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**Datasheet for the decision
of 18 January 2023**

Case Number: T 0500/20 - 3.2.04

Application Number: 08853575.2

Publication Number: 2232062

IPC: F03D7/00, F03D7/02

Language of the proceedings: EN

Title of invention:

A WIND TURBINE, A METHOD FOR CONTROLLING A WIND TURBINE AND
USE THEREOF

Patent Proprietor:

Vestas Wind Systems A/S

Opponent:

ENERCON GmbH

Headword:

Relevant legal provisions:

EPC Art. 100(b), 100(a)

RPBA 2020 Art. 12(6)

Keyword:

Grounds for opposition - insufficiency of disclosure (no) -
lack of patentability (no)
Late-filed evidence - admitted in first-instance proceedings
(no) - error in use of discretion at first instance (no)

Decisions cited:

Catchword:

Reasons 3.6. In claimed inventions that do not involve a range of parameter values or compositions but are directed at a concept expressed in terms of generic structural or functional features of an apparatus or of a method, it is not enough to demonstrate insufficiency to conceive of an example that falls within the terms of the claim that does not work because it does not achieve the claimed effect fully or at all so that therefore the invention would not be sufficiently disclosed across the entire breadth of the claim



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Case Number: T 0500/20 - 3.2.04

D E C I S I O N
of Technical Board of Appeal 3.2.04
of 18 January 2023

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 20 December
2019 rejecting the opposition filed against
European patent No. 2232062 pursuant to Article
101(2) EPC.**

Composition of the Board:

Chairman A. de Vries
Members: G. Martin Gonzalez
K. Kerber-Zubrzycka

Summary of Facts and Submissions

- I. The appeal was filed by the appellant opponent against the decision of the opposition division to reject the opposition filed against the patent in suit.
- II. The opposition division held that the invention as claimed by the granted patent was sufficiently disclosed and that the claimed subject-matter was new and involved an inventive step. It did not admit late filed document E18 into the proceedings.
- III. Oral proceedings were held before the Board on 18 January 2023.
- IV. The appellant opponent requests to set aside the decision under appeal and revocation of the patent.

The respondent proprietor requests dismissal of the appeal and thus maintenance of the patent as granted (main request) or alternatively to set aside the decision under appeal and maintain the patent according to auxiliary requests 1-5 filed with the reply to the grounds of appeal dated 18 September 2020.

- V. The independent claims of the main request read as follows:

1. "A wind turbine (1) comprising a rotor (4) comprising at least one rotor blade (5), a yaw controlling system including yaw control means (25), a yaw mechanism (24) comprising one or more yaw motors and a yaw bearing,

registration means (20) for registering an idling power producing situation of said wind turbine (1) in relation to a utility grid, and
detection means (21) for detecting edgewise oscillations in one or more of said blades (5), the wind turbine being characterised in that said yaw controlling system is adapted for changing the yaw position of the wind turbine nacelle (3) when said registration means (20) registers that said wind turbine (1) is operating in an idling power producing situation and said detection means (21) detects edgewise oscillations in one or more of said rotor blades (5), hereby damping or eliminating said edgewise oscillations".

11. "A method for controlling a wind turbine (1), said method comprising the steps of:

- registering if said wind turbine (1) is operating in an idling power producing situation in relation to a utility grid,
- establishing a edgewise oscillation value of a wind turbine rotor blade (5) of said wind turbine (1), and
- changing the yaw angle of the nacelle (3) of said wind turbine (1) if said wind turbine (1) is operating in an idling power producing situation and said edgewise oscillation value is above a predefined level, hereby damping or eliminating said edgewise oscillation."

VI. In the present decision, reference is made to the following documents:

E13 G. Bir et al: "Aeroelastic Instabilities of Large Offshore and Onshore Wind Turbines "; Journal of Physics: Conference Series 75 (2007) 012069.

E14 DK 173029 B1.

E15 English abstract of E14.

E16 WO 02/099277 A1.

E17 DIN EN 61400-1 Juli 2006.

