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**Datasheet for the decision
of 26 October 2016**

Case Number: T 1921/12 - 3.2.07
Application Number: 04753821.0
Publication Number: 1646477
IPC: B24B31/00, B23F19/00, F16H55/06
Language of the proceedings: EN

Title of invention:
SUPERFINISHING LARGE PLANETARY GEAR SYSTEMS

Patent Proprietors:
REM Technologies, Inc.
Osro GmbH

Opponents:
Metal Improvement Company, LLC
PIV Drives GmbH
Eickhoff Antriebstechnik GmbH

Headword:

Relevant legal provisions:
EPC Art. 56, 111(1), 128(4)
EPC R. 139, 140, 144(d)
RPBA Art. 11, 12(4), 13(1)

Keyword:

Correction of errors in the granted patent by the Examining Division (see points 2 and 3)

Public access to decisions correcting the patent after grant (see point 3.6)

Fundamental procedural defect - (no)

Late-filed auxiliary requests - request clearly allowable (no)

Inventive step - (no)

Decisions cited:

G 0001/10, G 0002/88, T 0226/02, T 1495/09, T 0021/08,

T 0176/84, T 0195/84, T 0995/95, T 1635/10, T 0809/10,

T 1689/12, T 0419/12, T 0176/84, T 0195/84

Catchword:



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Case Number: T 1921/12 - 3.2.07

D E C I S I O N
of Technical Board of Appeal 3.2.07
of 26 October 2016

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Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office posted on 6 July 2012
rejecting the opposition filed against European
patent No. 1646477 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairman H. Meinders
Members: V. Bevilacqua
 I. Beckedorf

Summary of Facts and Submissions

I. Appellants 01, 02 and 03 (respectively opponents 01, 02 and 03) lodged an appeal against the decision rejecting their oppositions against European patent 1 646 477.

II. The Opposition Division held that none of the grounds of opposition raised and substantiated under Article 100(a) EPC (lack of novelty, lack of inventive step, and under Article 100(b) EPC (lack of sufficient disclosure) held against the patent. It considered that the wording of the claims , as corrected by the Examining Division under Rules 139 and 140 EPC, was the valid version of the claims.

III. The present decision is based on the following documents mentioned, among others, during the opposition proceedings:

D1: "Recommended Practices for Design and Specification of Gearboxes for Wind Turbine Generator Systems", AGMA/AWEA 921 -A97, approved 28 October 1996;

D2: EP-A-1 167 825;

R12: Statement of Jan Bruins of 6 February 2007 (filed for the first time in the respondents' letter of 18 May 2012).

The present decision is also based on the following documents submitted, among others, with the statement setting out the grounds of appeal of appellant 03 and the replies thereto of the respondents:

- A8: "Chemically Accelerated Vibratory Finishing for the Elimination of Wear and Pitting of Alloy Steel Gears", October 2001;
- A9: "Graufleckigkeit an einsatzgehärteten Zahnrädern: Ermüdung der Werkstofffrandschicht mit möglicherweise schweren Folgeschäden", Antriebstechnik 24 (1985), pages 53-61.
- A10: Diagram 13 extracted from A9, enlarged.
- R6: "The Gearbox Challenge", Windpower Monthly Magazine, Vol. 21, No. 11, November 2005, pages 1,6,53-60;
- R7: "Survey of Micropitting Research Work of German's FVA ...", Thomas Tobie, presentation given at National Wind Technology Center in Boulder, Colorado, on 15 and 16 April 2009, Published in February 2010, Section 2.3.2;
- R8: "FZG Rig-Based Testing of Flank Load-Carrying Capacity Internal Gears; B.-R. Hoen et al., Gear Technology, June/July 2012, pages 60-69;
- R9: ISO/TR 15144-1 "Calculation of micropitting load capacity of cylindrical spur and helical gears; first edition 15 December 2010.

IV. The statements setting out the grounds of appeal and the replies thereto of the respondents contain a large number of requests.

In the annex to the summons for oral proceedings the Board presented its preliminary opinion on these requests of the parties, stating *inter alia* that:

There was a deficiency in the first instance proceedings because of the correction requested by the respondents with letter of 15 November 2010, which had been incorrectly allowed by the Examining Division

under Rule 139 EPC. The main issue in this correction was the addition of "or less" after "0,25 microns" in claim 1. In fact there was no decision of the Examining Division, since it had been taken by only one member of that division. In view of this evidence (which was sent to the parties) and the particular circumstances, however, the Board could deal with this issue itself without remittal to the Opposition Division, nor need the appeal fee be reimbursed.

The main request, as well as the auxiliary requests and the fall-back request of 18 May 2012 could not be allowed, because their respective claims 1 contravened the requirements of Article 123(2) and (3) EPC and Rule 139 EPC as they extended to input stage planetary gearboxes having teeth that had been superfinished to a final surface roughness (Ra) of 0,25 microns or less.

The request to maintain the patent as granted could also not be allowed, due to the subject-matter of its claim 1 lacking novelty over D4 and inventive step over the combination of the teachings of documents D1 and D2.

As the preliminary position of the Board on priority of claim 1 corresponded to the position taken by the Opposition Division, remittal of the case, as requested by the respondents, was also not envisaged.

The arguments of the appellants supporting their objections concerning lack of sufficient disclosure were considered not convincing.

- V. With letter of 23 September 2016 the respondents maintained their main request of maintenance of the patent in the form upheld by the Opposition Division,

or as granted. They replaced all the previously submitted auxiliary requests with 6 new auxiliary requests for claim 1, 3 new auxiliary requests for claim 6 and 5 new auxiliary requests for claim 9, together with an amended fall-back request. They objected to the Board showing with non-public evidence the non-existence of the correction decision by the Examining Division. It was requested to hear the remaining members of the latter and the chair of the Opposition Division. In this respect the respondents submitted two questions of law and requested that if neither the case was remitted to the Opposition Division, nor the requested corrections were allowed, they be referred to the Enlarged Board of Appeal.

