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**Datasheet for the decision
of 7 November 2018**

Case Number: T 1905/14 - 3.5.03

Application Number: 08250035.6

Publication Number: 1944667

IPC: G05B19/18

Language of the proceedings: EN

Title of invention:

Tonal emission control for wind turbines

Patent Proprietor:

General Electric Company

Opponent:

Siemens Aktiengesellschaft

Headword:

Tonal emission control for wind turbines/GENERAL ELECTRIC

Relevant legal provisions:

EPC Art. 56

RPBA Art. 13(1)

Keyword:

Inventive step - (no)

Admissibility - auxiliary request (no)

Decisions cited:

T 1634/09



Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 1905/14 - 3.5.03

D E C I S I O N
of Technical Board of Appeal 3.5.03
of 7 November 2018

Appellant: Siemens Aktiengesellschaft
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 18 July 2014
rejecting the opposition filed against European
patent No. 1944667 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairman F. van der Voort
Members: K. Schenkel
P. Guntz

Summary of Facts and Submissions

- I. This case concerns an appeal filed by the opponent (appellant) against the decision of the opposition division to reject their opposition against European patent No. 1 944 667.
- II. The opposition was based on the ground for opposition pursuant to Article 100(a) EPC.
- III. In its decision, the opposition division referred *inter alia* to the following prior art documents:
 - D1: WO 03/064853 A1;
 - D2: EP 1 045 988 B1; and
 - D3: International Standard IEC 61400-11:
"Wind turbine generator systems - Part 11:
Acoustic noise measurement techniques",
Edition 2.1, Geneva, CH, November 2006.
- IV. In its statement of grounds of appeal, the appellant requested that the decision under appeal be set aside and that the patent be revoked.
- V. In its reply, the respondent (patent proprietor) requested that the appeal be dismissed.
- VI. Both parties conditionally requested oral proceedings.
- VII. In a communication accompanying a summons to oral proceedings, the board gave its preliminary opinion that, *inter alia*, the subject-matter of claims 1 and 7 was not new having regard to the disclosure of D1 and informed the parties that it may wish to discuss

inventive step starting out from the disclosure of D1 and taking into account the common general knowledge or the teaching of D2.

VIII. In response to the board's communication, the respondent submitted, by letter dated 3 October 2018, an auxiliary request together with further arguments in support of novelty and inventive step of the subject-matter of the claims as granted and of the claims of the auxiliary request.

IX. Oral proceedings took place on 7 November 2018.

The appellant requested that the decision under appeal be set aside and that the patent be revoked in its entirety.

The respondent requested that the appeal be dismissed (main request) or, in the alternative, that the patent be maintained in amended form on the basis of the claims of the auxiliary request filed with the letter dated 3 October 2018.

At the end of the oral proceedings, after deliberation by the board, the chairman announced the board's decision.

X. Claim 1 of the main request, i.e. claim 1 as granted, reads as follows:

"A system for the noise reduction of a wind turbine (100), comprising: at least one acoustic sensor (200) providing a signal; a detection unit (250); and a control unit (270); characterized in that said acoustic sensor is attached to the wind turbine; said detection unit (250) is adapted to receive a sensor signal and to

detect a tonal component in said signal; and said control unit is adapted to receive an input from said detection unit (250), and to control at least one wind turbine control parameter in dependence of an amplitude of said tonal component in order to lower said amplitude."

- XI. Claim 1 of the auxiliary request differs from claim 1 of the main request in that the following wording has been added at the end:

"the system further comprising a reference data memory unit (260) storing at least one threshold value for the amplitude of at least one tonal component of a specific frequency, wherein the sensor (200) is coupled to a preamplifying unit (230) and the preamplifying unit (230) is coupled to a filter unit (240) connected to the detection unit (250), the system further comprising a second memory unit (280) adapted to store data related to wind turbine operating parameters and data related to previously detected tonal components, and wherein in case of a failure of the sensor (200) or the detection unit (250), the second memory unit (280) provides reference data to the control unit (270) as a fall back system".

Reasons for the Decision

1. *Main request - claim 1 - inventive step*

- 1.1 The subject-matter of claim 1 is directed to a noise reduction system for a wind turbine. The system includes at least one acoustic sensor attached to the wind turbine, a detection unit for detecting a tonal component in the acoustic sensor's output signal and a control unit adapted to control at least one wind

turbine control parameter in dependence of an amplitude of the tonal component in order to lower the amplitude.