E18 Operation Manual ENERCON E-66 / 18.70, Version 1, October 1999.

VII. The appellant's arguments can be summarised as follows:

The invention is not sufficiently disclosed. Document E18 should be admitted into the proceedings. Granted claims 1 and 11 lack novelty and inventive step.

VIII. The respondent's arguments can be summarised as follows:

The invention is sufficiently disclosed. Document E18 was correctly held inadmissible by the opposition division and should not be admitted into the proceedings. The subject-matter of claims 1 and 11 is new and involves an inventive step over the cited prior art.

Reasons for the Decision

1. The appeal is admissible.
2. Background.

The invention relates to a wind turbine and a method for controlling a wind turbine in an idling power producing situation, see specification paragraphs [0001], [0007] and [0011]. The wind turbine control and method is aimed at damping or eliminating undesirable edgewise oscillations of the rotor blades that may appear in an idling power producing situation, see paragraphs [0003], [0007]. The control of the wind turbine alters the nacelle yaw angle if it detects the presence of blade edgewise oscillations. Changing the yaw angle changes the conditions that influence the presence of edgewise oscillations to dampen or eliminate them, see paragraphs [0008]-[0010].

3. Main request - Sufficiency of disclosure
 - 3.1 The appellant contests the division's finding that the claimed invention is sufficiently disclosed, cf. section 2 of the impugned decision.
 - 3.2 The appellant objects, for both claim 1 and claim 11, that the invention cannot be carried out due to a contradiction of claim features. The claim requires to change the nacelle yaw position while the turbine is at *idle*, the latter in their view meaning that no operation at all (including change in nacelle yaw position) is possible.

However, the Board finds that such a contradiction neither exists in the claim language nor in the accompanying description. The term "idling" is generally understood as meaning "to run while disconnected from load or out of gear, so that it performs no external or useful work" (OED). In the field of wind turbines this simply means that the turbine runs but without generating power, normally when not coupled to the power grid (German: "Leerlauf"). The skilled person, an engineer designing and developing wind turbines, will have no difficulty whatsoever understanding the term either in claim context or in the description. Indeed this understanding is confirmed by the explicit statement in the claim, an idling power producing situation of said wind turbine in relation to a utility grid. Other operations, like nacelle yaw change, are not required to be suspended to meet this claim feature, see also the explicit definition of the expression in paragraph [0011] of the description. Thus, the argument that there would be some "contradiction" is a spurious one.

3.3 Nor does the Board have any difficulty whatsoever in understanding how the invention works when it considers the description and figures. In their view the exact workings of the claimed invention are amply clear to a skilled reader if they genuinely approach the patent and its disclosure constructively, with a sincere willingness to understand. Paragraphs [0074]-[0078] of the patent indicate sufficiently clearly to the skilled person how to carry out damping or eliminating of edgewise oscillations by changing the yaw position (claims 1 and 11) and also how to so reach an oscillation minimum (claim 8). It may be done by an iterative process until a minimum value has been reached or alternatively until a value below a certain

threshold, and/or on the basis of previously obtained data which may also include trend values calculated from previously obtained data stored in the control's memory. Specific values of yaw angle changing speed or choice of positive/negative sense for individual embodiments belong in the Board's view to the skilled person's routine design practice and are not needed in the patent specification description.

3.4 Nor does the Board identify any difficulty for the skilled person to carry out indirect detection of an idling condition by a rotation speed sensor as described in paragraph [0069]. As explained there, null or low rotating speeds can indicate that the wind turbine is idling.

3.5 As regard edgewise oscillation detection, specification paragraphs [0012]-[0019] provide examples of how these can be detected. For instance in paragraphs [0013]-[0015], detection is by load sensors or accelerometers placed in or on the blade to provide information on blade load, including load shifting between the blade's trailing and the leading edges, indicating edgewise oscillations as opposed to say load shifts in other directions. The appellant's objection of lack of information on how to differentiate edgewise and flapwise oscillations is also without merit.

