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**Datasheet for the decision
of 25 October 2023**

Case Number: T 1775/20 - 3.5.07

Application Number: 14151934.8

Publication Number: 2757495

IPC: G06F17/50

Language of the proceedings: EN

Title of invention:

System for parameterized finite element analysis

Applicant:

L.T. Calcoli SRL

Headword:

Parameterised finite element analysis/CALCOLI

Relevant legal provisions:

EPC Art. 56

RPBA 2020 Art. 12(4)

Keyword:

Inventive step - main request (no)

Amendment to case - auxiliary request - amendment admitted (no)

Decisions cited:

T 1775/18



Beschwerdekammern

Boards of Appeal

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Case Number: T 1775/20 - 3.5.07

D E C I S I O N
of Technical Board of Appeal 3.5.07
of 25 October 2023

Appellant:
(Applicant)

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Decision under appeal:

**Decision of the Examining Division of the
European Patent Office posted on 19 February
2020 refusing European patent application
No. 14151934.8 pursuant to Article 97(2) EPC**

Composition of the Board:

Chairman

J. Geschwind

Members:

P. San-Bento Furtado

R. de Man

Summary of Facts and Submissions

- I. The appeal lies from the decision of the examining division to refuse European patent application No. 14 151 934.8 by means of a "decision according to the state of the file", using EPO Form 2061.
- II. The examining division decided that the subject-matter of the claims of the sole request then on file was not inventive over the combination of documents D1 and D2:
D1: M.L. Bittencourt et al.: "An application service provider for finite element analysis", *Advances in Engineering Software*, Vol. 39, No. 11, November 2008, pages 899 to 910;
D2: S.K. Xie et al.: "Study on the method of parameterized meshing and its system realization", *Journal of Materials Processing Technology*, Vol. 187-188, 12 June 2007, pages 368 to 372.
- III. With its statement of grounds of appeal, the appellant filed claims according to an auxiliary request.
- IV. In a communication accompanying a summons to oral proceedings, the board expressed its preliminary opinion that the subject-matter of claim 1 of the main request was not inventive. The board informed the appellant that it intended not to admit the auxiliary request into the proceedings.
- V. The appellant did not reply in writing to the board's preliminary opinion.
- VI. Oral proceedings were held as scheduled. At the end, the Chair announced the board's decision.

- VII. The appellant's final requests were 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 the auxiliary request.
- VIII. Claim 1 of the main request reads as follows:
"A Finite Element Modeling (FEM) system, providing Finite Element Analysis (FEA) for numerical modeling of physical systems in a variety of engineering disciplines, comprising means for generating a finite element model (3), data processing means (4), result delivering means (43) for delivering the results so obtained to a user, the finite element model so generated (3) is parameterized, and a user interface (6) is provided for changing the parameters (7) of the finite element model (3) and for entering such parameters (7) into said data processing means (4), wherein the user interface is provided in combination with or consists of a data input program, such as a text generating program, or a spreadsheet or a database, a html program, which is started as desired by the user for inputting data for the changed parameters, i.e. an identification key for each parameter and the corresponding numerical value, and wherein the data is read, identified and converted into the format of the calculation program of the model by an interpreter/converter program."
- IX. Claim 1 of the auxiliary request differs from claim 1 of the main request in that the following text has been added at the end of the claim:
"and wherein
said data processing means (4) include one or more remote computing units (40) comprising one or more storage units and processor means for executing a logic

program, said executed logic program allowing the system to carry out the steps of:

- a) generating the finite element model mesh;
- b) processing data;
- c) delivering the results to a user;

and the optional and repeatable steps of:

- d) changing the parameters of the finite element model by the user;
- e) generating the further finite element model mesh;
- f) further processing data;
- g) delivering the results so obtained, and

wherein the step d) may comprise:

encoding unique pairs of individual changeable parameter identifiers and corresponding numerical values in a file having a predetermined format;

processing said file by an interpreter and recognizing the individual parameters and the corresponding numerical values;

converting, by said interpreter, said parameter identifiers and the corresponding numerical values into input data expressed in the language of the calculation program of the finite element model;

transmitting these parameter identifiers and the corresponding data to the input interface of the calculation program of the finite element model."