The following document, related to inventive step over the combination of the teachings of documents D1 and D2, was also submitted:

R15: Saint Gobain v Fusion Provida Ltd, Case No:
A3/2004/2441.

VI. Oral proceedings before the Board were held on 26 October 2016. Although having been duly summoned, appellant 02 did not attend, as announced with letter of 5 October 2016. According to Rule 115(2) EPC and Article 15(3) RPBA, proceedings were continued without that party.

At the start of and during oral proceedings the respondents requested, as a main request, that the patent be maintained as granted according to the "Druckexemplar", and filed a first auxiliary request for maintenance as corrected. In view of the main request, the issue of the correction decision of the Examining Division was deferred. In regard of the

outcome of the discussion on the main request (no inventive step over D1 and D2) the first auxiliary request was withdrawn and replaced by a (new) first auxiliary request. The respondents also requested that Mr. Summers be heard by the Board.

For the further course of the oral proceedings, in particular the parties' initial requests and the issues discussed with the parties, reference is made to the minutes.

VII. At the end of the oral proceedings the parties' final requests were established to be as follows:

Appellants 01 and 03 (appellant 02 in his written submissions) requested
that the decision under appeal be set aside and
that the patent be revoked.

The respondents requested
that the case be remitted to the Opposition
Division for prosecution in the event that
documents A8 to A10 were admitted into the
proceedings,
that the appeals be dismissed, i.e. that the patent
be maintained as granted on the basis of the
"Druckexemplar" or,
in the alternative, that the patent be maintained
in amended form on the basis of the set of claims
filed during the oral proceedings as (new) first
auxiliary request with the claims thereof to be
renumbered.

All other initial requests were not maintained by the parties.

The present decision was announced at the end of oral proceedings.

VIII. The text of independent **claim 1 of the main request**, corresponding to the **patent as granted according to the Druckexemplar**, is as follows:

"An input stage planetary gearbox for a large wind turbine generator comprising a hollow wheel gear, two or more planet gears, and a sun gear, wherein one or more of the hollow wheel gear, two or more planet gears, and sun gear comprise a plurality of teeth that have been superfinished to a final surface roughness of 0,25 microns."

The text of independent **claim 9 of the main request** is as follows:

"A method for reducing lubricant debris in an input stage planetary gearbox for a large wind turbine generator, wherein the planetary gearbox comprises a hollow wheel gear, two or more planet gears, and a sun gear, the method comprising superfinishing the teeth of one or more of the hollow wheel gear, two or more planet gears, and sun gear to a surface roughness of 0,25 μm or less before operating the planetary gearbox."

The text of independent **claim 1 of the (new) first auxiliary request** is as follows (amendments over claim 1 of the main request are, respectively, in bold or struck out, emphasis added by the Board):

"An input stage planetary gearbox for a large wind turbine generator comprising a hollow wheel gear, two or more planet gears, and a sun gear, ~~wherein one or~~

~~more of the hollow wheel gear, two or more planet gears, and sun gear, wherein all of the teeth of all of the gears~~ comprise a plurality of teeth that have been superfinished to a final surface roughness (**Ra**) of 0,25 microns"

The text of independent **claim 9 of the** (new) **first auxiliary request** is as follows (amendments over claim 9 of the main request are, respectively, in bold or struck out, emphasis added by the Board):

"A method for reducing **or eliminating damage to the bearings of** lubricant debris in an input stage planetary gearbox for a large wind turbine generator, **by reducing lubricant debris generated from the gear teeth**, wherein the planetary gearbox comprises a hollow wheel gear, two or more planet gears, and a sun gear, the method comprising superfinishing the teeth of one or more of the hollow wheel gear, two or more planet gears, and sun gear to a surface roughness of (**Ra**) 0,25 ~~µm~~ microns or less before operating the planetary gearbox."

IX. The appellants argued, insofar as relevant to the present decision, substantially as follows.

The Opposition Division wrongly delegated to the Examining Division its responsibility to decide on the correction requested by the respondents under Rule 139 EPC. The Examining Division was not competent to deal with this request because examination proceedings were not pending. It also wrongly applied the requirements of Rule 139 EPC.

The decision under appeal is insufficiently reasoned on the issues of sufficiency of disclosure, priority,

novelty and inventive step. The decision also does not contain any discussion on the expert statements submitted in relation to the knowledge of a person skilled in the art, said aspect having been extensively discussed during the oral proceedings before the Opposition Division.

As acknowledged in the decision under appeal, D1 discloses a gearbox from which the subject-matter of claim 1 of the main request only differs in the claimed value of surface roughness of the teeth of the gears.

This gearbox is a suitable starting point to discuss inventive step, especially because D1 contains a statement according to which smooth gear surfaces improve the micro-pitting resistance and therefore also the gearbox performance.

This effect is also mentioned in the description of the patent in suit.

The problem to be solved can be formulated as how to avoid micro-pitting in large gears used in input stage planetary gearboxes for large wind turbine generators.

Based on this problem the relevant person skilled in the art can only be identified as a gear design specialist, and not necessarily a wind turbine generator designer.

D2 teaches that smoothing the surface of the teeth of gears to a surface quality of 0,127 to 0,254 microns ([10], [22], "5 to 10 micro-inch") overcomes the problem of micro-pitting.

The decision under appeal was based on the wrong assumption that the person skilled in the art, starting from D1, would disregard this teaching as it is not specifically related to the field of large input stage planetary gearboxes for large wind turbine generators.

