

# Standardisation

**EWEA 2011 Reliawind side event**  
**15 March 2011**

**Peter Tavner,**  
**Durham University**

# Standardisation



- **What Wind Industry standards are relevant for Reliability**
- **Who in ReliaWind is involved in standardisation**
- **What standardisation is needed**
- **What has been done**
- **Standardisation in other industries**
- **The standardisation Deliverable**
- **Next steps**

# IEC 61400 Standards



- **Part 1: Design requirements for onshore wind turbines**
- **Part 3: Design requirements for offshore wind turbines**
- **Part 4: Design requirements for wind turbine gearboxes**
- **Part 5: Rotor blades**
- **Part 12: Wind farm power performance testing**
- **Part 21: Measurement and assessment of power quality characteristics of grid connected wind turbines**
- **Part 24: Lightning protection**
- **Part 25 (1-6): Communications for monitoring and control -Overall description of principles and models**
- **Part 26 (Not published): Time based availability for wind turbines**
- **Part 27 (Not published): Simulation models of wind turbines**
- **EN50308 Personal Safety**

# IEC 61400 Standards



- **Part 1: Design requirements for onshore wind turbines**
- **Part 3: Design requirements for offshore wind turbines**
- Part 4: Design requirements for wind turbine gearboxes
- Part 5: Rotor blades
- Part 12: Wind farm power performance testing
- Part 21: Measurement and assessment of power quality characteristics of grid connected wind turbines
- Part 24: Lightning protection
- **Part 25 (1-6): Communications for monitoring and control -Overall description of principles and models**
- **Part 26 (Not published): Time based availability for wind turbines**
- Part 27 (Not published): Simulation models of wind turbines
- EN50308 Personal Safety



# Who from ReliaWind is involved in Standardisation



	Main Parts Associated with Reliability & Availability			
	Part 1	Part 3	Part 4	Part 26
<b>GAMESA</b>	Enrique Gomez de las Heras <a href="mailto:egdelasheras@gamesacorp.com">egdelasheras@gamesacorp.com</a> Millan Esteban Cornejo <a href="mailto:mecornejo@gamesacorp.com">mecornejo@gamesacorp.com</a>		Cesar Diaz de Cerio <a href="mailto:cdcerio@gamesacorp.com">cdcerio@gamesacorp.com</a>	Millan Esteban Cornejo, <a href="mailto:mecornejo@gamesacorp.com">mecornejo@gamesacorp.com</a> Eugenio Gomez, <a href="mailto:eugomez@gamesacorp.com">eugomez@gamesacorp.com</a>
<b>ALSTOM</b>				Juan Ignacio López <a href="mailto:juan-ignacio.lopez@power.alstom.com">juan-ignacio.lopez@power.alstom.com</a>
<b>HANSEN</b>			Wim Meeusen <a href="mailto:wmeeusen@hansentransmissions.com">wmeeusen@hansentransmissions.com</a>	
<b>GH</b>	Graeme McCann, <a href="mailto:mccann@garradhassan.com">mccann@garradhassan.com</a> Steve Gilkes, <a href="mailto:steve.gilkes@garradhassan.com">steve.gilkes@garradhassan.com</a> Dave Quarton, <a href="mailto:dave.quarton@garradhassan.com">dave.quarton@garradhassan.com</a>	Tim Camp, Dave Quarton, <a href="mailto:dave.quarton@garradhassan.com">dave.quarton@garradhassan.com</a>	Steve Gilkes, <a href="mailto:steve.gilkes@garradhassan.com">steve.gilkes@garradhassan.com</a> Daniel Doncaster, <a href="mailto:daniel.doncaster@garradhassan.com">daniel.doncaster@garradhassan.com</a>	Keir Harman, <a href="mailto:keir.harman@garradhassan.com">keir.harman@garradhassan.com</a> Staffan Lindahl, <a href="mailto:staffan.lindahl@garradhassan.com">staffan.lindahl@garradhassan.com</a>
<b>Other parts( including IEC61400 Part 5, 12, 21, 24, 25, 27, EN50308)</b>				
<b>GAMESA</b>	Part 5: Part 11: Part 12-1: Part 12-2 & 12-3: Part 25: Part 27: EN50308 Personal Safety:	Alejandro Saez Moreno Millan Esteba Cornejo Roberto Gutierrez Ardanaz Millan Esteba Cornejo Nerea Perez Garcia Javier Perez-Jacoiste Asin Millan Esteba Cornejo	<a href="mailto:alsaez@gamesacorp.com">alsaez@gamesacorp.com</a> ; <a href="mailto:mecornejo@gamesacorp.com">mecornejo@gamesacorp.com</a> <a href="mailto:rgutierrez@gamesacorp.com">rgutierrez@gamesacorp.com</a> <a href="mailto:mecornejo@gamesacorp.com">mecornejo@gamesacorp.com</a> <a href="mailto:nperez@gamesacorp.com">nperez@gamesacorp.com</a> <a href="mailto:jperezjacoiste@gamesacorp.com">jperezjacoiste@gamesacorp.com</a> <a href="mailto:mecornejo@gamesacorp.com">mecornejo@gamesacorp.com</a>	
<b>GH</b>	Part 12: Part 21: Part 25:	Keir Harman, Andrew Strachan, Paul Gardner, Gordon Smith,	<a href="mailto:keir.harman@garradhassan.com">keir.harman@garradhassan.com</a> <a href="mailto:andrew.strachan@garradhassan.com">andrew.strachan@garradhassan.com</a> <a href="mailto:paul.gardner@garradhassan.com">paul.gardner@garradhassan.com</a> <a href="mailto:gordon.smith@garradhassan.com">gordon.smith@garradhassan.com</a>	
<b>LM</b>	Part 5 & Part 24:	Lars Bo Hansen,	<a href="mailto:lbh@lmwindpower.com">lbh@lmwindpower.com</a>	
<b>ABB</b>	Part 27:	Slavomir Seman, Jouko Niiranen,	<a href="mailto:slavomir.a.seman@fi.abb.com">slavomir.a.seman@fi.abb.com</a> <a href="mailto:jouko.niiranen@fi.abb.com">jouko.niiranen@fi.abb.com</a>	
<b>SKF</b>	Unsure which Part:	Par Malmberg,	<a href="mailto:Par@Malmberg@skf.com">Par@Malmberg@skf.com</a>	

