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**Datasheet for the decision
of 27 June 2016**

Case Number: T 1163/12 - 3.2.04

Application Number: 02787103.7

Publication Number: 1417409

IPC: F03D1/06, F03D3/06

Language of the proceedings: EN

Title of invention:

WIND TURBINE BLADE

Patent Proprietor:

Vestas Wind Systems A/S

Opponents:

LM Glasfiber A/S
Gamesa Eólica S.L.

Headword:

Relevant legal provisions:

EPC Art. 54(1), 56, 83, 107

Keyword:

Novelty - (yes)

Inventive step - (yes)

Sufficiency of disclosure - (yes)

Admissibility of appeal - notice of appeal - change of name

Decisions cited:

Catchword:



Beschwerdekammern
Boards of Appeal
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Case Number: T 1163/12 - 3.2.04

D E C I S I O N
of Technical Board of Appeal 3.2.04
of 27 June 2016

Appellant: Vestas Wind Systems A/S
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Decision under appeal: **Interlocutory decision of the Opposition**
Division of the European Patent Office posted on
16 March 2012 concerning maintenance of the
European Patent No. 1417409 in amended form.

Composition of the Board:

Chairman A. de Vries
Members: S. Oechsner de Coninck
 C. Heath

Summary of Facts and Submissions

I. The appellant I (opponent I) lodged an appeal, received on 9 May 2012, against the interlocutory decision of the Opposition Division, dispatched on 16 March 2012 on the amended form in which the patent No. 1 417 409 can be maintained. The statement setting out the grounds of appeal was received on 25 July 2012. The fee for appeal was paid on 9 May 2012.

The appellant II (proprietor of the patent) likewise lodged an appeal, received on 24 May 2012 against the interlocutory decision of the Opposition Division. The statement setting out the grounds of appeal was received on 20 July 2012. The fee for appeal was paid on 24 May 2012.

Opposition was filed against the patent as a whole and based on Article 100(a) together with 52(1) and 54(1) EPC and together with 52(1) und 56 EPC, and Article 100(b) together with 83 EPC.

The Opposition Division held that the grounds for opposition mentioned in Article 100 (a) and (b) EPC did not prejudice the maintenance of the patent as amended according to the request 1B, having regard in particular to the following documents that also played a role in the present proceedings:

D10: WO 93/05888

D11: Erich Hau, "Windkraftanlagen", 2. Auflage, Juli 1995, pages 201-206

D15: US 5,324,563

E4: WO 00/14405

PrI-D1: The Engineered Materials Handbook, Volume I, Composites, 1987-1988, pages 533-543

- II. Further, the following document was cited in appeal:
D16: Gewehr, Herbert W.: "Design, Fabrication, Test, and Evaluation of A Prototype 150-Foot Long Composite Wind Turbine Blade"; KAMAN AEROSPACE CORPORATION; September 1979.
- III. Oral proceedings were held on 27 June 2016.
- IV. The appellant/opponent I requests that the decision under appeal be set aside and the patent revoked.
- V. The appellant II/proprietor requests that the appeal of the appellant I be rejected as inadmissible, the decision under appeal set aside and the patent be maintained on the basis of the main request filed as auxiliary request 4 on 9 January 2013.
- VI. The party as of right opponent II did not make any submissions or file requests during the appeal proceedings.
- VII. The independent claim 1 of the main request reads as follows:
1. "A blade for a wind turbine, wherein at least a third of the total length, measured from the tip to hub, of said blade comprises a layer (1,2) along an outer periphery of the cross-section of said blade, characterised in that the layer (1,2) is at least partly constituted by a number of pre-fabricated pultruded strips (2) of a fibrous composite material and strips of a wooden material arranged in a sequence along the outer periphery."
- VIII. The appellant/opponent I argued as follows:
- LM Wind Power A/S which filed the appeal is the same legal entity as Glasfiber A/S in the name of which the

opposition was filed. The change of name was effected in 2010 and both entities bear the same registration number (CVR).

- With respect to sufficiency of disclosure the description merely exemplifies a single embodiment of wooden strips with pultruded composite strips on the basis of which it is not possible to reproduce all the workable combinations of strips within the scope of claim 1.

- With respect to novelty pultrusion cannot be distinguished from other manufacturing methods once the blade is produced. Therefore D16 and D11 disclosing strips of different materials also fall within the scope of claim 1.

- Inventive step is lacking starting from any one of documents D16, D11 or E4. Assuming the sole difference between D16 and the rotor blade of claim 1 is the provision of wooden strips, the skilled person would find it obvious to add such strips of a wooden material in order to obtain a workable alternative to the honeycomb panels described therein.