The knowledge of the skilled person in this technical field should, however, be properly appreciated on the basis of documents A8-A10, which should be admitted.

The circumstances alleged in R12, to show that at the time the invention was made nobody considered that such large gears could indeed be superfinished, are not described in detail. Therefore the reasons leading to the refusal by Sparleck GmbH to smooth the surfaces of large gears are only partially known.

As a consequence, this declaration cannot prove that the skilled person would generally refrain from superfinishing large gears used in slow speed planetary gear boxes.

A8 explicitly mentions wind turbine generators, and shows (figure 4 at page 4) that superfinishing of large gears was possible (and advantageous) before the priority date of the patent in suit.

The respondents cannot be surprised by the contents of A8, because the author of A8 is also the inventor of the patent in suit.

A8 is *prima facie* relevant and proves that the skilled person had the necessary knowledge to superfinish large gears, as taught by D2.

Documents A9 and A10 are also *prima facie* relevant because they show that according to a well known design procedure (FVA 54) for preventing micro-pitting, the parameter Ra is to be kept at 0,25 microns or less.

A8, A9 and A10 have been submitted with the statement setting out the grounds of appeal to confirm the information that would have been provided by the experts during the opposition proceedings, had they been allowed to speak. Therefore they show that the Opposition Division based its decision on an incorrect assessment of the knowledge of a skilled person.

These documents should therefore be admitted into the appeal proceedings.

R6 to R9, submitted by the respondents as a reaction to A8-A10, are not *prima facie* relevant and should not be admitted. At the oral proceedings, that request for not admitting documents was specifically directed to R7-R9.

The request to hear Mr. Summers on what was actually the situation in A8 should not be allowed, as it is very late filed and causes a delay of the proceedings, since its preparation for it would only be possible with an adjournment of the oral proceedings.

The subject-matter of claims 1 and 9 of the (new) first auxiliary request clearly does not involve inventive step over the combination of the teachings of documents D1 and D2. This request should therefore not be admitted into the proceedings as it not clearly allowable.

The *ratio decidendi* of G 2/88 (OJ EPO 1990, 93) is not directly applicable to claim 9 of this first auxiliary

request, as G 2/88 relates to a change into a second (non-medical) use claim of a substance, and claim 9 rather relates to a process for producing an improved gearbox characterised by superfinishing the teeth of the gears wherein the purpose of carrying out said process steps is indicated in the claim.

- X. The respondents argued, insofar as relevant to the present decision, substantially as follows:

The minutes of the oral proceedings before the Opposition Division show that appellant 01 contested extensively the right of the Examining Division to decide upon the request of correction, and Dr. Krull, the expert brought by appellant 03, was allowed to speak. The right to be heard was therefore not denied.

The decision under appeal is sufficiently reasoned on the mentioned issues, as it enabled the appellants to follow all their lines of argument, and argue before the Board that some of them were based on misjudgements of the Opposition Division.

The request for correction under Rule 139 EPC has been correctly dealt with and allowed by the Examining Division following T 226/02, because at that time neither the Opposition Division nor the Examining Division were bound by G 1/10 (OJ EPO 2013, 194).

A8, A9 and A10 have been filed late without any explanation for their delay, and the criteria for admission are not satisfied, as they are not *prima facie* relevant.

A8 neither refers to gearboxes for wind power generators, nor to gearboxes for low speed

applications, such as in an input stage planetary gearbox.

Figure 4 of A8 relates to a superfinishing experiment on large gears which did not produce satisfying results, and does not therefore represent an enabling disclosure which could be relied upon by the skilled person, who is a specialist in the field of large wind turbine generators.

Mr. Summers should be heard by the Board to allow the respondents to confirm that.

R7 to R9 have been submitted as a reply to the issues raised by A8-A10, and in particular to show why they are not relevant, and should be therefore introduced into the proceedings and discussed, if A8-A10 are admitted into appeal proceedings.

D1 discloses a gearbox from which the subject-matter of claim 1 of the main request only differs in the claimed value of surface roughness of the gear teeth.

However, D1 being only a recommendation from AGMA and not a standard, would not be considered by the skilled person as a reliable starting point to discuss inventive step.

The effect of the only distinguishing feature is that the presence in the lubricant of debris coming from the teeth is reduced. This prolongs the life of the bearings, which are lubricated by the same lubricant as the gears in the planetary gearbox.

Based on this effect, the problem to be solved should be formulated as how to improve the service life of the bearings in the known planetary gearbox.

This is because, as R6 clearly shows, at the effective date of the patent in suit the skilled person was very concerned with the failure of bearings, as these components were particularly problematic, and did not consider failure of the gears and the gearbox because of micro-pitting on the gear tooth surfaces as an equivalently problematic issue.

Based on this problem the person skilled in the art cannot be the generic gear designer, as argued by the appellants, but can only be a specialist in the field of large wind turbine generators.

D2 would not be taken into consideration by that skilled person as it relates to gears of any type, even of plastic material, does not mention micro-pitting, and mentions an improved fatigue life of only 100 hours after polishing.

Gears to be used in the technical field of the patent in suit operate with high loads at very low speed, and are therefore not to be compared with gears designed for being used in other technical fields.

A teaching coming from a document which is not directly related to this technical field would not be considered as reliable enough to depart from accepted practice with a reasonable expectation of success.

The approach used by the appellants in the discussion on inventive step is over-simplified, as it does not

take account of the principle of expectation of success, as outlined in R15.

It is known (lubricant retention or oil-pocket theory) that excessively smooth surfaces do not retain lubricant. This is because the customary surface roughness values used in this technical field were significantly higher than those which are now claimed.

