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Datasheet for the decision of 27 August 2020

Case Number: T 0039/17 - 3.5.02

Application Number: 11701227.8

Publication Number: 2572426

IPC: H02J3/48, F03D9/00, F03D7/02

Language of the proceedings: EN

Title of invention:
Arrangement for Generating a Control Signal for Controlling a Power Output of a Power Generation System

Patent Proprietor:
Siemens Aktiengesellschaft

Opponents:
Enercon GmbH
Vestas Wind Systems A/S

Relevant legal provisions:
EPC Art. 100(a), 56
EPC R.103(4)(c)

Keyword:
Inventive step - all requests (no)
Partial reimbursement of the appeal fee - withdrawal more than one month after summons (no)

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Beschwerdekammern

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Case Number: T 0039/17 - 3.5.02

D E C I S I O N
of Technical Board of Appeal 3.5.02
of 27 August 2020

Appellant: (Patent Proprietor)	Siemens Aktiengesellschaft Werner-von-Siemens-Straße 1 80333 München (DE)
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Respondent: (Opponent 2)	Vestas Wind Systems A/S Hedeager 44 8200 Aarhus N (DK)
Representative:	Inspicos P/S Kogle Allé 2 2970 Hørsholm (DK)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 24 November 2016 revoking European patent No. 2572426 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	R. Lord
Members:	F. Giesen
	A. Bacchin

Summary of Facts and Submissions

I. This appeal by the patent proprietor lies from the decision of the Opposition Division of the European Patent Office posted on 24 November 2016 revoking European patent No. 2572426 pursuant to Article 101(3)(b) EPC. The Opposition Division found *inter alia* that the subject-matter of claim 1 as granted did not involve an inventive step in view of the documents of the state of the art

E1: *WO 2005/025026 A1*
E5: *US 2006/273595 A1.*

II. The appellant (patent proprietor) requested in the statement of grounds of appeal as a main request that the impugned decision be set aside and the oppositions be rejected or, as an auxiliary measure, to maintain the patent in amended form on the basis of the claims of one of the first to sixth auxiliary requests, all filed with the statement of grounds of appeal.

Respondent 1 (opponent 1) requested in their reply to the grounds of appeal that the appeal be dismissed and that the auxiliary requests newly-filed in appeal not be admitted into the proceedings.

Respondent 2 (opponent 2) requested in their reply to the grounds of appeal that the appeal be dismissed and that the third, fifth and sixth auxiliary requests not be admitted into the proceedings.

No further requests were filed during the appeal proceedings.

All parties requested oral proceedings if the Board could not accede to their main requests in the written proceedings.

III. In response to the notification of a summons to oral proceedings pursuant to Rule 115(1) EPC, accompanied by a communication by the Board pursuant to Article 15(1) RPBA 2020 dated 11 May 2020, the appellant announced with letter dated 27 July 2020 that they would not be represented at the oral proceedings scheduled on 27 August 2020 and with letter dated 28 July 2020 withdrew their request for oral proceedings. The Board then cancelled the oral proceedings.

IV. Claim 1 of the **main request** (i.e. as granted) reads as follows:

"*Arrangement (100, 300) for generating a control signal for controlling a power output of a power generation system (463), in particular a wind turbine, wherein the power output is to be supplied to a utility grid, the arrangement comprising:*

an input terminal (101) for receiving an input signal (f_filt) indicative of an actual grid frequency of the utility grid;

a control circuit (107, 115) for generating the control signal (P_inertia), wherein the control circuit comprises a first circuit (121) for generating a time derivative value of the input signal;

and an output terminal (117, 317) to which the control signal is supplied, wherein the control signal depends on the generated time derivative value of the input signal,

characterized by further comprising a load determination unit for determining a load of the power generation system, wherein the load determination unit comprises a counter for counting a number of times the control signal caused an increase of the power output of the power generation system."

V. Claim 1 of the **first auxiliary request** comprises in addition to the features of claim 1 of the main request the feature

"*and wherein the counter is also adapted for measuring a time interval during which the control signal caused an increase of the power output of the power generation system.*"

at the end of the claim.

