breakage	0.21	-	-	0.32	0.11	-	-	-	-	1.17
Burst	-	-	-	-	0.11	-	-	-	-	0.21
Cavitation	-	-	-	-	-	-	-	-	-	0.32
Clearance/ alignment failure	0.11	0.11	-	-	-	-	-	-	0.21	0.85
Combined causes	-	-	-	-	-	-	-	-	-	0.53
Common mode failure	-	-	-	-	-	-	-	-	-	0.11
Contamination	0.11	0.43	0.11	0.11	-	-	-	-	-	0.85
Control failure	0.32	0.53	-	-	-	-	-	0.43	-	3.52
Corrosion	0.75	0.21	0.11	0.64	0.53	0.11	0.11	-	-	3.42
Deformation	0.11	0.11	-	-	-	-	-	-	-	0.32
Earth/isolation fault	0.21	-	-	0.11	-	-	-	-	-	0.43
Electrical failure - general	-	-	-	0.43	-	-	0.11	0.21	-	0.96
Erosion	-	-	-	0.11	1.17	-	-	-	-	3.52
External influence - general	-	-	-	-	0.11	-	-	-	-	0.11
Fatigue	-	-	-	-	-	-	-	-	-	0.32
Faulty signal/indication/alarm	-	0.21	-	-	-	-	-	0.96	-	9.07
Instrument failure - general	0.32	0.11	-	-	-	-	0.21	0.32	0.11	5.24



# Application of data

## + Availability studies

- Availability estimates
- Design optimization
- Equipment selection

## + Risk analysis

- Estimate probabilities of critical events
- Estimate survival time for safety-critical items

## + Benchmarking

## + Maintenance planning and optimization

- RCM
- Spare parts requirements
- Analyze reliability characteristics
- Reveal weak designs/design improvements