R12 (declaration of Mr Bruins) shows that before the priority date of the patent in suit not even a specialized company like Sparleck GmbH was able to surface finish the surface of big gear components (above 100 kg) simply because the manufacture of machines suitable for surface finishing of these gears was not possible.

The (new) first auxiliary request should be admitted into the appeal proceedings because its claims are clearly allowable. Clear allowability of claim 9 is, in particular, evident in the light of the *ratio decidendi* of G 2/88 (*supra*).

Reasons for the Decision

1. *Allegations of procedural violation - insufficient reasoning of the appealed decision*
 - 1.1 The appellants argue that the impugned decision is not sufficiently reasoned on the issues of sufficiency of disclosure, priority, novelty and inventive step.
 - 1.2 The Board disagrees and notes that the decision contains under point 1.1 general reasoning on sufficiency of disclosure, related to what the skilled

person would make of the wording of the claim and how the objections of the appellants should in fact be seen.

The Board establishes that the reasoning on "reach through" claims is insufficient as it amounts to "we do not agree that these are reach through claims". However, since the minutes do not refer to this argument of appellant 1, it cannot be established whether this argument was presented extensively or only as an allegation at the oral proceedings. In the latter case the simple answer mentioned above is regarded as sufficient.

Concerning the alleged lack of substantiation in the reasoning on priority, novelty and inventive step, the Board establishes that the decision under appeal contains (see points 13 and 14) reasoning on these issues, and notes that the appellants were able to criticize it in detail, and therefore were able to deal with it.

- 1.3 The appellants also consider the decision as being deficient because it does not contain any discussion on the expert statements submitted by the appellants and related to the knowledge of a person skilled in the art, said aspect having been extensively discussed during the oral proceedings.
- 1.4 The Board is not in a position to assess whether a procedural violation occurred in this respect, because it is not clearly apparent from the minutes to which extent these issues have actually been discussed.
- 1.5 Be that as it may, the Board considers that even if one of these procedural violations occurred, no purpose

would be served by remitting the case to the Opposition Division, which would at most issue another, maybe better reasoned, decision but to the same effect.

This consideration, combined with the fact that the appellants were able to deal, in their respective statements setting out the grounds of appeal, with the impugned decision in detail constitutes, in the Board's view a special reason for not remitting the case, as allowed under Article 11 RPBA.

The Board therefore decides not to remit the case.

2. *Allegation of procedural violation by the Opposition Division in respect of the competence of the Examining Division to decide on the correction of the patent under Rule 139 EPC*

Since this question has become moot by the requests having been amended at the oral proceedings, there is no necessity to deal with this issue here. It will be shortly discussed under point 3.

3. *Main request (reference to the "Druckexemplar")*
 - 3.1 The respondents formulate their main request in that the patent be maintained as granted i.e. in the form according to the "Druckexemplar".
 - 3.2 The appellants note that this does not correspond to the version of the claims with which the patent was maintained when the oppositions were rejected, because that was the version incorrectly accepted by the Examining Division. Based on that they argue that the main request of the respondents amounts to a request to

set aside the decision under appeal, which they cannot request as non-appellants.

3.3 The Board disagrees, because it is the order of the impugned decision, which is that the oppositions are rejected, which determines the actual version of the patent that results from the decision. In the present case that is the version as granted, which is indeed the subject-matter of the present main request ("Druckexemplar", see also point 3.5 below).

3.4 This is also not affected by the "Rule 139 EPC correction decision" dated 23 May 2012 which introduced the "or less" into claim 1. This decision was taken by only one member of the Examining Division, as could be established from EPO form 2051 which the Board could retrieve from the non-public part of the file. The parties were provided with a copy of that form.

Such a decision would be, in the opinion of the Board, non-existent. The result would be that the valid version of the patent is the version as granted, as was notified by the Board to the parties with its communication annexed to the summons to oral proceedings.

Since the main request, by its content, made a decision of the Board on this point unnecessary, there was also no need to refer questions related thereto to the Enlarged Board of Appeal.

3.5 There has been another decision dated "22.10.2011", also retrievable from the same EPO Form 2051, but this time having been signed by all the three members of the Examining Division, with which they saw the need for correcting printing errors that occurred when the

"Druckexemplar" was prepared for printing the granted patent, via Rule 140 EPC, i.e. a correction of their decision to grant.

That was entirely unnecessary because the "Druckexemplar" is in any case the valid version of the granted patent since it is the version communicated to the applicants with the notification pursuant to Rule 71(3) EPC, to which agreement had been given (see also T 995/95, Facts and Submission, point VII; T 1635/10, Reasons, point 1.2; T 809/10, Facts and Submissions, point IX), and to which the decision to grant referred (Article 97(1) and Rule 71a(1) EPC).

Be that as it may, this decision does not affect the wording of the present main request, which is exactly the version of the "Druckexemplar". In any case, the appellants had no objections to this decision of the Examining Division.

3.6 In the issue of the corrections carried out, via the use of EPO Form 2051, on the European Patent after grant, the Board wishes to note that it is rather disturbing that such decisions, more in particular the details of the persons that took them, are not at all retrievable by the public via file inspection. They are not excluded from file inspection pursuant to Article 128(4) EPC and Rule 144(d) EPC, see the Decision of the President of the EPO of 12 July 2007 (OJ EPO 2007, Special Edition, Nr. 3, J.3).

3.7 The main request that the patent be maintained in the form as granted ("Druckexemplar") cannot therefore be considered as a request to set aside the decision under appeal, but is a request to dismiss the appeals.

3.8 For the sake of clarity the Board notes that the text of claim 1 according to the "Druckexemplar" does not contain the modifications requested with the second request for correction, pursuant to Rule 139 EPC ("or less").

