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**Datasheet for the decision  
of 22 June 2022**

**Case Number:** T 1997/20 - 3.2.04

**Application Number:** 11151803.1

**Publication Number:** 2479423

**IPC:** F03D1/06

**Language of the proceedings:** EN

**Title of invention:**

Wind turbine rotor blade element

**Patent Proprietor:**

Siemens Gamesa Renewable Energy A/S

**Opponent:**

Vestas Wind Systems A/S

**Headword:**

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

Inventive step - (no)

**Decisions cited:**

**Catchword:**



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Case Number: T 1997/20 - 3.2.04

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.04**  
**of 22 June 2022**

**Appellant:** Siemens Gamesa Renewable Energy A/S  
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**Decision under appeal:** **Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
18 November 2020 concerning maintenance of the  
European Patent No. 2479423 in amended form.**

**Composition of the Board:**

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

## **Summary of Facts and Submissions**

- I. The appeals were filed by the appellant-proprietor and the appellant-opponent against the interlocutory decision of the Opposition Division finding that, on the basis of the auxiliary request 2, the patent in suit met the requirements of the EPC.

In particular, the Division decided that granted claim 1 was not new and claim 1 of auxiliary request 1 lacked an inventive step while claim 1 of auxiliary request 2 was new and involved an inventive step.

- II. In preparation for oral proceedings the board issued a written communication setting out its provisional opinion on the relevant issues.

Oral proceedings were held on 22 June 2022 before the Board by videoconference.

- III. The appellant-proprietor requests that the decision under appeal be set aside and the patent be maintained as granted (main request), auxiliarily to maintain the patent according to auxiliary requests 1-9, all filed or re-filed with the statement of grounds of appeal of 11 March 2021. Auxiliary requests 1-4 correspond to auxiliary requests 1-4 filed in first instance, where auxiliary request 2 is the version upheld by the Opposition Division.

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

IV. Independent claim 1 of the appellant-proprietor's requests reads as follows:

(a) Main request (as granted)

"A wind turbine rotor blade element (50, 60, 80) comprising a first portion (51, 61, 81) and a second portion (52, 62, 82) which are connected with each other, wherein the first portion (51, 61, 81) comprises a rear surface (53, 63) for facing a surface of a wind turbine rotor blade (5) and the second portion (52, 62, 82) comprises a top surface (56, 66) which includes an angle (57) between  $90^\circ$  and  $180^\circ$  with the rear surface (53, 63) of the first portion (51, 61, 81), characterised in that the wind turbine rotor blade element (50, 60, 80) comprises a plurality of wedges (90) which are connected to the first portion (51, 61, 81) and to the second portion (52, 62, 82) of the wind turbine rotor blade element (50, 60, 80)."

(b) First auxiliary request

Claim 1 as in the main request with the following amendment (emphasis by the Board to indicate deleted or added text):

"... which includes an angle (57) between  ~~$90^\circ$  and  $180^\circ$~~   $110^\circ$  and  $160^\circ$  with the rear surface..."

(c) Second auxiliary request (as upheld)

Claim 1 as in the first auxiliary request amended as follows (emphasis by the Board to indicate deleted or added text):

"...connected to the first portion (51, 61, 81) and to the second portion (52, 62, 82) of the wind turbine rotor blade element (50, 60, 80), and the second portion (52, 62, 82) comprises a number of corrugations (76, 86)."

(d) Third auxiliary request

Claim 1 as in the first auxiliary request amended as follows (emphasis by the Board to indicate deleted or added text):

"...connected to the first portion (51, 61, 81) and to the second portion (52, 62, 82) of the wind turbine rotor blade element (50, 60, 80), and a transition portion (79) is located between the first portion (51, 61, 81) and the second portion (52, 62, 82), wherein the transition portion (79) comprises a number of corrugations (76, 86)."

(e) Fourth auxiliary request

Claim 1 as in the first auxiliary request amended as follows (emphasis by the Board to indicate deleted or added text):

"...connected to the first portion (51, 61, 81) and to the second portion (52, 62, 82) of the wind turbine rotor blade element (50, 60, 80), a transition portion (79) is located between the first portion (51, 61, 81) and the second portion (52, 62, 82), and the second portion (52, 62, 82) and the transition portion (79) comprise a number of corrugations (76, 86)."

