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Datasheet for the decision of 10 February 2025

Case Number: T 1676/23 - 3.5.07

Application Number: 15778905.8

Publication Number: 3178025

IPC: G06F17/50

Language of the proceedings: EN

Title of invention:
Contact modeling between objects

Applicant:
Siemens Industry Software NV

Headword:
Contact modeling/SIEMENS

Relevant legal provisions:
EPC Art. 56, 123(2)
RPBA 2020 Art. 13(2)

Keyword:
Amendments - main request and first auxiliary request - allowable (no)
Inventive step - second auxiliary request (no)
Late-filed auxiliary requests - third and fourth auxiliary requests - admitted (no)

Decisions cited:
G 0003/08, G 0001/19, T 1127/05, T 0625/11

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Boards of Appeal

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Case Number: T 1676/23 - 3.5.07

D E C I S I O N
of Technical Board of Appeal 3.5.07
of 10 February 2025

Appellant: (Applicant)	Siemens Industry Software NV Interleuvenlaan 68 3001 Leuven (BE)
Representative:	Siemens Patent Attorneys Postfach 22 16 34 80506 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 3 May 2023 refusing European patent application No. 15778905.8 pursuant to Article 97(2) EPC**

Composition of the Board:

Chair	J. Geschwind
Members:	R. de Man
	M. Jaedicke

Summary of Facts and Submissions

I. The applicant appealed against the decision of the examining division refusing European patent application No. 15778905.8, which was published as international application WO 2016/050955 A1.

II. The examining division decided that the main request and auxiliary requests 1, 2 and 3 did not comply with Article 123(2) EPC and that the subject-matter of claim 1 of the main request and auxiliary requests 1 to 4 lacked an inventive step over a generally known standard computer system.

III. With its grounds of appeal, the appellant resubmitted auxiliary request 4 considered in the contested decision, now labelled "request 1", as its sole main request.

IV. In a communication accompanying the summons to oral proceedings, the board expressed the preliminary opinion that claim 1 of the sole request was not clear (Article 84 EPC) and that its subject-matter extended beyond the content of the application as filed (Article 123(2) EPC) and lacked an inventive step over a conventional computer (Article 56 EPC).

V. With a letter dated 8 January 2025, the appellant maintained the main request and filed first and second auxiliary requests, labelled "request 2" and "request 3".

VI. With a letter dated 6 February 2025 and received on 7 February 2025, the appellant filed third and fourth

auxiliary requests, labelled "request 4" and "request 5".

VII. At the end of the oral proceedings, which were held on 10 February 2025, the Chair announced the board's decision.

VIII. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims of the main request or, in the alternative, of one of the first to fourth auxiliary requests.

IX. Claim 1 of the main request ("request 1") reads as follows:

"A computer-implemented method for modeling contact of a gear with one or more objects, for modeling gear contact, for designing a gear box and/or individual gears and optimizing their performance to ensure the overall product quality in terms of performance and efficiency,
wherein contributions of dynamically responding Eigen modes are subtracted from compliance, resulting in a residual compliance,
the method comprising:

calculating a matrix for residual bulk compliance of an object, the calculating being performed prior to a simulation of contact interaction of the first object with another object, bulk compliance being a function that maps the contact loads at possible contact points to the bulk deflection at those possible contact points;

performing the simulation of the contact interaction of the first object with the other object, the simulation using the matrix for the residual bulk

compliance and treating residual flexibility of the first object quasi-statically;

outputting an output of the simulation,

using the output information of the simulation for assessing NVH for a transmission design,

wherein said output is a value, an image, a video, or a table,

wherein said output comprising a stiffness as a function of radius of a lightweight gear or an instantaneous meshing stiffness as function of a roll angle or gear meshing forces, a transmission error, an angular speed, or other values or a value or force in the frequency domain or the Fourier transform of the transmission error for a period of time after transients are damped out presented as a graph or chart, or a system-level analysis of a transmission or any characteristic of noise vibration harshness (NVH)."

X. Claim 1 of the first auxiliary request ("request 2") differs from claim 1 of the main request in that the text "wherein said modeling gear contact is done" has been inserted before "for designing a gear box and/or individual gears".

XI. Claim 1 of the second auxiliary request ("request 3") differs from claim 1 of the first auxiliary request in that the text "using the output information of the simulation for assessing NVH for a transmission design," has been deleted.

XII. Claim 1 of the third auxiliary request ("request 4") differs from claim 1 of the main request in that the text "computer-implemented" has been deleted and in that the text "by a computer" has been inserted after the first instance of "calculating" and after "performing" and "outputting".

XIII. Claim 1 of the fourth auxiliary request ("request 5") differs from claim 1 of the third auxiliary request in that the text "for designing a gear box and/or individual gears and optimizing their performance to ensure the overall product quality in terms of performance and efficiency," has been deleted.