4. *Admissibility of the documents submitted during the appeal proceedings*

4.1 A8-A10

The respondents request that A8-A10 not be admitted as being not *prima facie* relevant and late filed. The respondents also request, in the case that a positive decision on their admissibility is taken, to remit the case to the Opposition Division to deal with this fresh evidence.

The Board notes that the above question of admissibility raised by the respondents can only be discussed in the light of Article 12(4) RPBA as these documents have not been submitted during the opposition proceedings, but were filed by appellant 03 with its statement setting out the grounds of appeal.

The Board notes that Article 12(4) RPBA mentions "evidence which could have been presented in the first instance proceedings". To the benefit of the party concerned the Board interprets this to mean "should have been presented" (see also T 1689/12, Reasons, point 1.2, T 419/12, Reasons, point 2.1.2).

The question therefore arises whether appellant 03, in the course of opposition proceedings, should have realised that further material needed to be filed.

This is, for the following reasons and as argued by the appellants, not the case.

The appellants argued in the opposition proceedings that there was no prejudice against superfinishing of large gears, more in particular of gearboxes in wind turbine generators, at the priority date of the patent in suit.

Appellant 03 based this on documents A1 to A7 submitted before the Opposition Division, and offered an expert to testify on their content. Appellant 01 used documents D1 and D2 and argued that the skilled person would apply the general teaching of D2 to the gears of input gearboxes in large wind turbine generators. In its communication annexed to the summons to oral proceedings the Opposition Division rejected documents A1-A7 as not belonging to the prior art and expressed a positive opinion on inventive step over the combination of the teachings of documents D1 and D2. More in particular, the Opposition Division wrote that the skilled person would not do so.

To this appellant 01 replied that it would bring an expert to oral proceedings to support its arguments (appellant 03 had already offered an expert).

At the oral proceedings, these experts (Mr. Krull and Mr. O'Hara) were present.

The minutes do not show that they were allowed to speak. According to appellant 03 his expert (Mr. Krull) was cut short in his submission by the chair of the Opposition Division, who stated that A1 would in any case not be considered prior art. The latter was confirmed by the minutes.

Since the Opposition Division, only at the oral proceedings, did not accept the means of evidence submitted by appellants 01 and 03, the submission of A8-A10 with the statement setting out the grounds of appeal of appellant 03 is regarded by the Board as an acceptable attempt to further support with written evidence the existing line of arguments on the general knowledge of the skilled person and what he would consider as acceptable further teachings.

The Board therefore decides to admit A8-A10 into the appeal proceedings.

The Board also notes that the respondents cannot be surprised by the contents of A8, because the author of A8 is also the inventor of the patent in suit.

A9 and A10 are also not surprising in their respective content, as they relate to a well known gear design procedure.

4.2 R7-R9

The Board also decides to admit these documents, because they have been submitted by the respondents for the case that A8-A10 are admitted by the Board, in application of Article 13(2) RPBA.

The Board notes that the question, raised by the appellants, whether these documents are or are not *prima facie* relevant does not play a role in this respect.

5. *Remittal of the case to the Opposition Division for further prosecution on the basis of documents A8-A10 and R7-R9*

The respondents request that the case be remitted to the Opposition Division for further prosecution, as A8-A10 and R7-R9 were not the subject of the appealed decision.

The Board notes that none of A8-A10 has been directly referred to by the appellants in their objections as to patentability of the subject-matter of the claims of the main request and of the first auxiliary request.

The appellants only introduced A8-A10 to support an existing line of argument, namely that the skilled person would not consider that superfinishing of large gears was technically impossible at the priority date of the patent in suit.

As a consequence, the admission of A8-A10 does not raise issues substantially different from those on which the contested decision was based.

The Board also notes that the respondents only introduced R7-R9 to show that a wind turbine specialist aiming at improving the device disclosed in document D1 would not have taken the teaching of document D2 into consideration.

As this is the argument on which point 14.2 of the decision under appeal is in any case based, also the admission of R7-R9 does not raise a different issue either.

As a consequence, the relevant request to remit the case to the Opposition Division for further prosecution is not allowed.

6. *Hearing of Mr. Summers*

6.1 The respondents alleged, during the oral proceedings held before the Board, that the experiment to which figure 4 of A8 refers did not result in a positive outcome. They argued that the information contained in this document does not represent an enabling disclosure which could be relied upon by a specialist in the field of large wind turbine generators.

The respondents therefore requested that the author of A8, Mr. Summers, be heard to confirm these allegations.

6.2 The Board does not consider it necessary for the present decision to hear Mr. Summers.

This is because it is not at all apparent to a skilled reader that the content of A8 is either not correct or not complete. This document does not contain anything on the basis of which a skilled reader would, at the priority date of the patent in suit, have inferred that the superfinishing experiment on large gears shown in figure 4 at page 4 was not successful.

That this was allegedly the case came up only during the oral proceedings before the Board, and was therefore not public before the priority date of the patent in suit.

According to the established jurisprudence of the Boards of Appeal (see Case Law of the Boards of Appeal, 8th edition 2016, I.D.4.6) the assessment of inventive

step is to be made at the effective date of the patent on the basis of the information in the patent together with the common general knowledge available to the skilled person at that date.

A testimony by Mr. Summers could therefore at most disclose something which is post-published.