(f) Fifth to ninth auxiliary requests

These requests correspond to the above main request to fourth auxiliary request. They have in common that claim 1 has been amended in all requests as follows (emphasis by the Board to indicate deleted or added text):

"A wind turbine rotor blade (5) comprising a span direction (11), a root portion (13), a shoulder (14), which is defined as the location of the maximum profile depth of the wind turbine rotor blade (5), and comprising a wind turbine rotor blade element (50, 60, 80) being connected to the rotor blade (5) between the root portion (13) and the shoulder (14) in span direction (11), wherein theA wind turbine rotor blade element (50, 60, 80) comprisesing a first portion (51, 61, 81)..."

V. In the present decision, reference is made to the following document(s):

(E2) WO 2009/146810 A2

(E3) EP 1 112 928 A2

(E15) K. Hord: "Numerical investigation of the aerodynamic and structural characteristics of a corrugated wing", University of Louisville, August 2010.

VI. The appellant-opponent's arguments can be summarised as follows:

Claim 1 of all requests lacks an inventive step in the light of documents E2, E3 and E15.

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

The subject-matter of the independent claims of all requests is new and involves an inventive step over the cited prior art.

### **Reasons for the Decision**

1. The appeals are admissible.

2. Background

The patent relates to an element that can be attached to a wind turbine rotor blade to increase the aerodynamic properties of the blade, see paragraph [0010] of the patent specification; in particular to the trailing edge of the rotor blade to form a spoiler, a flow guiding device or a flap, also called Gurney flap, see paragraph [0014]. It comprises two portions connected to each other at an angle between 90° and 180° see figures 4, 5. The first portion is adapted for attachment to a surface of the rotor blade, see paragraph [0012]. The element further comprises a plurality of wedges connected between the first and the second element portions. The wedges increase the stability of the structure under varying aerodynamic load conditions, see paragraph [0015].

3. Main request - Inventive step

3.1 It is common ground that E2 discloses a turbine rotor blade element in the form of a Gurney flap 36 in the sense of the contested claim with two portions connected at an angle, see figures 19 and 20, page 13, lines 27-33 and claims 21, 22.



The elements 36 depicted in figures 19,20, of E2 also disclose an angle that is shown as obtuse, and would thus appear to lie between  $90^{\circ}$ - $180^{\circ}$ . Figures 19,20 are technical drawings that are of a similar nature as those of the patent. They are thus meant to illustrate how aerodynamic elements function, in the present case, to illustrate amongst other things how the elements 36 fulfil their function to alter or deflect the air flow. The skilled person would thus recognize that, though exact measurements may not be possible, the obtuse angle consistently shown in both figures of elements 36 is not accidental. It is intentional and meant to show a real feature of the elements that brings about a desired amount of flow deflection.

- 3.2 The only differing feature is thus that of a plurality of wedges connected between the element's first and second portion. This provides increased stability to the blade flap, see patent specification paragraph [0015]. The corresponding objective technical problem can thus be formulated as how to increase stability in the known blade element.
- 3.3 For the skilled person, the provision of wedges to increase stability is obvious in the light of E3, figure 19 and paragraph [0044] and [0002]. These passages teach the use of ridges or ribs ("Stege") providing increased rigidity and strength to the rear bent edge of a wing forming a Gurney flap. These ribs are clearly shown as wedge shaped in the figure.
- 3.4 Paragraph [0002] of E3 indicates that its teachings can be used in the field of turbines, and specifically mentions wind turbines as an application in paragraph [0029], col.7, ln. 53, and paragraph [0054], col.16, ln

17 ("Windkraftanlagen", "Windturbinen"). The appellant proprietor points out that noise generation by a Gurney flap is identified as a disadvantage in wind turbines, see E3 paragraph [0005]. That a Gurney flap may have certain (recognized) disadvantages does not alter the fact that, they are known to improve the aerodynamic properties of airfoils and are used for that very reason, as also recognized in paragraph [0011] of E3 in relation to the prior art, but also in their intentional and undeniable use in the embodiment of figure 19 of E3. Indeed insofar as Gurney flaps do give rise to vibrations and noise due to wake instability, as also discussed in paragraph [0011], further paragraph [0044] indicates that the improved rigidity and strength resulting from the wedges also results in wake flow stabilization ("Nachlauf-Strömungsstabilisierung"). This additional or bonus effect of the wedges mentioned in E3 represents a further motivation for the skilled person to apply its teaching to the Gurney flap of E2.