Starting from the rotor blade including a wooden panel of D11 or of the prior art as disclosed in the patent itself, the skilled person would face the problem of reducing the weight of such a blade. Knowing the lighter weight of pultruded strips from his own knowledge as illustrated in PRI-D1, the skilled person would obviously replace some of strips of D11 by other made from pultruded composite material as required by claim 1.

Considering the carbon fiber reinforced plastic strips of E4, the skilled person striving to reduce the waviness of the fibers would use his technical skills as illustrated in PrI-D1, D10 or D15 to provide pultruded strips as defined in claim 1.

IX. The appellant II/Proprietor argued as follows:

- The appeal filed on behalf of LM Wind Power A/S is a different legal entity than LM Glasfiber A/S in the name of which the opposition was filed, therefore the appeal has not been filed by a party entitled to appeal.
- Sufficiency is a new ground of opposition brought forward at a later stage against a new claim that had not previously been challenged and should not be admitted.
- D16 does not disclose strips as defined in claim 1 but instead panels made from paper honeycomb not being a wooden material. In addition the pultruded spline does not include strips in sequence along the periphery of the blade. D11 does not disclose strips made by pultrusion which are also identifiable as a finished product containing straight fibers.
- As for inventive step none of the combinations of D16 D11 or E4 with the common general knowledge suggests to provide a sequence of pre-fabricated pultruded strips. Starting from D16 the skilled person would not have any obvious reason to deviate from the load bearing leading edge spar by providing a sandwiched structure with strips along the periphery. Starting from the embodiment in figure 7.18 of D11, the skilled person would not have any motivation to replace only some of the wooden strips by pultruded ones. Considering E4 the carbon fiber casting used to manufacture the blades is not compatible with a laminate structure using pre-fabricated strips.

Reasons for the Decision

1. Admissibility of the opponent I's appeal

The admissibility of the opponent I's appeal has been challenged on the basis of the fact that the appeal was filed in a different name, L/M Wind Power A/S, than that, L/M Glasfiber A/S, used by the opponent during the opposition. The Board notes that the notice of appeal mentions both corporate names LM Wind Power A/S and LM Glasfiber A/S further indicating that both are the same legal entity. This statement is substantiated by an extract of the Danish Central Business Register submitted with letter of 12 April 2016 in response to a communication from the Board. On page 9 the extract indicates the change of name in 2010 from LM Glasfiber A/S first registered on 30.10.1985 to LM Wind Power A/S both bearing the same CVR number 76490511.

Based on this evidence the Board has no reason to doubt that the appeal was filed by the same legal entity that was party to the opposition procedure giving rise to this appeal. It is uncontested that this party was adversely effected by the interlocutory decision taken in that procedure. Thus the requirements of Art 107 EPC are fulfilled.

2. Background of the invention, amendments of claim 1

2.1 The patent is concerned with the improvement to a blade for a wind turbine. The main objective of the invention is to provide a wind turbine blade having improved strength and reduced manufacturing costs (see paragraph 0009). In the blade of granted claim 1 this is achieved by a layer that is at least partly

constituted by pre-fabricated *pultruded* strips of a fibrous composite in a sequence along the outer periphery of the blade. This design including the pultruded strips is much simpler, and thus cheaper, to manufacture. Furthermore, the resistance against tension and compression forces in a layer near the outer periphery of the shell provides the blade with an improved resistance to an edge-wise bending mode (paragraph 0012 and 0013).

The amended version of claim 1 according to the main request corresponding to that upheld by the opposition division further refines this concept by defining a second type of strips to be constituted of "strips of a wooden material". As wooden material is not prone to buckling, while pultruded fibrous material is, the end result is a stiffer blade in relation to weight, with thermal expansion coefficient within the same low range and with the same strain properties, cf paragraph 0020.

2.2 The further limitation of wooden strips introduced in claim 1 of the main request indeed represents a narrowing of the scope in comparison with the granted claim 1. Furthermore, this limitation is also supported by the passage on page 3, lines 5 to 7 of the published application WO 03/008800, in which the specific embodiment of arranging in sequence strips of a wooden material with fibrous composite material was explicitly disclosed.

2.3 This has also not been challenged, and the Board therefore concludes that the amended claim 1 complies with the requirements of Article 123(2) and (3) EPC.