7. *Claim 1 of the main request - Inventive step*

7.1 Content of the disclosure of D1

D1 discloses an input stage planetary gearbox (see page 21, point A.5.4, "Gear arrangements", where planetary gear arrangements are disclosed in the fourth and fifth paragraph) for a large wind turbine generator (up to 750 kW, see page 1, point 1, last line) comprising a hollow wheel gear, two or more planet gears, and a sun gear (as it is normally the case with epicyclic gear arrangements), wherein one or more of the hollow wheel gear, two or more planet gears, and sun gear comprise a plurality of teeth that have been finished to a smooth final surface roughness (in fact all teeth, see page 9, point 4.4.5.4).

7.2 D1 as a starting point to discuss inventive step

The Board concurs with the appellants that the wind turbine planetary gearbox disclosed in D1 is a suitable starting point for discussing inventive step, as it discloses most of the features of claim 1 of the main request and is used in an input stage.

The respondents argue that D1, being only a recommendation from AGMA, and not a standard, would not

be considered by the skilled person as a reliable starting point.

The Board disagrees: any document that is state of the art under Article 54(2) EPC may be taken into consideration for that purpose, as long as it is a feasible starting point (see e.g. T 21/08, Reasons, point 1.2).

A document which is confidential, or so speculative or obviously defective as to be readily recognised as such by those skilled in the art when trying to reproduce its disclosure cannot be taken as such an appropriate starting point.

The respondents did not, however, provide any reason (and none is apparent to the Board) on the basis of which a skilled person would immediately consider D1 as speculative, unreliable or even confidential, just because its title recites "Recommended Practices for Design and Specification of Gearboxes for Wind Turbine Generator Systems".

7.3 Difference

As agreed by all parties, D1 only fails to disclose one feature of the subject-matter of claim 1, namely that one or more of the gears comprises a plurality of teeth that have been superfinished to a final surface roughness of 0,25 microns.

7.4 Effect - Problem

7.4.1 According to the patent in suit this level of smoothness is sufficient to prevent micro-pitting of the gear surfaces (see paragraph [21]).

Based on this effect, the appellants formulate the problem to be solved as how to improve the functioning, reduce noise and increase the service life of the **gears** in the known planetary gearbox (see again paragraph [21], top of column 6 and at the end).

- 7.4.2 The respondents argue that inventive step should only be discussed on the basis of another, different effect mentioned at paragraph [24] of the patent in suit, namely that the presence in the lubricant of debris coming from the teeth surfaces is reduced.

Based on this effect, the problem to be solved should be formulated as how to improve the service life of the **bearings** in the known planetary gearbox (see again paragraph [24]).

This is because, as clearly acknowledged in the description of the patent in suit (see paragraph [19], lines 42-44, and paragraph [24]) at the effective date of the patent in suit the skilled person was more concerned with the failure of **bearings**, as these components were considered to be particularly problematic, and would not consider failure of the **gears** because of micro-pitting on their surfaces to be an issue to deal with.

This is further confirmed by document R6. This document shows that before the priority date of the patent in suit gearboxes were considered to fail mainly because of their **bearings** (see starting from the first page (53), left column, last line, and right column).

In a technical field in which wind turbine gearboxes were subjected to chronic failure (first page, left

column, line 3 of R6) because of their **bearings** the skilled person would not be really interested in improving the functioning, reduce noise and increase the service life of the **gears**.

- 7.4.3 The Board does not concur with the respondents: the reduction of debris coming from the teeth in the lubricant is not the only effect on the basis of which inventive step of claim 1 of the main request may be discussed. Such discussion can take place on the basis of any effect of the established distinguishing features, provided that such an effect is directly derivable from the patent in suit for a skilled person (see Case Law of the Boards of Appeal, *supra*, I.D. 4.4.1).

As the effect of preventing micro-pitting of the gear surfaces is explicitly mentioned in paragraph [21] of the patent in suit, together with the issues of damage of the gear surfaces, vibration and noise, the problems of improving the functioning, reducing the noise and increasing the service life of the gears in the known planetary gearboxes immediately follow. The Board considers that the above approach in the problem formulation is in line with the problem-solution approach, as defined in the jurisprudence of the boards of appeal (see Case Law of the Boards of Appeal, *supra*, I.D.4.4.1 and I.D.4.4.2).

- 7.5 Person skilled in the art

The respondents argue that the person skilled in the art should be a designer of components of large wind turbine generators, including gearboxes therefor, and not a specialist in gear design, because the former field is the technical field of the patent in suit.

According to the Case Law of the Boards of Appeal (*supra*, I.D.8.1.1), the starting point for defining the appropriate skilled person (or group of skilled persons) is not only the technical field of the patent in suit, but also the problem to be solved on the basis of what the prior art (D1 in the present case) already discloses.

The Board therefore agrees with the appellants' position that the person skilled in the art is to be considered as a person with knowledge in the general field of gears and gearboxes, and not only in the narrow field of gearboxes for large wind power generators.

In any case, the Board is convinced that a skilled person as defined by the respondents, once confronted with the problem as defined in point 7.4.3, will refer to the specialist in the field of gear design, because the service life of gears depends heavily on the gear design (see Case Law of the Boards of Appeal, *supra*, I.D.8.1.2: "Competent skilled person - group of people as skilled person").

7.6 D2 - consideration by the skilled person

7.6.1 The respondents note that according to R6 (see the fourth page, second half of the left column: "Simply Huge") gears to be used in the technical field of the patent in suit operate with high loads at very low speed and cannot be compared with gears designed for use in other technical fields.

D2 covers gears of any type, even of plastic material. It does not mention micro-pitting and mentions an

improved fatigue life of only 100 hours after polishing.

They therefore conclude that a skilled person would not take a teaching coming from D2 into consideration.

7.6.2 The Board disagrees.

D2 is a document relating to transmission gears, and deals with the issue of improving their wear resistance (see paragraph [1]).