Reasons for the Decision

1. The present invention concerns a finite element modelling (FEM) system for numerical modelling of physical systems in a variety of engineering disciplines (page 1, lines 5 to 12). The system generates a "parameterized finite element model" (PFEM) and comprises a user interface, such as a data input program, for changing the values of the parameters of

the finite element model (page 2, lines 24 to 31; page 9, lines 30 to 34; Figure 4). These parameters include material properties such as Young's modulus (Figure 4; page 10, lines 29 to 31).

2. The application explains that PFEMs are known in the art and obviate the need to generate a new finite element model whenever a parameter value of the finite element model is changed (page 1, line 16, to page 2, line 23; page 3, lines 3 to 8).

Main request

3. *Inventive step - claim 1*

- 3.1 Document D1 discloses a web-based application service provider for finite element analysis (FEA) which supports pre-processing and simulation services based on forms for mesh generation and ANSYS processing (abstract). The functionality is provided through a web site (page 899, right-hand column). The system includes software for generating a finite element model, processing data and delivering the results, for example of the mesh generation, to the user (page 900, section 2; page 905, section 5; page 907, right-hand column; Figure 9b).

- 3.2 As explained in section 6 on page 906, part of the system of D1 is a pre-processing software module providing a graphical user interface through which the user can read in a geometry SAT file and enter parameter values for mesh generation and the finite element model. The specified parameters are converted into the APDL file format, which is the file format of the ANSYS simulation service, and uploaded to the simulation service together with the SAT file (section 6, second paragraph, and section 5). Figure 10 of D1 in

combination with the paragraph bridging pages 907 and 908 shows a user interface allowing the user to specify material properties such as Young's modulus. Each property consists of an identification key, i.e. the name of the parameter, and the corresponding numerical value. Figure 11 illustrates a user interface for further parameters of the finite element model. Therefore, the system of D1 comprises a user interface with a data input program which reads, identifies and converts data as required by claim 1.

- 3.3 The appellant argued that using the system of D1 required "a profound knowledge of the language of the program". In order to avoid costs of a specialised professional for carrying out the process each time a parameter needed to be changed, the invention provided a user interface comprising an interpreter/converter, so that the user could change one or more parameters by themselves and run the finite element analysis with the new parameters without any specific knowledge about how to use and interface with the system. In support of the user-friendliness of the invention, the appellant referred the board to a video clip showing how the invention was operated.

The board does not find these arguments convincing. As explained under point 3.2 above, the system of D1 includes a graphical user interface for setting parameters. Claim 1 of the main request refers to the HTML (hypertext markup language) user interface only as one of a few options ("such as ..., a html program, ...") and does not provide any details about the user interaction facilitated by the system. Document D1 discloses with reference to Figure 5 an HTML-based user interface for setting parameters for mesh generation (see page 904). The user interfaces

described in Figures 5, 10 and 11 are easy to use and do not require more specialised knowledge than the claimed invention. On the left hand side of the HTML form shown in Figure 5, the user may change the type of mesh ("Tipo da malha:"), element shape ("Tipo de elemento: Triângulo ... ") and other mesh parameters (see also page 904, left-hand column). In the window shown in Figure 10, the user may change the material properties such as the type of steel ("Aço") used.

- 3.4 The simulation service to which the APDL file and the SAT file are uploaded performs mesh generation (section 6, second paragraph). Hence, in document D1 the mesh of the finite element model is generated on the basis of the specified parameter values and is not itself parameterised. Therefore, the board recognises that document D1 does not disclose generating a parameterised FEM.
- 3.5 The appellant argued that there was no local access to the service of D1, which merely provided a portal to FEM/FEA services. The user had access only to the server where the software was installed. This was in contrast with the invention, which offered a user interface to the software, including Autocad, running at the user's own machine and which supported the common languages provided in the Windows system.

The board is however of the opinion that no such advantages can be derived from claim 1, let alone from the distinguishing features.

- 3.6 In view of the above, the features distinguishing the claimed subject-matter from the disclosure of D1 are:
- (i) the generated finite element model is parameterised,

(ii) the changed parameters are the parameters of the parameterised finite element model.

