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**Datasheet for the decision
of 27 September 2019**

Case Number: T 2345/14 - 3.5.03

Application Number: 08019235.4

Publication Number: 2093641

IPC: G05B19/401, G05B19/402,
B23B49/00, B23K26/02

Language of the proceedings: EN

Title of invention:
Performing a process on a workpiece

Patent Proprietor:
Rolls-Royce plc

Opponent:
Siemens Aktiengesellschaft

Headword:
Performing a process on a workpiece/ROLLS-ROYCE

Relevant legal provisions:
EPC Art. 52(1), 56, 108
RPBA Art. 13(1)
EPC R. 99(2)

Keyword:

Admissibility of appeal - appeal sufficiently substantiated
(yes)

Inventive step - main request (no) - second and third auxiliary
requests (no)

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

Decisions cited:

T 0506/92



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Case Number: T 2345/14 - 3.5.03

D E C I S I O N
of Technical Board of Appeal 3.5.03
of 27 September 2019

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
18 November 2014 concerning maintenance of the
European Patent No. 2093641 in amended form.**

Composition of the Board:

Chairman J. Geschwind
Members: J. Eraso Helguera
T. Snell

Summary of Facts and Submissions

- I. The opponent and the patent proprietor respectively filed an appeal against the interlocutory decision of the opposition division by which it held that the ground for opposition according to Article 100(c) EPC prejudiced the maintenance of the patent as granted, but that, account having been taken of the amendments made by the proprietor in accordance with a first auxiliary request, the requirements of the EPC were met.
- II. In its decision, the opposition division referred *inter alia* to the following prior art document:
- D6: US 6 380 512 B1, 30 April 2002
- III. In its statement of grounds of appeal, appellant I (opponent) requested that the decision under appeal be set aside and that the patent be revoked in its entirety. Appellant I referred to the following documents filed with the notice of opposition:
- D4: US 5 418 345 A, 23 May 1995
D5: US 2003 004 606 A, 2 January 2003
- IV. In its statement of grounds of appeal, appellant II (proprietor) requested that the decision under appeal be set aside and that the patent be maintained as granted, i.e. that the opposition be rejected, or, in the alternative, that the patent be maintained in amended form on the basis of the claims of either a first or a second auxiliary request annexed to the statement of grounds of appeal. Further, by way of a

third auxiliary request, it requested that the appeal filed by the opponent be dismissed.

V. With a letter of reply to appellant's I statement of grounds of appeal, appellant II further requested that appellant I's appeal be rejected as inadmissible and that arguments based on either of D4 and D5 be not admitted into the appeal proceedings.

VI. In a communication accompanying a summons to oral proceedings, the board gave *inter alia* a preliminary opinion

- that appellant I's appeal is admissible;

- that the lines of attack based on D4 and D5 appear to constitute fresh cases.

VII. Oral proceedings were held on 27 September 2019.

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

Appellant II requested that the decision under appeal be set aside and that the patent be maintained as granted, i.e. that the opposition be rejected, or, in the alternative, that the patent be maintained in amended form on the basis of the claims of either a first auxiliary request filed during oral proceedings or the second auxiliary request filed with the statement of grounds of appeal. It further requested dismissal of appellant I's appeal as a third auxiliary request.

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

VIII. Claim 1 of the patent as granted (**main request**) reads as follows:

"A method of performing a re-drilling process whereby the re-drilling process is performed on existing arrays of holes (10) in a component characterised in that the method comprises:

i) selecting at least three (A to F), but not all, of the holes of a first of the arrays;

ii) identifying the nominal position in three dimensional coordinate space of each of the selected holes (A to F), and generating a nominal position data set for the selected holes;

iii) identifying the actual position in the three dimensional coordinate space of each of the selected holes (A to F), and generating an actual position data set for the selected holes;

iv) generating an algorithm to transform the nominal position data set to the actual position data set of the first array;

v) applying the algorithm to the nominal positions of the non-selected holes of the first array to generate actual positions of the non-selected holes;

vi) re-drilling the selected and non-selected holes at the respective identified and generated actual positions;

wherein steps i to vi are repeated for each array of holes present on the component."

- IX. Claim 1 of the **first auxiliary request** is the same as claim 1 as granted except that feature iv reads as follows (board's underlining):

"iv) generating an algorithm to transform the nominal position data set to the actual position data set of the first array; characterised in that the algorithm is generated by performing a best fit alignment of the actual position data set with the nominal position data set, wherein the best fit alignment is established by relative translation and rotation of the nominal position data relative to the actual position data, and calculating the offset between the actual and nominal position data sets;".