VI. Claim 1 according to the **third auxiliary request** comprises in addition to the features of claim 1 of the first auxiliary request the feature

"*and wherein the control signal is also based on the load determined by the load determination unit.*"

at the end of the claim.

VII. Claim 1 according to the **fifth auxiliary request** comprises in addition to the features of claim 1 of the third auxiliary request the feature

"*wherein the load determined by the load determination unit is based on the counted number of times and the measured time interval*"

inserted between the features added in the first and third auxiliary requests.

VIII. Claims 1 according to the **second, fourth and sixth auxiliary request** correspond to those of the first, third and fifth auxiliary request, respectively, with the words "during which" in the feature which had been added in the first auxiliary request having been deleted.

IX. The arguments of the appellant which are relevant for the present decision were essentially as follows:

The ground for opposition pursuant to Articles 100(a) and 56 EPC did not prejudice the maintenance of the opposed patent because the subject-matter of claim 1 according to the main request involved an inventive step in view of E1 and E5. E1 could be considered the closest prior art. It did not disclose a load determination unit for determining a load of the power generation system, wherein the load determination unit comprises a counter for counting a number of times the control signal caused an increase of the power output of the power generation system. The objective technical

problem was to modify the wind turbine of E1 such as to obtain an expected lifetime estimate. The skilled person would not have consulted document E5 in order to solve this problem because it did not deal with estimating the lifetime but rather with a method to optimise power production during high wind speed. Furthermore, E5 did not suggest the claimed solution. The counting referred to in E5 was done on a farm level in order to allow the central control system to consider each individual count value when selecting one or more wind turbines for the task of "harnessing excess wind energy" by temporarily increasing the corresponding rated power value(s). There was no indication in E5 that the counting was done by a load determination unit. Furthermore, the counting described in E5 related to "the number of times the wind power generators have already been allowed to operate above rated power in the past" and not to the number of times an actual increase of the power output had been caused (by a control signal depending on the time derivative of the grid frequency). Just because a wind turbine was allowed to did not necessarily mean that the wind turbine actually did operate at a higher power level, *e.g.* if the wind suddenly decreased. Counting such events would obviously not be useful when trying to estimate lifetime. Finally, there was no indication in E5 that the described counting was done with the aim of providing a lifetime estimate. In fact, E5 mentions "life of the individual wind turbine generators" as a separate parameter that may also be considered in the selection process in addition to the "number of times", see paragraph [0024], four lines from the end.

The subject-matter of claim 1 of the first and second auxiliary requests involved an inventive step. The distinguishing features were counting the number of

times the control signal caused an increase of the power output and also measuring the duration of the corresponding time intervals (i.e. the duration of the increased power output as a result of the control signal). The technical effect was to be seen in providing an even better lifetime estimate. More specifically, increased power output with a longer duration would have a larger impact on the lifetime in comparison to increased power output with a shorter duration. The objective technical problem was thus that of modifying the power generation system of E1 in order to obtain a precise expected lifetime estimate for the power generation system. The skilled person would not have consulted E5 for the reasons given in connection with the main request and they would not have found a suggestion leading to the claimed solution. The "transient period of time" according to paragraph [0028] of E5 was a protective measure ("such that the baseline life of the wind turbine generator 14 is not compromised") but had nothing to do with estimating lifetime with high precision. E5 also did not disclose a counter within a load determination unit capable of both counting the number of power increases and of measuring the duration of the power increases. The counting of the number of allowed requests is done by the wind farm control system 54, while the alleged measurement of duration is done by a wind turbine controller 88. A measurement of "the transient period of time" in accordance with E5, *i.e.* the period of time the wind turbine is allowed to operate with a higher rated power, is not the same as measuring the actual duration of a period with increased power output.