Reasons for the Decision

1. The application relates to modelling and simulating industrial lightweight gears (see paragraph [0019] of the published application).

Main request

2. *Added subject-matter*

2.1 Claim 1 of the main request is directed to a computer-implemented method which performs a simulation and includes a step of "using the output information of the simulation for assessing NVH for a transmission design", where NVH stands for noise vibration hardness. The application as filed discloses such a step only in paragraph [00108] of the description, which states that "[t]he simulation may be used to output information for assessing NVH for a transmission design". However, this passage does not disclose this step as being carried out by a computer. Rather, the skilled reader would understand that assessing NVH for a transmission design using the "output information" is to be done by a human.

2.2 The appellant did not dispute the board's reading of claim 1 and paragraph [00108], nor did it indicate another basis in the application as filed.

2.3 Hence, the subject-matter of claim 1 of the main request extends beyond the content of the application as filed. The main request therefore does not comply with Article 123(2) EPC.

First and second auxiliary request

3. *Admission into the appeal proceedings*

The first and second auxiliary requests, filed in response to the board's communication, contain amendments intended to address objections raised for the first time in that communication. The board therefore considers that the admittance of these requests into the appeal proceedings is justified by exceptional circumstances (Article 13(2) RPBA).

First auxiliary request

4. *Added subject-matter*

4.1 The subject-matter of claim 1 of the first auxiliary request extends beyond the content of the application as filed for the same reasons as given in point 2. above.

4.2 Hence, the first auxiliary request does not meet the requirements of Article 123(2) EPC, either.

Second auxiliary request

5. Claim 1 of the second auxiliary request reads as follows (itemisation added by the board):

(a) A computer-implemented method
(b) for modeling contact of a gear with one or more objects,
(c) for modeling gear contact,
(d) wherein said modeling gear contact is done for designing a gear box and/or individual gears and optimizing their performance to ensure the overall product quality in terms of performance and efficiency,
(e) wherein contributions of dynamically responding Eigen modes are subtracted from compliance, resulting in a residual compliance,
the method comprising:
(f) calculating a matrix for residual bulk compliance of an object, the calculating being performed prior to a simulation of contact interaction of the first object with another object, bulk compliance being a function that maps the contact loads at possible contact points to the bulk deflection at those possible contact points;
(g) performing the simulation of the contact interaction of the first object with the other object, the simulation using the matrix for the residual bulk compliance and treating residual flexibility of the first object quasi-statically;
(h) outputting an output of the simulation, wherein said output is a value, an image, a video, or a table,
(i) wherein said output comprising a stiffness as a function of radius of a lightweight gear or an instantaneous meshing stiffness as function of a

roll angle or gear meshing forces, a transmission error, an angular speed, or other values or a value or force in the frequency domain or the Fourier transform of the transmission error for a period of time after transients are damped out presented as a graph or chart, or a system-level analysis of a transmission or any characteristic of noise vibration harshness (NVH).

6. Claim 1 of the second auxiliary request no longer includes a (computer-implemented) step of "using the output information of the simulation for assessing NVH for a transmission design". The added-matter objection raised in point 2. above there does not apply to the second auxiliary request.

7. In its communication, the board raised a similar added-matter objection to the combination of features "computer-implemented method ... for designing a gear box and/or individual gears and optimizing their performance to ensure the overall product quality in terms of performance and efficiency" in claim 1 of the main request, noting that the application as filed did not disclose computer-implemented steps of designing a gear box and individual gears, let alone of optimising their performance.

In claim 1 of the second auxiliary request, feature (d) has been amended to express that the modelling of gear contact referred to in features (b) and (c) "is done for" designing a gear box and/or individual gears and optimising their performance.

The board accepts that, with this formulation, the claimed computer-implemented method does not include steps of designing and optimising. Rather, the results

of the simulation are suitable for use in subsequent, non-claimed steps of designing and optimising.

8. *Inventive step*

8.1 The board interprets the features of claim 1 referring to the design and optimisation of a gear box or of individual gears as expressing the intended subsequent use of the simulation results, i.e. their suitability for such use (see point 7. above). Consequently, the method of claim 1 amounts to a computer-implemented method which carries out a calculation (including a simulation) on the basis of certain input data and then outputs the result of the calculation, where the result represents a predicted physical property of the gear box or an individual gear and may take the form of a value.

8.2 Hence, the subject-matter of claim 1 differs from a well-known conventional computer only in the computer program that it runs. This computer program contributes to an inventive step only to the extent that it achieves a technical effect going beyond the normal functioning of a conventional computer over substantially the whole scope of the claim. However, the presence of such a technical effect is not apparent to the board.