- X. Claim 1 of the **second auxiliary request** is the same as claim 1 as granted except that the preamble of the claim reads as follows (board's underlining):

"A method of performing a re-drilling process whereby the re-drilling process is performed on existing arrays of holes (10) in a component supported on a fixture, different arrays of holes being formed in different operations,".

- XI. Claim 1 of the **third auxiliary request** is the same as claim 1 of the second auxiliary request except that the preamble of the claim reads as follows (board's underlining):

"A method of performing a re-drilling process whereby the re-drilling process is performed on existing arrays of holes (10) in a component supported on a fixture,

different arrays of holes being formed in different operations involving mounting of the component in different fixtures,".

Reasons for the Decision

1. Admissibility of appellant's I appeal (Article 108 EPC, Rule 99(2) EPC)

1.1 Appellant II argues that the appeal of appellant I should be held inadmissible due to a lack of substantiation, in particular in view of the failure to provide arguments as to why the opposition division erred in its decision.

1.2 The board notes however that in its statement of grounds of appeal, appellant I gives arguments regarding a violation of Article 123(2) EPC in respect of the subject-matter of claim 1 of the first auxiliary request, in which reference is made to point 3.5 of the decision under appeal. In paragraph 2, pages 3 to 6 of the same submission, appellant I comments on the findings of the opposition division with respect to inventive step, in particular with regard to the disclosures of D4 and D6. In the board's view, these are clear indications that appellant I disagrees with the decision in at least two points concerning Articles 123(2) and 56 EPC, respectively, which renders the appeal admissible (cf. Rule 99(2) EPC).

2. Main request - claim 1 - inventive step (Articles 52(1) and 56 EPC)

2.1 The board agrees with the parties that D6 represents the closest prior art. This document discloses:

A method of performing a re-drilling process whereby the re-drilling process is performed on existing arrays of holes in a component (see col. 3, lines 47-51: *"Typically, at least a full row of holes up to all the holes of a component, for example, a blade or vane, is evaluated in this manner prior to laser drilling the series of holes. Typically from 10 to 600 cooling holes will be evaluated prior to laser drilling"*), the method comprising:

- i) selecting at least three, but not all, of the holes of a first of the arrays (see col. 3, l. 37-41: *"The vision processor 6 of the machine vision system will then analyze the image"*; NB: of the holes constituting an array, not all of them are visible, see col 3, l. 57-58: *"the machine vision system does not locate the actual location of the cooling hole based on a preprogrammed general location of the cooling hole (e.g. if the cooling hole was fully blocked)"*);
- ii) identifying the nominal position in three dimensional coordinate space of each of the selected holes and generating a nominal position data set for the selected holes (see col. 3, l. 7-10: *"the CNC 5 is preprogrammed with program data or tool path data which contains the specifications of the cooling hole locations and angles for such component type"*);
- iii) identifying the actual position in the three dimensional coordinate space of each of the selected holes, and generating an actual position data set for the selected holes (see col. 3, l. 37-41: *"The vision processor 6 of the machine vision system will then analyze the image to determine the actual location for each cooling hole 1 and store this location in the*

memory of the CNC or data storage device (e.g. hard disc, disc, network etc.)");

iv) generating an algorithm to transform the nominal position data set to the actual position data set of the first array (see col. 3, l. 63-65: *"the value stored in the CNC memory or data storage device for laser drilling will be the preprogrammed general location adjusted by a correction. This correction is based on the actual location of the previous cooling hole compared to the preprogrammed general location of the previous cooling hole"*; NB: this amounts to defining an algorithm by which $\text{actual_position}(\text{hole}) = \text{nominal_position}(\text{hole}) + \text{correction}(\text{previous_hole})$, the algorithm as such being generally applicable to both visible and not visible holes);

v) applying the algorithm to the nominal positions of the non-selected holes of the first array to generate actual positions of the non-selected holes (see col. 3, l. 63-65: *"the value stored in the CNC memory or data storage device for laser drilling will be the preprogrammed general location adjusted by a correction. This correction is based on the actual location of the previous cooling hole compared to the preprogrammed general location of the previous cooling hole"*; in this case the algorithm is actually applied to those holes);

vi) re-drilling the selected and non-selected holes at the respective identified and generated actual positions (see col. 3, l. 43-47: *"This determination of actual location of the cooling hole and storing the actual locations in CNC memory or data storage device continue for a series of cooling holes which are to be redrilled with the laser"*; see col. 3, l. 57-63: *"Where*

the machine vision system does not locate the actual location of the cooling hole based on a preprogrammed general location of the cooling hole (e.g. if the cooling hole was fully blocked) then the value stored in the CNC memory or data storage device for laser drilling will be the preprogrammed general location adjusted by a correction)".