3. *Sufficiency of disclosure - Article 83 EPC*

- 3.1 Claim 1 has been amended by the proprietor during opposition and appeal proceedings. In accordance with Article 101(3)a) and G10/91 (see item 19) these amendments of claim 1 are to be fully examined as to their compatibility with the requirements of the EPC. This also applies to the provisions of Art 83 EPC in respect to the pending new version of claim 1.
- 3.2 The appellant/opponent I submitted in writing (page 4 of the grounds for appeal) that the claimed invention was not sufficiently disclosed across its full breadth as the patent did not provide sufficient information regarding all possible combinations of fibrous composite strips with wooden ones that would solve the technical problem of the patent. In particular the amount of trial and error needed to work out the workable material combinations would impose an undue burden on the skilled person.
In accordance with established jurisprudence in order to establish sufficiency the burden of proof is upon the opponent to establish on the balance of probabilities that a skilled reader of the patent, using his common general knowledge, would be unable to carry out the invention (see Case Law of the Boards of Appeal II.C.8, 7th edition 2013). A presumption thus exists that a granted patent is sufficiently disclosed, and the onus is on an opponent to provide compelling proof that this presumption is invalid.
- 3.3 In the present case the appellant/opponent I merely alleges that only a single embodiment of 6x40 mm carbon fiber pultrusions and 40x40 mm birch plywood strips amongst a large number of possible combinations of strips of different possible compositions and dimensions is disclosed. This allegation is however not supported by any corroborating evidence that might

demonstrate or otherwise suggest difficulty or uncertainty in establishing workable rotor blades solutions within the sequence of pultruded strips with wooden ones has been suggested. Likewise, no evidence of unworkable combinations of strips falling within the scope of claim 1 has been submitted. For the Board such an unsubstantiated allegation is insufficient to cast doubt on the presumption that the invention is sufficiently disclosed. In the Board's view the detailed embodiment, which indisputably provides clear and complete instructions of at least one way of putting the claimed invention into practice, represents a firm starting point from which the skilled person using routine skills and by trial and error can adapt the size and quality of the strips sequence by minor variations, without any undue burden. Thus the Board does not see any other compelling reason that might suggest that putting the claimed invention into practise constitutes an undue burden.

3.4 It follows that the amended claim 1 does not result in a non reproducible amount of embodiments such that the provisions of Article 83 EPC does not prejudice the maintenance of the patent.

4. *Novelty*

4.1 D16 has been put forward to challenge novelty. This document discloses a trailing edge spline obtained by pultrusion (page 8, section 4.1; fig 2), and furthermore (page 13, paragraph 2) explicitly teaches laminating E-glass/polyester pultruded planks with epoxy adhesive. In the appellant-opponent I's view the paper core honeycomb panels depicted in figure 2 also represent strips made of wooden material thereby also anticipating the added feature of claim 1.

For the skilled person the terms "paper" and "wooden material", given their normal meaning, denote quite distinct materials. Paper itself is not necessarily made of wood pulp, it may also be made of grass, cotton or other fibrous pulp material. Irrespective of the material used, neither the honeycomb structure comprising patterned webs forming cells nor the whole panel formed with honeycombs as shown in figure 2 can be equated with strips in their usual meaning as used in the present patent. According to page 7, lines 21 to 24 and as further depicted in figure 3, the strips are in cm section range and form a structural reinforcement within a sandwiched layer. Moreover the claimed arrangement of a sequence of strips of two different materials suggests that the strips need to be of a similar dimension or arrangement. Read in this context the skilled person will understand the term strips to have the meaning commonly used in the field of composite blade manufacture, and also coherent with the disclosure in the patent, as a long, narrow piece performing a stiffening function.

The panels of fig 2 in D16 although being somehow elongated do not provide this stiffening function to the blade. On the contrary the load bearing function of the blade depicted in figure 2 of D16 is performed by the leading spar which is attached to the hub by the blade to hub adaptor shown in figure 2. Furthermore the Board also considers that the trailing edge spline made of pultruded planks bonded together to form a solid structure does not qualify as a layer around the outer periphery of the cross section of the blade according to claim 1. A layer should normally be construed as a covering surface having a relatively thin thickness, and in the present context of the outer periphery of

the cross section of a (hollow) blade as having both an internally and externally facing surface. On the contrary the trailing edge spline of figure 2 exhibits a solid triangular cross section linking the extrados (upper curve) fiberglass skin to the intrados (lower curve) skin, therefore neither exhibiting an inner facing surface nor a relatively thin surface.

Hence neither the paper core honeycomb panels can be equated to the strips of a wooden material, nor can the trailing edge spline form part of the layer as defined in claim 1.

Therefore D16 does not directly and unambiguously disclose a layer at least partly constituted by a number of pre-fabricated pultruded strips of a fibrous composite material and strips of a wooden material arranged in a sequence.