Summary of IEC contacts

# What standardisation is needed

- **Taxonomy or Structure of the wind turbine and wind farm**
- **Structure of the Control & Communications Input/Output List and its relation to the Taxonomy**
- **Collection of reliability data**
- **Method of reporting maintenance and in particular:**
  - **Fault terminology;**
  - **Fault recording;**
  - **Fault location.**
- **Time & energy definitions of Availability for wind turbines and wind farms**

# What standardisation is needed

- Taxonomy or Structure of the wind turbine and wind farm
- Structure of the Control & Communications Input/Output List and its relation to the Taxonomy
- Collection of reliability data
- Method of reporting maintenance and in particular:
  - Fault terminology;
  - Fault recording;
  - Fault location.
- **Time & energy definitions of Availability for wind turbines and wind farms**

# What has been done

- ReliaWind members have participated in discussion and survey
- Knowledge from ReliaWind, particularly WP1 & 2 has been used to define a standard
- A taxonomy has been agreed
- Standards from other industries have been located
- A recommendation from ReliaWind has been drawn up



# Standardisation in other industries



- OREDA, [Offshore Reliability Data](#)
  - OREDA-1984. Offshore Reliability Data Handbook. VERITEC – Marine Technology Consultants, PennWell Books, 1st edition.
  - OREDA-1997. Offshore Reliability Data Handbook. SINTEF Industrial Management. Det Norske Veritas, Norway, 3rd edition.
  - OREDA-2002. Offshore Reliability Data Handbook. SINTEF Industrial Management. Det Norske Veritas, Norway, 4th edition.
- EN ISO 14224:2006, Petroleum, petrochemical and natural gas industries-Collection and exchange of reliability and maintenance data for equipment.
- EEMUA 191:1999, Alarm systems, a guide to design, management and procurement ISBN 0 8593 1076 0
- IEC 60812:2006, Analysis techniques for system reliability- Procedure for failure mode and effects analysis (FMEA). International Electrotechnical Commission.
- MIL-STD-1629A, Military standard procedures for performing a failure mode, effects and criticality analysis, 1980, United States Department of Defense.
- NSWC-06A, Handbook of Reliability Prediction Procedures For Mechanical Equipment, 2006, CDNSWC.
- MIL-HDBK-217F, Military Handbook of Reliability Prediction of Electronic Equipment, 1991, United States Department of Defense.
- VGB PowerTech, Guideline, Reference Designation System for Power Plants, RDS-PP, Application Explanation for Wind Power Plants, VGB-B 116 D2, 1<sup>st</sup> Ed 2007.

# Deliverable



ReliaWind



Contract number 212966

## ReliaWind

Reliability focused research on optimizing Wind Energy systems design, operation and maintenance: Tools, proof of concepts, guidelines & methodologies for a new generation

Collaborative Project : Large Scale Integrated Project  
FP7-ENERGY-2007-1-RTD

### Deliverable D 6.7 – Report

**Recommendations from the ReliaWind Consortium  
for the Standardisation for the Wind Industry of  
Wind Turbine Reliability Taxonomy, Terminology and  
Data Collection**

Workpackage WP 6 – Dissemination

Task T.6.4 – Development of a Wind Energy Reliability Workshop

Month of delivery: M36

Deliverable leader: UDUR

# Next Steps

- **ReliaWind members on Standards Committees recommend the ReliaWind Deliverable to their National IEC Committees**
- **Wind Industry members of IEC 61400 Standards Committees adopt those recommendations**
- **Manufacturers and Operators push for this standardisation**

# Thank You



## Useful Documents.

- Website: <http://www.reliawind.eu/>
- Monograph of published papers available from website
- Deliverables in the Public Domain include:
  - ReliaWind D.1.1 Literature Review
  - ReliaWind D.1.2 Reliability Profiles Methods
  - ReliaWind D.1.3 Reliability Profiles Results
  - ReliaWind D.2.0.1 Common Reliability Analysis Methods & Procedures
  - ReliaWind D.2.0.2 Functional Block Diagrams & Specifications
  - ReliaWind D.2.0.4 Whole System Reliability Model, Summary
  - ReliaWind D.6.7 Recommendations for Standardisation