The patent specification (paragraph [0007]) states that the expression "tonal component" is used for acoustic emissions which can be typically characterised by the fact that they consist substantially of one or a few fundamental frequencies. Furthermore, it is stated that tonal components exhibit a substantially periodic behaviour, can be characterised by their main frequency, and are mainly caused by periodic oscillations or interactions in mechanical systems, e.g. tooth-meshing-effects of gearboxes. The board will interpret "tonal component" accordingly.

- 1.2 Document D1 relates to an apparatus and a method for controlling the sound emitted by a wind turbine for observing acoustic limits set for a given place (abstract and Fig. 4). The apparatus includes an acoustic sensor adapted to measure the sound pressure at or near the place for which the acoustic limits are set and is adapted to control the operation of the wind turbine accordingly (page 7, lines 17 to 22, and page 16, lines 18 to 24). In the board's view, the apparatus implicitly includes a detection unit to analyse the output signal of the acoustic sensor and a control unit to control the operation of the wind turbine accordingly.

D1 further discloses that a microphone may be attached to the wind turbine to, after calibration, indirectly measure the sound power level at the given place (page 13, lines 13 to 18 and 34 to 36).

- 1.3 D1, using the language of claim 1, thus discloses

a system for the noise reduction of a wind turbine (abstract), comprising:

at least one acoustic sensor providing a signal ("microphone"), a detection unit, and a control unit, whereby the acoustic sensor is attached to the wind turbine, the detection unit is adapted to receive a sensor signal and to detect a sound power level in this signal, and the control unit is adapted to receive an input from the detection unit and to control at least one wind turbine control parameter in dependence of an amplitude of the sound power level to lower this amplitude.

- 1.4 The subject-matter of claim 1 thus differs from the system disclosed in D1 in that the sound power level is further specified as a tonal component.

The board notes that in D1 further observations are made with respect to specific frequency ranges of the sound which is generated by a wind turbine and its effects. One of the sources of sound is identified as being the sound emanating from the gearbox of the wind turbine, which produces mechanical sound (page 2, lines 2 to 5). This, in the board's judgement, implies a narrow-band sound. Furthermore, it is stated that lower-frequency sound is normally the most important, primarily below 300 Hz, especially in the frequency range of 0 Hz to 150 Hz (page 8, lines 31 to 33). Furthermore, according to D1, a threshold of vibrations causing rattle-sound indoors may be observed as the acoustic limit, and there may also be an acoustic limit set for the infrasound frequency range below 20 Hz (page 8, lines 11 to 15). However, D1 does not provide further details on how the sound power level in specific frequency ranges is detected.

1.5 Starting out from the system of D1, the technical problem underlying the subject-matter of claim 1 may therefore be seen in finding an implementation of the known system which allows a frequency analysis of the sound generated by the wind turbine.

1.6 Document D3 relates to acoustic noise measurement techniques for wind turbines and discloses measurement procedures enabling noise emissions generated by a wind turbine to be characterised (page 7, beginning of point 1 "Scope"). The skilled person, starting out from D1 and faced with the above-mentioned technical problem, would therefore consider D3.

D3 discloses that the presence of tones shall be determined by a narrow-band analysis and that in the frequency range below 2000 Hz, which includes the frequencies emphasised in D1, the frequency resolution shall be between 2 Hz and 5 Hz (page 22, beginning of point 8.5 "Tonality" and Table 2). The board notes in this respect that the patent in suit, in the description of the embodiments, discloses a frequency resolution within the same range (column 3, lines 55 to 57, "2 Hertz"). D3 further discloses the identification of possible tones by finding local maxima in the spectrum, comparing each local maximum with the average energy of the adjacent frequencies and determining whether the local maximum exceeds the adjacent sound level by 6 dB (page 23, point 8.5.2 "Identifying possible tones"). The local maxima in the frequency spectrum thus correspond to the amplitudes at the respective frequency or frequency range (depending on the selected frequency resolution) of the measured sound power level. D3 thus discloses that a tonal component and its amplitude is detected.

The skilled person, starting out from D1 and faced with the above-mentioned technical problem, would therefore, on applying the teaching of D3 to the system of D1, implement the detection unit such that it is adapted to detect a tonal component and the control unit such that it controls the at least one wind turbine control parameter in dependence of the amplitude of the tonal component in order to lower its amplitude.

He would thus arrive without exercising inventive skill at a system which includes all the features of claim 1.