This is also the case for the objection against claim 3, that the disclosure would be insufficient as to how to detect edgewise oscillations with acceleration sensors placed in a nacelle, see specification paragraph [0064]. As indicated there, blade edgewise oscillations induce nacelle oscillations in the yawing direction at frequency values that correspond to the first blade edgewise natural frequency, in the

described example in the interval of 0.9-1.8 Hz. Proper placement of the sensor measurement direction and/or frequency bandpass filter or similar can thus readily be used to isolate the oscillation component associated with the blade edgewise oscillations. Similar frequency filtering can be used for any other type of sensor and other locations as generally described in paragraph [0065]. It might be (as a matter of speculation) that for some special wind turbine design this frequency happens to be close to the resonance frequency of some other component of the turbine, which would distort detection of edge-wise oscillation. However, as variously stated in case law, these isolated cases of non-working or not ideally working embodiments is of no import for the issue of sufficiency in the light of the large number of conceivable and realisable alternatives (see above) indicated in the description, cf. in this respect **G 1/03** reasons 2.5.2, **T 0857/16** reasons 35.

- 3.6 The Board adds that the general argument, made in this case and unfortunately heard ever more often not only in the present field but more widely in mechanics, that the invention would not be sufficiently disclosed across the entire breadth of the claim misapplies an approach developed mainly in the field of chemistry for inventions where a central aspect of the claimed invention is a *range* of compositions or of parameter values, cf. CLBA, 10th edition, 2022, II.C.5.4. There it is important that an effect associated in the patent with the *range* is plausible or plausibly demonstrated across the whole breadth of the claimed range (leaving aside issues of proof of plausibility, the subject of current referral G2/21). Otherwise the claimed invention would be insufficiently disclosed, because the effect is not plausible across the whole breadth of the *range*.

In claimed inventions that do not involve a range of parameter values or compositions basing an argument of insufficiency on this approach is inappropriate and can be rejected offhand for that reason. This is especially so where, as in the present case, an invention is directed at a broadly defined concept expressed in terms of generic structural or functional features of an apparatus or of a method. There it normally suffices to provide a single detailed example or embodiment to illustrate how this concept can be put into practice, cf. CLBA, II.5.2., in such a way that the underlying principles can be understood by the relevant skilled person and they can reproduce the claimed invention using their common general knowledge without undue burden, CLBA, II.4.1. It is thus not enough to demonstrate insufficiency to conceive of an example falling within the terms of the claim that does not work because it does not achieve the claimed effect fully or at all. Such an example does not prove that the claimed concept does not work; rather it reflects the limitations that are inherent in any technological endeavour and which may provide the scope for future (inventive) development. To successively argue insufficiency in a case such as this a very high burden of proof applies: the party must demonstrate through cogent argument based on the underlying principles, if necessary supported by evidence, that the claimed concept does not work, because it does not achieve the desired effect in any measure or indeed is counter to the laws of nature. Or they must demonstrate that the disclosure lacks information on an important aspect of the claimed invention, without which the skilled person cannot realize the claimed invention without undue burden. The appellant has failed to present any such arguments in the present case.

3.7 The Board thus concludes that the invention is sufficiently disclosed, as held by the opposition division.

4. Main request - Novelty

4.1 The scope of certain claimed features is in dispute. In the Board's view, the feature M1.6 of claim 1 that "said yaw control means is adapted for...when" implies specific adaptations of the claimed control means. Contrary to the appellant opponent's arguments, the formulation "adapted for" in normal usage implies much more than mere suitability of the control to be adapted: the means must be so adapted, e.g. by appropriate programming or further hard-wiring. If a known control is not so adapted and cannot perform said function without that adaptation, it does not anticipate the feature.

Additionally, the subject-matter of a claim is not only delimited by the meaning of isolated features but also by their interrelationship as defined by the whole claim wording. Contested claim 1 defines control means that change the yaw position when two conditions occur, namely detecting idle power production and edgewise oscillations. This implies a limitation that the control command to change the yaw position must be triggered by a determination by the control means that the two conditions are satisfied. Therefore, without such a determination, a mere coincidence in time of edgewise oscillations (sensed or not) at idle and change in the yaw position triggered by another (disclosed or undisclosed) event or events does not anticipate the claimed subject-matter.