The subject-matter of claim 1 of the third and fourth auxiliary requests involved an inventive step. In addition to the distinguishing features of the

preceding request, the feature "the control signal is also based on the load determined by the load determination unit" was a further distinguishing feature. The technical effect was to consider the estimated lifetime when generating the control signal, such that "frequency response" could be avoided in cases where the estimated lifetime indicated that a high risk of damage to the power generation system may be present. The objective technical problem was that of providing power generator frequency control while limiting the impact on the lifetime of the power generation system. The skilled person readily understood claim 1 according to the third auxiliary request such that the load determination unit served to obtain an "accumulated load" as also referred to in paragraph [0008] of the patent as it included the counter with the dual function of counting the number of power output increases caused by the control signal and of measuring the time interval during which the control signal caused an increase of the power output. The general statements in paragraph [0035] and claim 23 of E5 regarding "past operating conditions, history and the decisions stored in memory" did not suggest the claimed solution.

The subject-matter of claim 1 of the fifth and sixth auxiliary requests involved an inventive step. In case the Board was not convinced by the argument that the load determination necessarily had to be determined based on results of the counter in the preceding request, this was now explicitly claimed. The same arguments therefore applied.

X. The arguments of respondent 1 which are relevant for the present decision were essentially as follows:

The ground for opposition pursuant to Articles 100(a) and 56 EPC prejudiced the maintenance of the opposed patent because the subject-matter of claim 1 according to the main request did not involve an inventive step in view of E1 and E5. The features of the preamble concerned the frequency control of a power generator and were known from E1, whereas those of the characterising portion concerned the lifetime estimation. They were a mere agglomeration. Hence it was not necessary for E1 to contain a pointer to the solution according to the characterising portion. The objective technical problem was an improved lifetime estimate taking into account the output power. This idea was disclosed in E5, which enumerated various parameters for estimating the lifetime, *e.g.* in paragraph [0028]. Additionally, E5 suggested in paragraphs [0027] and [0029] to take into account output power for estimating the baseline life. The first, third and fifth auxiliary requests did not meet the requirements of Article 123(2) EPC. The second, fourth and sixths auxiliary requests should not be admitted because they were not convergent. All additional features according to the various auxiliary requests were already suggested by E5.

XI. The arguments of respondent 2 which are relevant for the present decision were essentially as follows:

The ground for opposition pursuant to Articles 100(a) and 56 EPC prejudiced the maintenance of the opposed patent because the subject-matter of claim 1 according to the main request did not involve an inventive step in view of E1 and E5. Starting from El the problem to be solved was to modify the wind turbine suggested in El in order to estimate or measure its expected

lifetime. E5 disclosed in paragraph [0004] that an inherent trade-off existed between the power at which a wind turbine operated and its lifetime, due to the fatigue limit of the mechanical components of the wind turbine and other factors, that is, the maximum output rating. The skilled person would therefore have consulted E5. The solution to the above problem was provided in paragraph [0024] of E5, which taught that selected individual wind power generators were allowed to operate at higher power ratings. This selection was based on a farm level assessment of the operating conditions of the wind turbine generators with respect to other conditions, such as the power output of the other power generators, life of the individual wind power generators, the number of times the wind power generators had already been allowed to operate above the rated power set point in the past and so forth. In paragraph [0024] E5 taught an arrangement for determining a load of a wind turbine as well as a counter for counting the number of times the control signal caused an increase of the power output and described load determination features, whereby different loads were mentioned, such as mechanical, temperature and electrical loads, see paragraphs [0025] to [0027] and [0029]. The control scheme according to E5 was the same irrespective of whether it was applied on a wind farm level or on an individual turbine level. The wording of claim 1 did not exclude that the "arrangement for generating a control signal" might form part of an external control unit, such as a control unit of a wind power plant.

Reasons for the Decision

1. Admissibility of the Appeal

The appeal was filed in due time and form. It is therefore admissible.

2. Decision in the Written Procedure

This decision can be handed down in the written procedure. After having been notified of the Board's preliminary opinion in a communication pursuant to Article 15(1) RPBA 2020, the appellant withdrew their request for oral proceedings with letter dated 28 July 2020. Respondents 1 and 2 have requested oral proceedings only for the case that the Board could not accede to their requests to dismiss the appeal in the written procedure, which is not the case. Additionally, this decision is only based on grounds and evidence which were notified to the parties in the statement of grounds of appeal and the respondents' replies, and were taken into account by the Board in the the communication pursuant to Article 15(1) RPBA 2020. The parties thus have had an opportunity to comment on these grounds and evidence as required by Article 113 EPC.

