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Declarations under Rule 4.17:

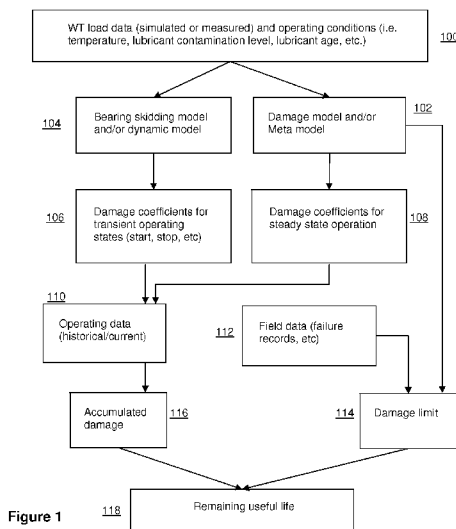
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

[Continued on next page]

(54) Title: DETERMINING DAMAGE AND REMAINING USEFUL LIFE OF ROTATING MACHINERY INCLUDING DRIVE TRAINS, GEARBOXES, AND GENERATORS



(57) Abstract: A method for predicting remaining useful life of a wind or water turbine or component determines in step (116) an accumulated damage for the turbine or component and compares this in step (118) to preset damage limit obtained in step (114). This provides a simple approach to estimating remaining useful life, giving the turbine operator an indication of the condition of turbines or farms under management.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2012/051154

A. CLASSIFICATION OF SUBJECT MATTER
INV. G05B23/02 F03D1/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G05B F03D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, COMPENDEX, INSPEC, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 264 314 A2 (VESTAS WIND SYS AS [DK]) 22 December 2010 (2010-12-22) the whole document -----	1-22,28, 29
X	EP 1 930 855 A2 (GEN ELECTRIC [US]) 11 June 2008 (2008-06-11) the whole document -----	1-22,28, 29
X	US 2011/106510 A1 (POON SIU YUN [GB]) 5 May 2011 (2011-05-05) abstract; figures 1-3 paragraphs [0001], [0002], [0047] - [0048] pages 108-160 ----- -/--	1-22,28, 29

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

14 September 2012

Date of mailing of the international search report

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International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2009/091335 A1 (VESTAS WIND SYS AS [DK]; SIEW PEY YEN [SG]; SANDVAD INGEMANN HVAS [SG]) 23 July 2009 (2009-07-23) the whole document -----	1-22,28, 29
X	WO 2011/060424 A1 (NRG SYSTEMS INC [US]; BECHHOEFER ERIC R [US]; TAYLOR JOHN T [US]) 19 May 2011 (2011-05-19) the whole document -----	1-22,28, 29
X	EP 1 965 281 A1 (ABB RESEARCH LTD [CH]) 3 September 2008 (2008-09-03) the whole document -----	1-22,28, 29

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2012/051154

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

see annex

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-22(completely); 28, 29(partially)

Method for determining damage to a rotating machine or component thereof, as a function of an operating condition and a damage coefficient

2. claims: 23-27(completely); 28, 29(partially)

Method for calculating a damage weighting factor for a wind or water turbine or a component thereof, comprising the steps of: assessing damage to the wind or water turbine or a component thereof under rated operating conditions and under a plurality of field operating conditions; calculating the weighting factor from the expected life under rated conditions and the expected life caused under the plurality of field operating conditions.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2012/051154

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