- 4.2 D11 has also been submitted by the appellant-opponent I as novelty destroying. On page 201; Fig 7.12 a cross section of a blade is depicted with webs instead of a wound spar as shown in Fig. 7.11. The blade comprises two main laminates connected by three C-shaped webs. The appellant-opponent I submits that a pultruded finished product cannot be distinguished from another product obtained by another manufacturing method such as extrusion or laminating. Therefore the laminate of Fig. 7.12 and the balsa stiffener provided in the trailing edge region would anticipate all the features of claim 1.

The Board does not share this opinion. Even assuming a balsa strip in the trailing edge region is indeed disclosed in D11 (which is not evident to the Board), claim 1 furthermore specifies as a feature that some of the strips are pre-fabricated pultruded strips. This feature forms part of the features that according to

Rule 43(1) EPC define the matter for which protection is sought, and which in order to take away novelty must be directly and unambiguously derivable from the content of the prior art. This is not the case here since the laminates ("laminierte Schalenbauweise") are explicitly obtained by a lamination process, not by a pultrusion process. Furthermore, the Board does not share the view that strips obtained by pultrusion cannot be differentiated from any other strip obtained otherwise. As explained in Pr1-D1 middle column paragraph 2 and 3, a finished pultrusion product will have a constant cross section with embedded and relatively straighter fibers, so that the pultruded strip also exhibits a relatively higher tensile strength. These verifiable properties or qualities allow a pultrusion product to be easily distinguished from a laminate in D11.

4.3 Consequently, novelty of the subject-matter of claim 1 is given with respect to the documents D11 and D16 cited by the appellant.

5. *Inventive step*

5.1 *Document D16 with common general knowledge*

The appellant substantiated lack of inventive step in particular with respect to document D16. D16 also discloses a wind turbine blade including a pultruded trailing edge spline (Page 98, Chapter "Trailing Edge Spline") and indeed appears to represent a suitable starting point for assessing inventive step. Contrary to the appellant/opponent I's opinion, the Board does not consider the paper core honeycomb panels of figure 2 to represent the sole difference with respect to the subject-matter of claim 1. Indeed as

already explained above, the Board also considers that the pultruded planks of the trailing edge spline bonded together to form a solid structure do not qualify as part of a layer according to claim 1.

As indicated in paragraphs [0012] and [0013] of the patent specification, one of the advantages of combining different types of strips in a blade outer layer, is that each type of strips is easier and cheaper to manufacture, while once assembled the properties of the two types combine to provide an improved resistance to edge-wise bending modes in comparison with designs comprising an inner beam.

The corresponding objective technical problem can then be formulated as how to provide a rotor blade which is simple and cheap to manufacture while improving bending resistance.

This problem is not expressly addressed in D16 nor is it derivable therefrom in the context of the honeycomb panels, because as already explained above the honeycomb panels do not form part of the load bearing structure.

Turning to the blade construction provided in D16, the blade is made of a structural leading edge spar on which two paper core honeycomb panels are attached forming the middle chord region and ending in the trailing edge region at the stiffening spline. Here again the layer forming the outer periphery of the cross section of the depicted blade of D16 is quite different from the plurality of strips of two different types arranged in sequence as required by claim 1. Absent any evidence to the contrary the Board is unconvinced that it would be common general knowledge

to use a sequence of pre-fabricated pultruded strips of a fibrous composite and wooden material strips to replace the honeycomb panels in order to improve the bending properties.

Even assuming the technical problem starting from these two differing features would (as proposed by the appellant-opponent I) merely reside in providing a workable alternative to the honeycomb panel of D16, the Board is not convinced the skilled person from his own general technical knowledge would obviously replace the honeycomb panels by a sequence of pre-fabricated pultruded strips and strips of a wooden material. The leading edge structural beam of D16 is made of a filament wound part, providing the blade's main load bearing support, and therefore does not point at the use of reinforcement strips. In looking for a workable alternative for the paper core honeycomb panels, the skilled person does not need to bear in mind any enhanced structural resistance. This portion of the blade only needs to guide the external flow without load bearing function for the blade itself. Therefore, looking for such a workable alternative the skilled person might contemplate replacing the paper core honeycomb pattern by a series of strips of the same or similar material properties as paper honeycomb as a possible alternative. In the Board's view he would however have no incentive to add a strip made of a second material in combination, let alone pre-fabricated pultruded strips.