This document teaches that gears having a final surface roughness of 0,25 microns (within 0,127 and 0,254 microns, or 5 to 10 micro-inches, see paragraph [10]) have improved service life, because the maximum contact stress, as well as the subsurface shear stress are reduced as the result of improved lubrication conditions (see paragraph [11]).

The skilled person, being a gear specialist, and in the light of the objective problem as defined above, has therefore good reason to consider D2 and apply its teaching to the apparatus of D1, especially because he can be expected to take account of solutions to this problem proposed in the same or neighbouring technical fields.

Contrary to what is argued by the respondents, the teaching on surface smoothness is presented in D2 as universally valid (see page 5, line 10: "any metal gear"). There may indeed be an example related to gears having a fatigue life (up to 100 hours, see page 3 lines 50-51), but, as argued by the appellants, the "fatigue life" of a gear, which is expressed in hours under **testing conditions**, is something quite different

in the eyes of a skilled person from the actual "service life" of the apparatus comprising such a gear.

7.6.3 As a consequence of the above, the Board concurs with the appellants that D2 would be taken into consideration by the person skilled in the art.

7.7 D1+D2 - combination of teachings

7.7.1 The respondents argue that the teaching of D2 cannot be applied to superfinishing the surfaces of the teeth of very large gears, like those described in D1.

This is because according to the declaration of Mr. Bruins (R12), before the priority date of the patent in suit not even a specialized company like Sparleck GmbH was able to superfinish the surfaces of large gear components (above 100 kg) simply because the manufacture of machines suitable for these gears was not possible.

7.7.2 The Board disagrees. In the first place because such a declaration is just what it is: it expresses the opinion of one company, not necessarily of the entire group of specialists in the field. Secondly, as argued by the appellants, the reasons leading to this opinion would be, even if all the circumstances alleged by the respondents in relation to R12 would be confirmed, only partially known. It cannot for example be excluded that also commercial reasons played an important role.

This declaration cannot therefore prove that the skilled person would **always** refrain from superfinishing large gears used in low speed planetary gear boxes, especially because he would, in such a situation, have referred to another specialist, namely an expert in the

design of machines suitable for surface finishing of big components (see the Case Law of the Boards of Appeal, *supra*, I.D.8.1.2: "Competent skilled person - group of people as skilled person").

- 7.7.3 In addition to that, A8 clearly shows (see figure 4 at page 4) that superfinishing of very large gears (up to 1,2 meter diameter, see page 4, left column, point 1) was presented as possible before the priority date of the patent in suit. This already contradicts the declaration R12.

As already discussed above under point 6, the content of A8 belongs to the state of the art, whereas the information that the disclosure of this document is at least partially not enabling does not.

As a consequence, the skilled person would have seen no particular reason not to consider D2. In view of A8 he would not see any difficulty in applying the teaching of D2 to the gearbox disclosed in D1.

- 7.7.4 The respondents also argue (by referring to R15) that a skilled person dealing with the design of large wind turbine generators, which are costly devices to be installed in rough conditions with difficult access and with an intended design life of 20 years would not depart from accepted practice unless there was an expectation of success based on a reliable teaching. To be reliable such a teaching should be clearly related to the technical field of the patent in suit.

One particular reason for his caution is the so-called lubricant retention or oil-pocket theory: oil retention was considered exceptionally problematic for low speed gear stages such as those presently under discussion.

Starting from D1 the skilled person would therefore **not apply** the teaching of D2, or of any other document disclosing superfinishing outside of the technical field of the patent in suit, because the roughness values which were customary in gearboxes for wind turbine generators were significantly higher than those disclosed in D2 and now claimed in claim 1 of the main request.

7.7.5 The Board disagrees.

The question whether a skilled person would consider the teaching of documents which are not strictly related to the specific field of the patent as *a priori* unreliable, and whether and to what extent neighbouring areas beyond the specific field of the patent in suit might be taken into consideration when assessing inventive step is addressed in detail in the Case Law of the Boards of Appeal (*supra*, I.D.8.2). Reference is frequently made to T 176/84 (OJ EPO 1986, 50) and T 195/84 (OJ EPO 1986, 121).

Accordingly, when examining inventive step, a skilled person would, as well as considering the state of the art in the specific technical field of the patent in suit, look for suggestions in neighbouring fields or a broader general technical field if the same or similar problems arise, and if he could be expected to be aware of such fields.

This is because solutions of general technical problems in non-specific (general) fields have to be viewed as forming part of the general technical knowledge which *a priori* is to be attributed to those skilled persons versed in any specific technical field.

This situation clearly applies to the present case for the combination of the teachings of D1, which is in the same technical field of the patent in suit, with those of D2, which, as discussed above, relates to the broader field of gear design.

The Board also notes that the skilled person would also consider that the teaching of D2 could be used with a reasonable expectation of success on the basis of the oil pocket retention theory, as it is not in contrast therewith. Indeed, paragraph [12] of this document warns the skilled person that excessively smooth surfaces (less than 3 microinches, corresponding to less than 0,08 microns, which is a value well below the claimed 0,25 microns) would be disadvantageous as they would result in reduced oil retention for lubrication.

In view of the above, the particular circumstances of the present case make that the present decision does not need to go into the *ratio decidendi* of national decision R15.

7.7.6 As a consequence of the above, the Board concurs with the appellants that the skilled person is in a position to apply the teachings of D2 to the input planetary gearbox of D1.

7.8 D1+D2 - result of the combination of teachings

The Board concurs with the appellants that the combination of the teachings of D1 and D2 renders the subject-matter of claim 1 of the main request obvious.

This is because a skilled person would indeed take a cautious approach. As the respondents argue, because

the surface roughness values normally chosen for these gears are above 0,25 microns, he would follow the warning given at paragraph [12] of D2 and limit at first the superfinishing to the upper value (10 microinches) of the range mentioned in this document, which is 0,25 microns.