- 3.5 Furthermore, there is no suggestion in paragraph [0044] that the use of wedges for increasing flap stability would be confined to flaps that are integral with the blade or wing. The final sentence (col.13, ln.7-9), clearly indicates that the flap with wedges can be manufactured as a pre-formed unit that is then attached to the underside of a wing, see also paragraph [0042], first sentence.
- 3.6 The Board thus concludes that granted claim 1 lacks an inventive step, Articles 100(a) and 56 EPC.

- 4. First auxiliary request - Inventive step
  - 4.1 Claim 1 is only amended to restrict the claimed angle between the two element's portions to a range between 110° and 160°.
  - 4.2 The Board is unable to identify any apparent technical effect associated with the specific new angle range compared to what is already achieved by the known obtuse angle of elements 36 in E2. The contested patent also does not identify any effect achieved by this angle range. It only indicates that it is preferable, see e.g. paragraph [0012].

In the Board's view, this is therefore a technically arbitrary selection of angles to carry out in practice, the obtuse angle of the known element 36 of E2. A feature without a technical effect, i.e. a technically arbitrary feature, does not contribute to the solution of any technical problem. It therefore cannot contribute to inventive step according to established case law, see Case Law of the Boards of Appeal, Ninth Edition, 2019 (CLBA), I.D.9.5, and the decision T 1009/12 cited in there.

Alternatively, if it is surmised that this range represents values for which the aerodynamic effects of the Gurney flap are optimized, then that range of values, absent evidence to the contrary, must be regarded as the result of routine optimization effort.

- 4.3 The Board concludes that claim 1 lacks an inventive step over the combination of E2 and E3 for similar reasons as claim 1 of the main request.

5. Second auxiliary request - Inventive step
  - 5.1 Upheld claim 1, second auxiliary request, adds the feature that the second portion of the claimed element comprises a number of corrugations.
  - 5.2 These further increase stiffness whereby the element can be made of thinner material, see specification paragraph [0016]. No further effect is described in the contested patent. Additionally, no synergistic effect arising from the combination of the claimed corrugations and wedges in the sense that the effect of the combination of these two measures is more than their combined effect on stability or stiffness, is apparent from the description or otherwise. Hence inventive step can be assessed independently for each group of features.
  - 5.3 As discussed above for the higher ranked requests, stating from E2 the provision of wedges is considered as an obvious measure in the light of E3. It follows that inventive step of the second auxiliary request hinges on whether the addition of corrugations to the known flap of E2 is obvious in the light of the cited prior art, in particular for solving the problem of increasing its stiffness.
  - 5.4 In the Board's view it is well known, as any engineer will confirm, that corrugations increase rigidity of otherwise thin planar material. Thus, for example, sheet metal is corrugated to allow it to be used as structural elements of buildings, such as walls and roofing. Use of rigidifying corrugations is however also known in the field of aerodynamics, as illustrated by E15. E15 is a thesis that investigates the

characteristics of corrugations on wing structures, see its title and abstract. In section B, "Literature Review", see in particular pages 18 and 19, it reviews various studies that had already associated corrugations in wing structures with increased rigidity and structural stability and less material. On the basis of its own investigations it confirms these findings, see section VII "CONCLUSION", page 73, concluding that this is indeed the primary benefit of corrugations, as they provide "no advantages in terms of stall delay or lift generation" which were found to be similar to those of the reference model.

- 5.5 The Board is not convinced by the Opposition Division's and appellant proprietor's argument that the skilled person would not consider the teaching in E15 as relevant for solving the above problem in a wind turbine blade flap element as that of E2.

It is true that E15 does not address flap elements or refer to wind turbines. E15 reports the result of a numerical investigation of the aerodynamic and structural characteristics of a corrugated wing, see title. The study is inspired by a biological model, dragonfly forewings which are corrugated, and examines properties of corrugations with the aim of possible application to Micro-Air-Vehicles (MAVs), see section A "Background", pages 11-12, and section C "Objectives", page 19.

It is not under dispute that the skilled person in the present case is an engineer involved in the design and development of wind turbines, in particular of wind turbine blades, with relevant knowledge in the field of aerodynamics. From their knowledge in that field they will be familiar with developments in airfoil

technology in other applications, as the field covers a wide range of applications, e.g. aircraft wings or spoilers. This is illustrated by E3, which shows how its teaching are applicable in different fields (paragraph [0002] of E3), see also paragraph [0006] where it describes the history of "Gurney-flaps" originally developed for race cars and successfully applied in aircraft wings. Thus, in the Board's view, because the skilled person is knowledgeable in the wider field of aerodynamics they would be familiar with E15. The question is then whether they would also consider a broader application of its teaching beyond the wing models of the study.