- 4.2 Claim 11, is a method claim for controlling a wind turbine that defines method steps: "registering...", "establishing...", "changing the yaw angle...". They thus represent genuine technical limitations that the method must be so carried out. A known method of the prior art must thus unambiguously disclose the method steps as defined by the claim to deprive it of novelty. Mere suitability of a known device for performing the steps is thus not an anticipation of the method.
- 4.3 Turning to the appellant's novelty objections, the Board is not convinced that a generally known wind turbine or the wind turbine E13 or E17 deprive claim 1 and claim 11 of novelty.
- 4.4 The appellant's objection regarding a generally known wind turbine is predicated on an interpretation of the claim features that only requires the presence of a generic nacelle yaw angle control, and suitable sensors either or both of which could be reconfigured or adapted to realize detection and control as claimed. As explained above the subject-matter of claims 1 and 11 is more limited and requires control means and sensors already adapted to detect edgewise oscillations and to act on the yaw angle in response to this detection in a specific idle situation. The appellant has not submitted any argument or proof that these features are generally known to the skilled person.
- 4.5 The above also holds for E17 insofar as cited as an example of such a general wind turbine with yaw angle control means and sensors.
- 4.6 E13 is a scientific paper that examines instabilities of wind turbines, see its title. It includes

mathematical model analyses amongst others of edgewise motion of the rotor blades in parked (idling) conditions, see last sentence of abstract. Table 4 on page 15 of E13, cited by the appellant, presents the results for design load cases: DLCs 6.1a & 6.2a, where column "1st Lag" corresponds to blade edgewise oscillations.

The table, however, only discloses a list of mathematical model results. No nacelle yaw angle control means or control method for damping or eliminating edgewise oscillations as required by claims 1 or 11 is described there.

Section 6 "Conclusions and Future Work" describe practical strategies to mitigate instabilities in idling conditions. There is also no disclosure of nacelle yaw angle control. This section suggests only acting on the blade pitch angle, namely feathering at non-90° angles - or applying generator brake. The second paragraph concludes by suggesting further future effort toward "...trying alternate designs and controls to improve stability,...". The standard for novelty under Art 54(2) EPC is direct and unambiguous disclosure in the prior art. Contrary to the appellant's submissions, a disclosure of trying alternative controls is very general and does not meet that standard. It is also not a one-way-street inevitably leading the skilled person to nacelle yaw angle control. Other alternatives, for example different pitch angle control strategies, are also included.

4.7 The Board thus holds that the subject-matter of independent claims 1 and 11 are new over the admitted prior art.

5. Document E18 - Admission

5.1 The appellant has resubmitted document E18, not admitted by the opposition, for admission by the Board. In section 5 of its written communication the Board explained why it was inclined not to overturn the division's discretionary decision not to admit (for D18 read E18):

"The Board shall not admit evidence which were not admitted in the proceedings leading to the decision under appeal, unless the decision not to admit them suffered from an error in the use of discretion or unless the circumstances of the appeal case justify their admittance, Article 12(6) RPBA2020. D18 was filed during the oral proceedings before the opposition division as relevant for novelty of claims 1 and 11. The opposition division, exercising its discretion under Article 114(2) and Rule 116(1) EPC, decided not to admit document D18 as late filed without proper justification, prima facie not relevant for novelty and for reasons of procedural economy, see written decision sections 5 and 5.1, and did so after having heard the parties, see points 5-10, 29, 31 to 34 of the minutes. The division's assessment of prima facie relevance does not appear manifestly wrong: the cited D18 sections 3.16, 3.6, 3.10 neither prima-facie nor explicitly disclose a yaw control as a function of an idling status or edgewise oscillations detection.

"There is thus no apparent error in the division's exercise of discretion. It appears to have applied the proper criteria in an even-handed manner and heard the parties. The subject-matter of the case, granted claims 1 and 11, is unchanged. Therefore there also appear to

be no new circumstances of the case that justify its admittance at this stage.