3. Inventive Step - Main Request

3.1 The ground for opposition pursuant to Article 100(a) EPC prejudices the maintenance of the opposed patent because the subject-matter of claim 1 of the main

request does not involve an inventive step within the meaning of Article 56 EPC in view of E1 and E5.

3.2 Closest Prior Art

The Board is satisfied that E1 is a suitable starting point for the assessment of inventive step.

3.3 Distinguishing Features

E1 deals with the stabilisation of the grid frequency by temporarily increasing the output power of a wind turbine by tapping into the kinetic energy stored in its rotating parts, see page 6, last two paragraphs. Grid frequency deviations are detected by taking into account the time derivative, see page 7, second paragraph ("D-Verhalten") and claim 5 ("Änderungsgeschwindigkeit"). According to E1, page 16, fourth paragraph the output power can be increased up to 22% above rated output power.

The Board is satisfied, and the parties agree, that E1 does not disclose the features of the characterising portion of claim 1 of the main request, *i.e.* in particular a load determination unit and a counter.

3.4 Technical Effect and Objective Technical Problem

The technical effects of and the technical problem to be solved by these distinguishing features is to determine a load on the wind turbine.

3.5 Assessment of the Solution

E5 is concerned with temporarily increasing the output power of wind turbines above the rated output power

without overly shortening the lifetime of the wind turbines. In fact, in order to increase the power above rated power without compromising the baseline lifetime, E5 teaches both that loads have to be monitored and how the lifetime is estimated from this data. The teaching of E5 is thus relevant in the context of E1, *i.e.* grid frequency stabilisation, and also promises to be relevant for the solution of determining the loads. Therefore, the skilled person would have consulted E5.

E5 suggests determining the loads on a wind turbine, in particular by counting the number of times increases of power above rated power were allowed in the past, in paragraph [0024], last sentence.

The appellant's argument regarding the difference between "allowing" and "causing" does not persuade the Board. According to E5, individual wind turbines send a request to the wind farm level controller to operate above the rated power. The wind farm level controller then "allows" this request. This non-technical wording of E5 merely means in technical terms that a control signal is sent to the individual turbine making the request and hence, E5 clearly discloses that the number of times the power output is increased in response to a control signal is counted. Likewise, a skilled person would clearly understand that only those instances are counted that actually have an influence on the lifetime of the turbine. It has to be noted in this context that claim 1 of the main request does not specify that the control signal causes the output power to be increased above the rated power of the power generation unit or that the increase affects the lifetime in any other way. The appellant's observation concerning a lack of usefulness of counting events when a turbine is operated below its ratings equally applies to claim 1

of the main request where counting such events is not excluded.

The load on a given individual wind turbine is independent of the loads acting on other wind turbines. Whether the counting takes place in a central unit or individually, it will in any case have to keep track of the individual loads. A composite load count would be useless and a skilled person would consequently not interpret E5 in this manner. The Board is therefore not convinced by the appellant's argument that E5 suggested counting on a wind farm level.

The Board is also not persuaded by the appellant's argument that E5 did not suggest that the load determination unit "comprised" the counter. Claim 1 of the main request uses purely functional wording without defining any spatial relationship of the components. A "load determination unit" will itself normally consist of a number of distributed sensors and a processor, as is exemplarily also shown in E5 in figure 1. Hence, any counter that is functionally used to determine loads and estimate lifetime, as is done in E5, paragraph [0024], last sentence, is also "comprised" by the functional load determination unit.

In conclusion, E5 suggests to provide a load determination unit with a counter as claimed in the characterising portion of claim 1 of the main request. The subject-matter of claim 1 of the main request therefore does not involve an inventive step.