In the Board's view, it lies within the skilled person's normal skills of comprehension and abstraction to recognise that the teachings in E15 are also relevant for other types of aerodynamic elements such as the wind turbine flap 36 of E2 and that they can be adapted for this particular use. This is so as the main takeaway from E15 is that corrugation *primarily* improves rigidity and structural stability of flat, thin structures with little or no effect on aerodynamic properties. Exactly because there is hardly any or no aerodynamic effect one way or another, that might tie the use of corrugations to particulars of the wing structure, the skilled person recognizes that they can continue to have the same benefits generally associated with corrugation also in an aerodynamic context. In the Board's view this recognition is within the skilled person's normal skills of understanding.

The skilled person would thus regard the use of corrugations in the second portion of the known element of E2 for increasing its stiffness as a matter of obviousness.

5.6 Finally, the appellant proprietor submits that E15 teaches spanwise corrugations E15, not chordwise ones as shown in the patent figures. The skilled person would thus need a further adaptation step, which is neither obvious nor suggested by E15. However, claim 1 does not require any specific orientation of the corrugations. The argument is therefore moot. The Board is also not convinced by the argument that the skilled person would not seek to improve the stiffness in an element already made stiffer by the provision of wedges. The skilled person is generally intent on further improving any performance characteristic; there are no limits to their desire to improve. In the Board's view they will therefore as a matter of course consider the combined application of different known measures to the same effect, as long as those measures do not exclude or interfere with each other in some other way. No argument has been presented that this would be so, nor is this apparent. Finally, both measures allow material savings to be made, the degree to which either measure or both are applied is a matter of the balance the skilled person needs to strike between material costs and structural integrity. Such considerations are routine.

5.7 The Board concludes that upheld claim 1 lacks an inventive step, Article 56 EPC, and that the impugned decision must thus be set aside.

6. Auxiliary requests 3 and 4 - Inventive step

6.1 These requests, as compared to auxiliary requests 1 and 2, add the feature of a transition portion between the first and second element's portions. The claimed transition portion also includes corrugations.

6.2 The new claims, however, do not specify any requirement as regards form, shape or size of the transition portion. Any arbitrary area in the region of the transition between the first and second portions of the known flap 36 can thus be regarded as the claimed transition portion. Such area could for example include neighbouring parts of the first and second portions. As pointed out by the Board in its preliminary written opinion, a flap element resulting from the obvious combination of teachings of E2, E3 and E15 as discussed above for auxiliary request 2 would in that case also meet these added limitations. Such an embodiment would have a second portion with corrugations extending across the entire second portion and thus also into the area neighbouring the edge where the first and second portions meet, which can be identified as a transition portion.

6.3 The appellant proprietor's further submissions during the oral proceedings have not convinced the Board to change its preliminary view. It may be that a flap element is easier to manufacture by bending or may have a higher structural stability due to a smooth, curved transition zone such as depicted in figures 7 or 8. However, as stated, claim 1 lacks any definition of the transition zone, let alone that it specifies that it is curved .

Similarly, that the corrugations are provided at the transition portion, the area with higher mechanical stresses, thus providing higher stability, is at best a bonus effect resulting from the obvious corrugation of the entire second portion of the flap.



6.4 The Board therefore concludes that Claim 1 of auxiliary requests 3 and 4 does not involve an inventive step.

7. Auxiliary requests 5-9.

7.1 As submitted by the Board in its preliminary opinion:

"Auxiliary requests 5-9, only differ from the main request and auxiliary requests 1-4 in that they are directed to a wind turbine rotor blade (including the flap element with the same claimed features) and not only to the flap element. The flap element 36 of E2 is also described in that document as part of a wind turbine rotor blade. Thus without prejudice to the question of admission, the only amendment to these requests cannot establish an inventive step when starting the assessment from E2."

7.2 The appellant proprietor refrained from further comment during the oral proceedings. Absent any further argument from the appellant proprietor, the Board sees no reason to change its preliminary view.

7.3 The Board therefore concludes that claim 1 of these requests does not involve an inventive step, Article 56 EPC.

8. For the above reasons the Board finds that the decision was wrong in concluding inventive step and that therefore it must be put aside. Furthermore, taking into consideration the amendments made by the appellant proprietor, the patent and the invention to which it relates do not meet the requirement of the Convention. The patent must be revoked pursuant to Article 101(3) (b) EPC.

**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. Magouliotis

A. de Vries

Decision electronically authenticated