- 2.2 The subject-matter of claim 1 as granted differs from the known method in that steps i to vi **are repeated** for each array of holes present on the component.
- 2.3 The technical effect achieved by the distinguishing feature is that the known re-drilling method can be applied to components with a large number of holes or with holes arranged in a complex geometry, i.e. a complex and/or large array of holes to be re-drilled in a component can be sub-divided in a number of simpler and/or smaller arrays.
- 2.4 The objective technical problem can thus be defined as how to apply the known re-drilling method to components with a large number of holes or with holes arranged in a complex geometry.
- 2.5 The subject-matter of claim 1 as granted does not involve an inventive step in the sense of Article 56 EPC, for the following reasons:

An array of holes according to D6 does not necessary include all the holes in the component (see col. 3, lines 47-51: "*Typically from 10 to 600 cooling holes will be evaluated prior to laser drilling*"). It is apparent that under certain circumstances the evaluation and re-drilling of all holes present in the component in a single operation may become unfeasible,

e.g. the geometry of the component might be such that the vision system and/or the laser cannot access all the holes to be re-drilled without re-positioning the component, a change of drilling head might be required or the memory limitations of the CNC might establish a maximum number of holes to be evaluated or re-drilled.

The skilled person willing to re-drill more holes in a component than can be evaluated at once would readily consider repeating steps i to v_i , for instance, on a row by row basis, or, if the original drilling already required more than one operation, reproducing the original series of drilling operations, arriving thereby at the subject-matter of claim 1 as granted without the exercise of any inventive skill.

2.6 Appellant II agrees that D6 does not disclose that steps i to v_i are repeated for each array of holes present on the component. However, appellant II submits that D6 does not disclose steps i , iv and v either, since in D6 the decision to apply a correction based on the previous hole, when a given hole cannot be seen at the preprogrammed location, is made on a hole-to-hole basis. Thus, there is no selection of at least three but not all holes in an array in D6, and neither is there an algorithm for transforming the nominal position data set to the actual position data set of an array, the algorithm being first generated and subsequently applied to generate the actual positions of the non-selected holes.

2.7 The board finds these arguments to be unconvincing since claim 1 as granted defines no particular criteria under which the selection of holes in an array should be made, and therefore, the distinction made in D6 between visible and non-visible holes amounts to a

selection embraced by the claim, inasmuch as for visible holes the identified actual positions are used in the re-drilling, whereas for non-visible holes actual positions are generated by applying an algorithm of the form : $\text{actual_position}(\text{hole}) = \text{nominal_position}(\text{hole}) + \text{correction}(\text{previous_hole})$. Furthermore, in the view of the board, claim 1 as granted does not set out any specific limitation with respect to the algorithm, as long as it provides a transformation from nominal to actual positions for the selected holes and it is applied to non-selected holes to generate actual positions. These features are also present in D6, since the algorithm generated, i.e. correction of the nominal position based on the previous hole, may also transform nominal positions of visible holes, but it is actually applied to non-visible holes to generate their actual positions.

Therefore, the board concludes that claim 1 of the main request does not involve an inventive step (Articles 52(1) and 56 EPC).

3. *First auxiliary request filed during the oral proceedings replacing the first auxiliary request on file - admissibility (Article 13(1) RPBA)*
- 3.1 According to Article 13(1) RPBA, any amendments to a party's case after the grounds of appeal has been filed (or the reply to the grounds of appeal, as the case may be) may only be admitted and considered at the board's discretion. This discretion is to be exercised in view of, *inter alia*, the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy.