4. Admissibility of the Third, Fifth and Sixth Auxiliary Requests

Both respondents requested not to admit the third, fifth and sixth auxiliary requests. In view of the finding explained below that none of the auxiliary requests meets the requirements of Article 56 EPC, the Board exercises it discretion to admit all of the auxiliary requests, for reasons of procedural economy.

5. Inventive step - Fifth and Sixth Auxiliary Request

5.1 The subject-matter of the independent claim 1 of the fifth and sixth auxiliary requests is directed to the combination of features present in the first and third auxiliary request and a further feature. This is thus the most limited subject-matter on file. The Board will deal with the fifth and sixths auxiliary requests first for reasons of procedural economy.

5.2 The Board notes that given the minimal disclosure of the load determination unit in the opposed patent, which is confined to paragraphs [0007] and [0008], it must be assumed that the skilled person in the present case can draw on substantial general knowledge concerning the determination of loads and making estimates of the lifetime on that basis.

5.3 According to E5 the wind farm controller allows increases of power above rated power only if this does not compromise the overall wind turbine's lifetime. This means that the corresponding control signal must be based on the complete lifetime estimate, which in turn must take into account all relevant factors. In particular, E5 suggests in paragraph [0029] that rather

than taking into account only the parameter load for estimating the lifetime, composite parameters, *i.e.* several different factors, should be considered simultaneously. E5 discloses as relevant factors *inter alia* thermal and mechanical loads, see paragraph [0029]. A further relevant factor, as explained above, is the number of times a control signal caused the wind turbine to increase output power above rated power. In addition to this, E5 discloses in paragraph [0028] that the rated power is increased "for a transient period of time such that the baseline life of the wind turbine generator 14 is not compromised". A skilled person thus understands due to the mention of "a transient period" that accumulated duration of increases above rated power is a relevant factor for the lifetime estimate.

Given this disclosure, a skilled person receives the clear suggestion from E5 to base a control signal for increases of power above rated power on:

- the number of times of past increases above rated power,
- the accumulated duration of such increases above rated power and
- the individual thermal, mechanical and electrical loads.

Taking into account the first two factors suggests a counter for the historical instances of power increases above rated power and a measurement of the durations of each of the increases. Clearly, the determined total load will be based on these two factors.

A skilled person wanting to operate a wind turbine according to E1 above rated power in order to stabilise the grid frequency without compromising the wind

turbine's overall lifetime, would be led in an obvious way to take all of the above factors in combination into account. Therefore, the subject-matter of claim 1 according to the fifth auxiliary request does not involve an inventive step in view of E1 and E5.

The omission of the words "during which" in the sixth auxiliary request does not change this assessment. The appellant stated that the purpose of this omission was to ensure compliance with Article 123(2) EPC, but did not argue that this amendment had any influence on the assessment of inventive step. Therefore, the subject-matter of claim 1 according to the sixth auxiliary request also does not involve an inventive step in view of E1 and E5.

5.4 First to Fourth Auxiliary Requests

Given that the first to fourth auxiliary requests are directed to subject-matter limited only to either the first or the first and second of the above factors (see point 5.3), and given that the omission of the words "during which" is immaterial for the assessment of inventive step, the reasoning concerning the fifth and sixth auxiliary request applies also to the higher ranking auxiliary requests.

It follows that the subject-matter of claim 1 according to the first to fourth auxiliary requests also does not involve an inventive step.

6. Reimbursement of the Appeal Fee

No reimbursement of the appeal fee is ordered because the requirements of Rule 103(4)(c) EPC for a partial

reimbursement of the appeal fee are not met. Pursuant to Rule 126(2) EPC, the Board's communication issued in preparation for the oral proceedings on 11 May 2020 was deemed to be delivered to the appellant on the 21 May 2020. With the advice of delivery dated 18 May 2020, the appellant acknowledged having received the communication. The appellant's request for oral proceedings was withdrawn by letter dated 28 July 2020, *viz.* not within one month of the notification of the above communication.

7. Conclusions

Since the subject-matter of none of the appellant's requests involves an inventive step, the Board accedes to the respondents' requests.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

U. Bultmann R. Lord

Decision electronically authenticated