8.3 In this respect, the appellant argued that the output of the claimed simulation represented necessary information for an engineer to compare the different designs underlying different simulation runs. The features (b), (c) and (d) achieved a technical effect since they related to designing a gear transmission using the tool provided by the claimed method. The invention made it possible to design and optimise gear

boxes without the need to carry out physical experiments. It had an impact on the real world because the final product had improved technical properties such as a lower weight. Moreover, the claimed implementation of the calculations permitted simulations with a speed and precision that could not be achieved with prior-art methods.

However, the use of calculated information representing predicted physical properties for the evaluation and comparison of different designs is not a technical use or effect but amounts to gaining knowledge about the designs, which is in itself not a technical effect (see decision G 1/19, OJ EPO 2021, A77, points 97 and 98; decisions T 1227/05, OJ EPO 2007, 574, and T 625/11, both referred to by the appellant, are no longer relevant in so far as they might support a different conclusion).

The board does not dispute that the knowledge gained may allow an engineer to improve the design of a gear transmission, which ultimately may lead to an improved physical product. But this is not the only relevant use of the calculated information, i.e. this is not an "implied use" within the meaning of points 94, 95 and 98 of decision G 1/19 which can be considered to extend across substantially the whole scope of the claimed method. Moreover, any specific technical improvement achieved by such use would in any event have to be attributed to the ingenuity of the engineer rather than to features of the claimed method.

8.4 The appellant further argued that the method of claim 1 resulted in an interaction with the physical environment via the energy consumption of the computer,

the heat dissipation during the calculation, and the reception of the output by the user.

However, such effects do not go beyond the normal functioning of a conventional computer. Any calculation carried out by a computer consumes energy and produces heat.

8.5 The appellant further argued that the method steps (f) and (g) enabled a "fast and accurate calculation" for a specific technical application because, as explained in paragraph [0022], last sentence, of the application, other calculations would be much more time consuming.

However, a mere speed comparison with a conceivable reference method is not a suitable criterion for distinguishing between technical and non-technical procedural steps (see decision T 1227/05, Reasons 3.2.5).

8.6 The appellant extensively criticised the COMVIK approach commonly applied by the boards of appeal for the assessment of inventive step of an invention involving both technical and non-technical features. According to the appellant, there was no basis in the EPC for distinguishing between technical and non-technical features in the assessment of inventive step in accordance with Article 56 EPC. The exclusion under Article 52(2)(c) EPC concerned only computer programs, which were regarded as non-inventions to avoid overlapping protection between patent and software copyright laws. A computer was a technical device based on physical laws. The execution of different software instructions led to distinct technical processes, thereby establishing a direct link between the software and the physical operation of the computer. The EPO's

approach to assessing inventive step of computer-implemented inventions was arbitrary and backward-looking.

In its opinion G 3/08 (OJ EPO 2011, 10), the Enlarged Board of Appeal noted that the list of "non-inventions" in Article 52(2) EPC could play a very important role in determining whether claimed subject-matter was inventive and that the COMVIK approach appeared to have created a practicable system for delimiting the innovations for which a patent may be granted (Reasons 10.13.1 and 10.13.2). In its decision G 1/19, the Enlarged Board of Appeal again did not call into question the validity of the COMVIK approach (see in particular points 30 to 39 and 61).

This board therefore sees no compelling reason to reconsider the COMVIK approach.

8.7 Hence, the subject-matter of claim 1 of the second auxiliary request lacks an inventive step over a conventional computer (Article 56 EPC).

Third and fourth auxiliary requests

9. *Admission into the appeal proceedings*

9.1 The third and fourth auxiliary requests were filed only shortly before the oral proceedings and include amendments intended to address objections under Article 123(2) EPC raised in the board's communication.

The appellant explained that it could not have filed these requests with its initial response to the board's communication due to difficulties in understanding the objections relating to "Clarity and added subject

matter". In particular, the applicant had been confused by the mixing of these two aspects in the same section of the communication and there had been several ways of understanding the objections in the summons.

9.2 The board notes that, while point 6 of its communication was headed "Clarity and added subject-matter", points 6.1 and 6.3 referred only to Article 123(2) EPC, and point 6.2 referred only to Article 84 EPC.

In any event, the board has admitted the second auxiliary request into the appeal proceedings and has dealt with it not under Article 123(2) EPC but under Article 56 EPC. The objections which the appellant intended to address with its third and fourth auxiliary requests are therefore not decisive for the outcome of the appeal.

9.3 In these circumstances, the board does not consider that the appellant's difficulties in understanding the board's objections under Article 123(2) EPC represent exceptional circumstances which justify the admittance of the third and fourth auxiliary requests. The board therefore does not admit the third and fourth auxiliary requests into the appeal proceedings (Article 13(2) RPBA).

10. Since none of the requests admitted into the proceedings is allowable, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chair:

S. Lichtenvort J. Geschwind

Decision electronically authenticated