- 3.2 In the present case, claim 1 of the first auxiliary request further states, compared with claim 1 as granted, that the algorithm is generated by performing a best fit alignment of the actual position data set with the nominal position data set, wherein the best fit alignment is established by relative translation and rotation of the nominal position data relative to the actual position data, and calculating the offset between the actual and nominal position data sets.
- 3.3 Appellant II referred to page 8, second paragraph, of the application as filed as providing a basis for these features. This paragraph reads as follows:
- "In step 30 a best-fit analysis is performed between the actual and nominal positions of the holes A to F. Any appropriate form of best-fit analysis can be used, for example a 3-2-1 (plane, line, point) iterative alignment or a simultaneous best-fit alignment. Once a best-fit alignment has been established by relative translation and rotation of the nominal position data relative to the actual position data, respective scaling factors can be calculated, for the X, Y and Z axes to improve the alignment fit."
- 3.4 The amendments carried out in claim 1 of the first auxiliary request cannot be considered to comply *prima facie* with the requirements of Article 123(2) EPC. It is apparent that some of the accompanying features appearing in the original context, e.g. the calculation of scaling factors, are not present in the claim, resulting thereby in an intermediate generalisation. Notwithstanding further *prima facie* considerations in relation to other requirements of the EPC, merely deciding whether such an intermediate generalisation is allowable or not would require a detailed evaluation of

the parties respective arguments. Account being taken of the fact that the request was filed at an advanced stage of the oral proceedings, after conclusion of the discussion on inventive step with respect to the main request, a further debate on this additional issue would have been substantially detrimental to procedural economy.

- 3.5 Thus, the board, exercising its discretion in accordance with Article 13(1) RPBA, decided not to admit the first auxiliary request filed during oral proceedings into the appeal procedure.
4. *Second auxiliary request - claim 1 - inventive step (Articles 52(1) and 56 EPC)*
- 4.1 Compared with claim 1 as granted, claim 1 of the second auxiliary request further states that the component is supported on a fixture and that the different arrays of holes are formed in different operations.
- 4.2 The first feature is also disclosed in D6 (see col. 4, l. 21-22: "*It is also within the scope of the present invention to mount component 2 in a stationary fixture*").
- 4.3 As to the second feature, the board considers that it belonged to common general knowledge to perform the original drilling in different operations, at the very least due to constructional constraints given by the shape of the component, which may prevent the laser from accessing all the surfaces of the component in a single operation, but possibly also due to other limitations, such as memory capacity of the laser, or different hole geometries requiring different drilling heads. All these constraints may obviously render it

impossible to drill all the holes in a single operation. In such cases, due to the fact that at least some of the constraints, e.g. the shape of the component and the geometry of the holes, are likely to remain the same for the re-drilling operation, it would be straightforward for the skilled person to reproduce the same series of drilling operations that took place originally, arriving thereby at different arrays being defined as series of holes being formed in different operations.

- 4.4 Thus, the addition of these two features does not render the subject-matter of claim 1 of the second auxiliary request inventive in the sense of Article 56 EPC.
- 4.5 Appellant II submits, with reference to page 2, first paragraph of the application as filed, that the claimed definition of arrays takes advantage of the good hole-to-hole tolerance normally present in holes of the same array, and that D6 does not disclose more than one array of holes.
- 4.6 As stated previously, it is obvious that in D6 not all the holes of the component need or can always be inspected and re-drilled in a single operation. Confronted with the task of organizing the inspecting and re-drilling operations, reproducing the original series of drilling operations would be a straightforward option, irrespective of possible advantages to be derived from such an option. In this respect, in accordance with case law, a bonus effect resulting from an obvious measure does not normally contribute to inventive step (cf. e.g. T 506/92, point 2.6 of the reasons).

5. *Third auxiliary request - claim 1 - inventive step
(Articles 52(1) and 56 EPC)*

5.1 Claim 1 of the third auxiliary request is based on claim 1 of the second auxiliary request, with the additional limitation that different operations involve mounting of the component in different fixtures.

5.2 The board considers changing the fixture to be a commonplace measure imposed by constructional constraints of the component and/or the laser. Thus, it would be customary practice in accordance with the particular circumstances (i.e. shape of the component, type of laser) to arrive at different drilling operations requiring mounting the component in different fixtures. In those cases, and for the same reasons stated for above for claim 1 of the second auxiliary request, the skilled person starting out from D6 and wishing to inspect and re-drill all the holes of the component would be led to reproduce the original series of drilling operations, including mounting the component in different fixtures, in a straightforward manner. Therefore, the subject-matter of claim 1 of the third auxiliary request does not involve an inventive step in the sense of Article 56 EPC.

6. *Conclusion*

As there is no allowable request, the decision under appeal must be set aside and the patent revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar:

The Chairman:



G. Rauh

J. Geschwind

Decision electronically authenticated