1.7 Arguments of the respondent

1.7.1 The respondent argued that D1 did not refer to a tonal component but to a reduction in broadband noise like, for example, the frequency range below 300 Hz. However, since D3 discloses the detection of tonal components (see point 1.6 above) this argument became moot.

1.7.2 The respondent further argued that the subject-matter of claim 1 provided the advantage of reduced mechanical loads, which led to a different technical problem, namely that of increasing the lifetime of a wind turbine. The board notes however that in the patent in suit this problem is not mentioned. It only mentions the problem of noise caused by the running of wind turbines, which leads to various problems, such as resistance from neighborhoods and the like (column 1, lines 12 to 14, and claim 1 ("for the noise reduction of a wind turbine")). The board thus sees no reason to reformulate the technical problem when starting out from D1 (see points 1.2 to 1.5 above).

1.7.3 The respondent argued that Figs. 3 and 4 could not be combined and, hence, that D1 did not disclose a control

method for the noise reduction of a wind turbine which used an acoustic sound sensor attached to the wind turbine.

The board notes however that the description corresponding to Fig. 3 states that after calibration of the microphone 20, which is arranged on the hub of the wind turbine, the sound power level may later on during the operation of the plant be indirectly measured by the microphone 20 (page 13, lines 34 to 36). This passage thus describes this method of determining the sound power level and, in particular, of providing the acoustic input data as an alternative to the method described with respect to Fig. 4 in which the microphones 11 are not attached to the wind turbine.

1.7.4 The respondent further argued that D3 refers to the sound pressure level of tones. The board notes that the patent refers to an amplitude of a tonal component without further defining it. In the board's view, the sound pressure level of a tone, i.e. the local maximum in the frequency spectrum, as referred to in D3 may thus be considered as the amplitude of a tonal component in the sense of claim 1.

1.8 In view of the above, the board concludes that the subject-matter of claim 1 does not involve an inventive step (Articles 52(1) and 56 EPC). The main request is therefore not allowable.

2. *Auxiliary request - admissibility*

2.1 The auxiliary request was filed with the letter dated 3 October 2018, i.e. one month before the scheduled oral proceedings before the board.

According to Article 13(1) RPBA, any amendment to a party's case after it has filed its grounds of appeal or reply may be admitted and considered at the board's discretion. The discretion shall be exercised in view of, *inter alia*, the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy.

2.2 In accordance with the case law, a request may be admitted pursuant to Article 13(1) RPBA at a late stage of appeal proceedings if sound reasons exist for filing the request so far into the proceedings, which may be the case when amendments are occasioned by developments during the proceedings, if the request does not extend the scope of discussion as determined by the grounds of appeal and the respondent's reply, it being noted that under Article 12(2) RPBA the grounds of appeal and the reply must contain a party's complete case, and if the request is clearly or obviously allowable, meaning that it must be immediately apparent to the board, with little investigative effort on its part, that the amendments made successfully address the issues raised without giving rise to new ones (cf. T 1634/09, point 3.2 of the reasons).

2.3 Claim 1 of the auxiliary request essentially adds the features of a reference data memory unit storing a threshold value for the amplitude of a tonal component and a second memory unit adapted to store wind turbine operating parameters and data related to previously detected tonal components for providing reference data to the control unit in case of failure of the sensor or the detection unit. These features define a strategy of handling a failure of the sensor or the detection unit and do not touch upon the criteria for analysing the

sound, which was the central point in the discussion during the oral proceedings and in the communication annexed to the summons. Hence, the auxiliary request was not a reaction to the discussion relating to the detection of tonal components. Thus, the filing of the auxiliary request was not occasioned by developments during the appeal proceedings.

- 2.4 The board further notes that the added feature of the second memory unit was taken from the description and was not in any of the claims before the examining division or the opposition division. If the board were to admit this request, the board would be compelled either to give a first ruling on the subject-matter, which is contrary to the main purpose of appeal proceedings to give the losing party a possibility to challenge the decision of the opposition division on its merit, i.e. to review the correctness of the first-instance decision, or to remit the case to the opposition division, which goes against the need for procedural economy.
- 2.5 Therefore, the board, exercising its discretion under Article 13(1) RPBA, did not admit the auxiliary request into the appeal proceedings.
3. There being no allowable request, it follows that the patent is to be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar:

The Chairman:



G. Rauh

F. van der Voort

Decision electronically authenticated