D2 discloses a system of two gear elements (gear and pinion, see claim 1), in which all gear surfaces of both are superfinished (see claims 5 and 6).

By following this additional teaching of D2 the skilled person would inevitably arrive at the subject-matter of claim 1 of the main request.

8. *Independent claim 9 of the main request*

D1 discloses a method for reducing lubricant debris (by improving micro-pitting resistance, see page 9, point 4.4.5.4; see also page 54, table G-7, showing the presence of laminar wear debris particles coming from the gears in the lubricant) in an input stage planetary gearbox (see page 21, point A.5.4, "Gear arrangements" where planetary gear arrangements are disclosed in the fourth and fifth paragraphs) for a large wind turbine generator (up to 750 kW, see page 1, point 1, last line), wherein the planetary gearbox comprises a hollow wheel gear, two or more planet gears, and a sun gear (as it is always the case with planetary gearboxes), the method comprising smoothing the teeth of one or more of the hollow wheel gear, two or more of the planet gears and a sun gear to a low surface roughness before operating the gearbox (see page 9, point 4.4.5.4).

D1 only fails to disclose one feature of the subject-matter of claim 9, namely that the method comprises superfinishing (smoothing) the teeth of one or more of the hollow wheel gear, two or more of the planet gears and a sun gear to a surface roughness of 0,25 µm ("microns") or less.

This difference substantially corresponds (*mutatis mutandis*) to the difference already established and discussed in relation to claim 1.

Based on this difference, the appellants formulated an inventive step attack based on the combination of the teachings of D1 and D2 by adapting the arguments already submitted in relation to claim 1, to the discussion of the method claim.

Also the arguments provided by the respondents in support of inventive step for the subject-matter of this claim substantially correspond to those which have already been discussed above in relation to claim 1.

As a consequence, the Board concludes that also the subject-matter of claim 9 of the main request lacks an inventive step, for the same reasons as discussed above in relation to claim 1 of the main request.

9. *Admissibility of the (new) first auxiliary request*

9.1 The appellants contest the admissibility of the (new) first auxiliary request filed as late as the oral proceedings with the argument that the subject-matter of independent claims 1 and 9 (to be renumbered as 2) is not clearly allowable as the amendments made do not overcome the inventive step objections already

discussed in relation to claims 1 and 9 of the main request.

9.2 The respondents argue that claim 1 and 9 of the (new) first auxiliary request are clearly allowable, and that this is particularly evident for claim 9 in the light of the *ratio decidendi* of G 2/88 (*supra*).

9.3 The Board disagrees.

The request is made up of a claim 1 which the Board can recognise as having been in an earlier auxiliary request (with "or less"), and, more importantly, a claim 9 which was only filed with letter of 23 September 2016. The admissibility of the request can therefore clearly be dealt with under Article 13(1) RPBA.

In accordance with the jurisprudence (see Case Law of the Boards of Appeal, *supra*, IV.E.4.4.1 a)) one criterion for regarding late-filed auxiliary requests as inadmissible under Article 13(1) RPBA is that they are directed to subject-matter which *prima facie* is not allowable.

This may either mean that such subject-matter does not give rise to new objections or that it does not overcome an outstanding objection.

9.3.1 Claim 9 is not clearly allowable.

The respondents note that claim 9 of the (new) first auxiliary request has been reformulated as a method for reducing or eliminating damage to the bearings of an input stage planetary gearbox for a large wind turbine

generator by reducing lubricant debris generated from the gear teeth.

Such a claim clearly overcomes the inventive step objections discussed above. This is because, based on G 2/88 (*supra*), it should be regarded as a use claim (use of a gearbox), whereby such a use achieves a beneficial effect which was not known before (eliminating damage to the bearings), and therefore as including this technical effect as a functional technical feature.

Clear allowability is given because of this "eliminating damage to the bearings".

9.3.2 The Board disagrees.

G 2/88 (*supra*) deals with the novelty of second non-medical use in a claim amended from a "compound X" to a "use of compound X for a particular purpose", or similar wording, where the only novel feature was the purpose of that use.

G 2/88 (*supra*) does not appear to the Board to be applicable in the present case, even if one would not see it as an amendment to the earlier existing method claim 9, but as an amendment to product claim 1.

The reason is that claim 9 is not directed towards the use of the input stage planetary gearbox, but to its production steps. It is a production method. For this reason it is not a *prima facie* allowable amendment of product claim 1.

9.3.3 Seeing claim 9 for what it is, namely an amendment to method claim 9, the inventive step arguments in point 8

above continue to apply. If the method steps are not inventive, the (realisation of) the inherent effects of executing that obvious method cannot make the subject-matter of claim 9 inventive.

- 9.3.4 Claim 1 of the (new) first auxiliary request has been amended to further specify that all of the teeth of all of the gears (instead of a plurality of teeth of one or more of the gears) have been superfinished to 0,25 microns.

As discussed above in relation to claim 1 of the main request, the skilled person starting from D1 would apply the teaching of D2 to reduce micro-pitting. This teaching relates to two interacting gear elements and consists in smoothing the gear surfaces of both those elements (see claim 6).

The respondents did not provide any reason why a skilled person would not superfinish all the surfaces of all the teeth of all of the gears of D1 in order to minimize micro-pitting in the gearbox. Such a reason is also not apparent to the Board.

As a consequence, the Board does not see how the amendments to claim 1 of the (new) first auxiliary request may be considered as leading to subject-matter which is now clearly allowable for inventive step.

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. Nachtigall

H. Meinders

Decision electronically authenticated