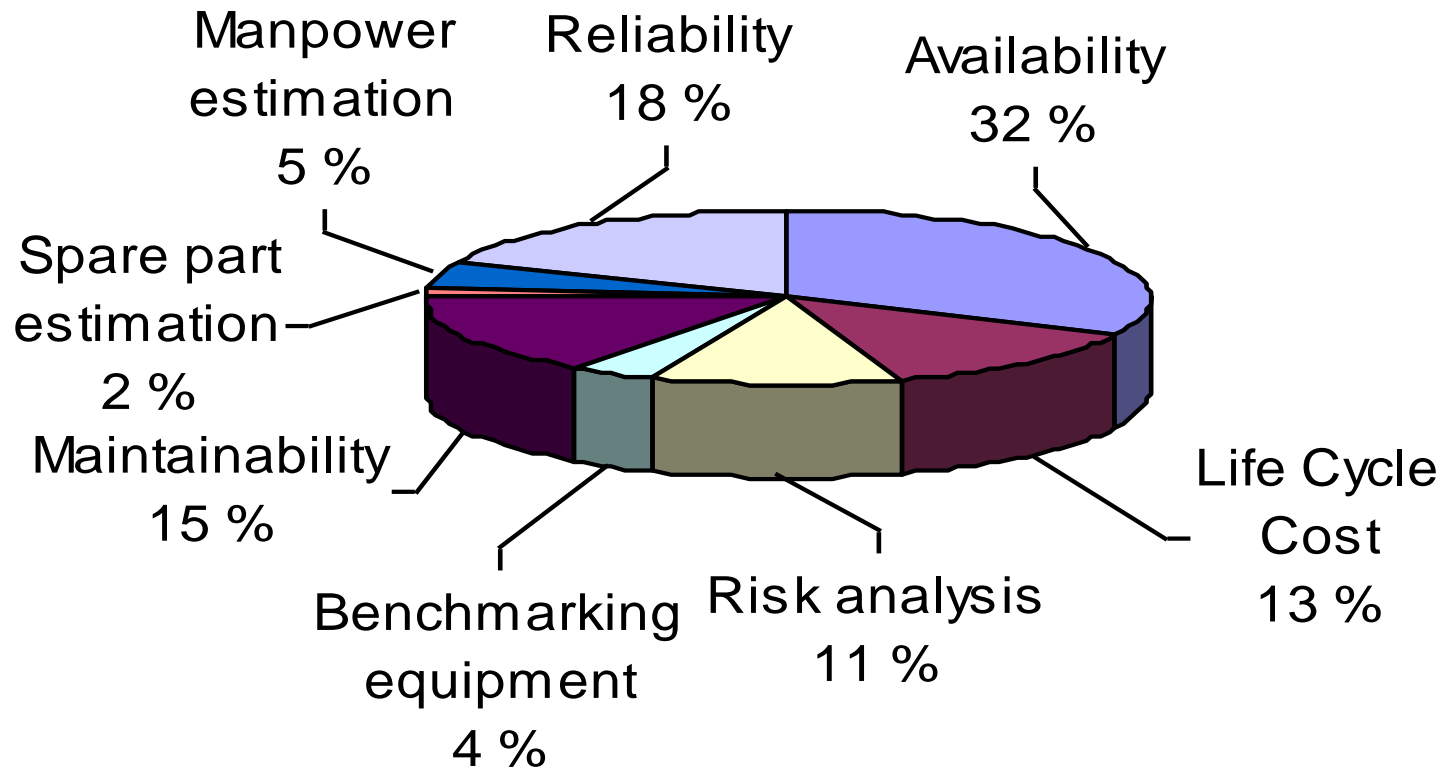
## + Operations

- Condition monitoring
- Trend monitoring

## + LCC



# Application of data – Example (one oil company)



# Why use OREDA data?

- **Widely recognized and used in the industry**
- **Credibility of analyses and results**
- **No real alternatives**
- **Limited accuracy, but still the best available**
- **Specific reliability data will often be better, but rarely exist**

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OFFSHORE & ONSHORE **RELIABILITY DATA**



OFFSHORE & ONSHORE **RELIABILITY DATA**

# New Collaboration site (SharePoint-based)

DNV-GL

Meeting places / OREDA

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## Announcements

<input type="checkbox"/> @ Title	Body	<input type="checkbox"/> Modified By	Modified
<a href="#">ISO 14224 Rio seminar Nov 2014 documents available for comments</a>	Presentations from ISO 14224 seminar in Rio Nov 2014 are available at the following address: <a href="https://meet.dnv.com/sites/OREDA/MWG/MWG%20documents/1/Presentations%20ISO14224">https://meet.dnv.com/sites/OREDA/MWG/MWG%20documents/1/Presentations%20ISO14224</a> Please feel free to comment using Changelog list and category ISO14224. Files may be uploaded to your Changelog item.	Vieille, Jean-Raphaël	04/12/2014 11:40
<a href="#">Welcome to the all new OREDA SharePoint site</a>	Our goal is to replace eRoom with this SharePoint site, but the transition will be gradual. The ambition is not to copy all files from eRoom, but only the necessary ones. However, all files from eRoom will be copied and saved at separate location as backup. For permission issues on this site, please contact <a href="mailto:pm.oreda@dnvgl.com">pm.oreda@dnvgl.com</a> . For SharePoint technical issues, please contact technical support directly on the contact information at the bottom of the page.	Maqsood, Tariq	01/10/2014 11:17

 Add new announcement



# New Data Analysis and Data Collection software

The screenshot displays the OREDA BI-Cycle software interface. The window title is "BI-Cycle - Release Area - Topside". The interface includes a menu bar with "Favorites", "Report", "Admin", and "Help". Below the menu bar are tabs for "Filter Data", "Standard Analyses", "Frequency Analyses", and "Failure Analyses".

**Filter Settings**

Installation Category: Fixed platform

**Summary**

Installation	173	Corrective Maintenance	23,565
Inventory	10,810	Periodic Maintenance	24,579
Failure Events	23,660	Surveillance hrs (avg)	28,569
Items Failed	22,571	Operating hrs (avg)	24,363

[Hide QA Report](#)

**OREDA**

Navigation tabs: Topside | Installation | Inventory | Failure Events | Items Failed | Corrective Maintenance | Periodic Maintenance

Data release 10.2 (December 2012)  
Software release 2.0 (December 2012)

26 records | 11.1 secs | Administrator | Last Updated: 11-12-2012

# Guidelines

## Avoid re-inventing the wheel and inconsistencies

- ✦ **OREDA-based research**
- ✦ **Usage of OREDA by Contractors**
- ✦ **Man-days contributions by members**
- ✦ **Change Management Process**
- ✦ **Data Collection Quality and Efficiency**



# Future Issues

- + **Contribution with respect to Reliability of Safety System Components**
- + **Research Projects**

# OREDA News

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