In further considering the trailing edge spline of D16 made from bonded planks of pultruded composite material, the skilled person also would not find therein any incentive to incorporate this pultruded material in the form of a plurality of strips in the

outer periphery of the blade depicted in figure 2. The solid nature of the spline does not suggest to the skilled person that it can be extended into an outer circumferential layer, much less as part of a sequence of strips.

In the light of the above, the Board concludes that the combination of D16 with the skilled person's general technical knowledge does not lead in obvious manner to the blade for a wind turbine defined in claim 1.

5.2 *Document D11 or Patent's prior art with common general knowledge*

In the fig 7.18 on page 205 of D11 a wooden blade section is depicted, wherein part of the outer layer is made of plywood arranged in a cell structure ("Sperrholz mit Zellstruktur"). In the appellant-opponent I's view this corresponds to a sequence of strips of a wooden material as required by claim 1, as also described as prior art in paragraph [0003]. Starting from any of these prior art blade structures the only difference between the subject-matter of claim 1 and either of this prior art would be the inclusion or insertion of a number of pre-fabricated pultruded strips in the sequence with the existing wooden strips. Wood being relatively heavy, the problem would be to reduce the weight of such a blade. The skilled person would derive from his general technical knowledge as identified in PrI-D1 (page 541, left hand column) that pultruded strips can be chosen both for their light weight and high tensile strength. He would then obviously replace some of the wooden strips by pultruded ones.

This argument cannot convince the Board. As with D16, the middle chord panels in figure 7.18 of D11 that include the wooden strips (as the one of 7.11 thereof) do not serve the purpose of providing a load bearing structure for the blade. That is rather the function of the front beam structure including spruce veneer laminate ("Fichtenfurnier laminiert") and a cross beam. It would not occur to the skilled person as a matter of obviousness and based on his common general knowledge to transfer part of this load bearing function to the middle chord region by the inclusion of pultruded fiber composite strip in the sequence.

If, as submitted, the skilled person merely strives to reduce weight, he would not immediately consider composite material as a straightforward solution, but would rather opt for lighter materials such as balsa wood in the middle chord section. Should the skilled person nevertheless find that certain pre-fabricated pultrusions of fibrous composite material as identified in PRI-D1 are lighter than the cell-structured plywood layer of D11, he would then rather replace all the wooden strips of D11 by these pultruded ones. Hence, merely striving to reduce the weight would not lead the skilled person to replace only some of the wooden strips in the outer layer panel of D11 with pultruded strips, let alone pre-fabricated pultrusions of a fibrous composite material which are specifically chosen for their stiffness to improve the blade bending properties

Consequently, the combination of D11 with the skilled person's general technical knowledge as illustrated in PRI-D1 does not result in an obvious way in the blade for a wind turbine as defined in claim 1.

5.3 *Document E4 with common general knowledge*

E4 describes a pre-reinforced wind turbine blade. It is mentioned on page 1, last paragraph, that strips of carbon fibre-reinforced plastics form part of a fibre glass blade. On page 3, lines 14-27 it is also explained that the carbon fibre-reinforced plastics preferably form part of the laminate. Starting from this disclosure, the appellant-opponent I submits that the skilled person on the basis of common general knowledge as exemplified in D10 or D15 would identify waviness as a problem associated with laminating fibers within a matrix, and would know that pultrusions are an obvious solution to this problem.

Even if the skilled person would recognize fiber waviness as a problem, and consider pultruded material as its solution, the Board does not find any apparent further hint for the skilled person to foresee the additional modification of providing the pultruded material in strips together with wooden strips in a sequence in the relevant areas of the blade outer skin (fig. 2, E4). Additionally, the choice of wooden material strips would be at odds with the materials suggested in E4 (glass, carbon fiber) and materials commonly used for a pultrusion process (e.g. Plastic PrI-D1, graphite or carbon D10,D15).

Therefore, the Board concludes that starting from E4, the skilled person's general technical knowledge as disclosed in D10 or D15 does not prompt him to provide the arrangement of strips as defined in claim 1.

5.4 The Board concludes, therefore, that the subject-matter of claim 1 of the main request involves an inventive step with respect to the prior art brought forward by

the appellant/opponent I, and therefore fulfills the requirements Article 52(1) and 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent as amended in the following version:

Description:

pages 2 and 3 as filed during oral proceedings,
pages 4 - 6 as published in the patent specification,

Drawings: :

Figures 1,2A,2B,2C,3 as published in the patent specification

Claims:

1 - 22 according to the Main Request filed as Auxiliary Request 4 with letter dated 9 January 2013.

The Registrar:

The Chairman:



G. Magouliotis

A. de Vries

Decision electronically authenticated