The Board sees no reason at present to admit D18."

5.2 Absent further arguments the Board sees no reason to change its point of view. The Board thus decided not to overturn the division's decision not to admit E18 into the proceedings, Article 12(6) RPBA.

6. Main request - Inventive step

The appellant contests the findings of the opposition division in section 6 of the decision. The appellant submits that granted claims 1 and 11 lack an inventive step starting from E14/E15.

6.1 E14/E15 discloses a wind turbine and a method for damping or eliminating rotor blade edgewise oscillations in a power production situation. The known wind turbine uses a vibration sensor 9 for detecting edgewise oscillations and changes the rotor rotating speed in order to dampen them, see E15 (translated abstract of E14).

The method in E14/E15 is aimed at wind turbines during regular power production. Indeed, the solutions described in E14/E15 for mitigating oscillations only make sense in the context of energy production. These solutions are to trigger an output relay inserted into the emergency stop circuit of already installed wind turbines, or, in newly constructed turbines, to signal the turbine control system to temporarily reduce the rotor speed until the vibration phenomenon ceases, cf. E14, p. 4, ln. 13-20. The appellant has not identified any part of E14/E15 that teaches or suggests the use of

the described measures during idling or a registration of an idling power production situation, as claimed.

- 6.2 Therefore the known method and control of E14/E15 neither changes yaw angle for damping edgewise oscillations nor is it adapted to act when the wind turbine is at idle, as is claimed. These claimed differences provide a technique for damping or eliminating undesirable oscillations in a wind turbine operating also in idling mode in high winds, see patent specification paragraphs [0004] and [0007].
- 6.3 The Board agrees with the decision's finding that the above modifications to the known control are not obvious from common general knowledge. E14/E15 does not address the problem in an idling situation. It does also not explicitly disclose or suggest to change yaw angle for dampening edgewise oscillations. The appellant alleges that changing yaw angle is a customary measure to control the rotor speed, in particular in stall regulated wind turbines. The Board is not convinced. In its understanding of stall controlled turbines, while rotor speed can be influenced by changing the yaw angle, rotor speed regulation is essentially achieved through blade aerodynamic design and generator brake, whereas in pitch regulated wind turbines, by blade pitch angle control.
- 6.4 As regards a combination with E13, E13 does not teach or suggest changing yaw angle for dampening edgewise oscillations. As explained above, table 4 of E13 (section 5.3), cited by the appellant, only reports mathematical model calculations results. It shows edgewise oscillation risk at nacelle yaw angles of -30° , 30° or 20° degrees (instability risks exist for

negative damping ratio values, while edgewise oscillations correspond to the 1st Lag mode, i.e. last column - see bridging paragraph between pages 8 and 9). These yaw angles belong to Design Load Case (DLC) 6.2a, a situation with faulty yaw angle control (loss of grid), cf. table 3 on page 14. The Board is unable to read herein any suggestion to use yaw control in the calculated negative damping ratios in such conditions.

Actual controls are only described in section 6 of E13, on page 16 mentioned above. No hint, suggestion or teaching to control or set nacelle yaw angle for mitigating the instabilities (edgewise oscillations) can be found there. It describes that certain instabilities were aggravated for certain nacelle yaw settings in combination with non-90° pitching or with braked rotor at certain azimuth angles. However only pitch control or generator brake are taught as suitable means to mitigate the oscillations problem.

- 6.5 A combination with E16 does also not lead to the claimed subject-matter as a matter of obviousness. E16 relates to a method for maximizing the energy output of a wind turbine. Its teaching that the power output and rotor speed can be influenced by changing the yaw angle appears of no relevance for solving the problem of eliminating or dampening oscillations at idling conditions.
- 6.6 The Board therefore confirms the finding of the opposition division that claim 1 and claim 11 involve an inventive step in the sense of Art 56 EPC.
7. As the appellant's arguments against the findings in the opposition division's decision fail to convince, the Board upholds the opposition division's decision.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



G. Magouliotis

A. de Vries

Decision electronically authenticated