3.7 In the board's opinion, by offering a PFEM that does not require a lengthy recalculation of the model when the parameters are changed, the distinguishing features solve the problem of reducing processing load and shortening the time necessary to develop a product (or equivalently, shorten the cycle of product development).

The question whether this problem is technical does not need to be answered in view of the following.

3.8 Document D2 discloses the concept of PFEA to solve the same problem of streamlining the development process and reducing grid generation workload by parameterising the CAD model, allowing parameters of the model to be modified, and adjusting both the CAD and the FEA models simultaneously (see abstract; page 368, left-hand column, second paragraph; page 369, section 3, Figures 2 and 3).

3.9 At the oral proceedings, the appellant conceded that document D2 disclosed the distinguishing features but argued that there was no indication in document D1 that would motivate the skilled person to combine the teaching of document D1 with that of document D2.

However, in the framework of the problem-and-solution approach, it is sufficient that the skilled person finds motivation in the objective technical problem for modifying the closest prior art in the light of a second teaching (Case Law of the Boards of Appeal, 10th edition, 2022, I.D.5). The objective technical problem is the technical problem which can be seen to have been actually solved over the closest prior art (*ibid.*, I.D.

4.1). Provided that the formulated problem is one that the skilled person might be asked to solve at the priority date, there is no requirement that the document selected as the closest prior art discloses the problem or otherwise motivates the skilled person to consider it.

3.10 Hence, since document D2 teaches that the use of a PFEM results in a reduction of processing load and a shortening of the product development cycle, the skilled person, starting from document D1 and faced with the objective technical problem, would modify the system of document D1 to use a PFEM in accordance with features (i) and (ii) and thereby arrive at a system falling within the term of claim 1.

3.11 In view of this, the main request does not fulfil the requirements of Article 56 EPC for lack of inventive step in the subject-matter of claim 1.

Auxiliary request

4. *Admittance of the request*

4.1 The appellant submitted that claim 1 of the auxiliary request was based on claims 1, 3 and 4 on which the decision was based. The claim better highlighted the difference between the teaching of the present invention and the combination of features of documents D1 and D2. The additional features were not known from, nor rendered obvious by, the cited documents. The appellant further argued that the auxiliary request should be admitted into the proceedings because the decision under appeal provided an opinion on claims 1, 3 and 4 then on file.

4.2 The decision under appeal refers for its reasons to the communication annexed to the summons to oral proceedings before the examining division. It is therefore evident that any amendments filed on appeal in response to the written decision could have been filed during the first-instance proceedings in response to that communication. However, the appellant chose not to respond to that communication by filing further (auxiliary) requests but to request a decision according to the state of the file.

4.3 In decision T 1775/18, the board rejected the argument that the introduction in an independent claim of a feature taken from a dependent claim was not an amendment of the appellant's case which, under Article 13(2) RPBA 2020, required exceptional circumstances justified with cogent reasons. While it was true that dependent claims defined fallback positions for certain purposes, in EPO proceedings they could not be equated with auxiliary requests (Reasons 3.6).

Similarly, a claim request submitted with the grounds of appeal which differs from a request on which the decision was based only in that it adds to claim 1 features of a dependent claim is also an amendment under Article 12(4) RPBA 2020 and its filing requires a justification. The mere fact that the decision under appeal includes an opinion on the claims on which amended claim 1 is based does not render admissible such an amended claim request submitted with the grounds of appeal.

4.4 The auxiliary request is thus an amendment under Article 12(4) RPBA 2020 and does not become admissible for the mere fact that the decision under appeal decided on the dependent claims. For the sake of

completeness, the board further notes that in this case the decision under appeal states that the dependent claims are not inventive, but does not provide any detailed reasoning.

- 4.5 The amendments filed with the auxiliary request constitute major amendments to claim 1 of the decision under appeal, which could and should have been submitted during the first-instance proceedings. In particular, the appellant should have filed the request in reaction to the communication accompanying the summons to oral proceedings, which presented the reasoning to which the appealed decision refers. For this reason alone, the request is inadmissible.
- 4.6 In addition, the subject-matter of claim 1 of the auxiliary request is *prima facie* not inventive since the added features are *prima facie* known from documents D1 and D2, repetitions of features already included in claim 1 of the main request or obvious implementation options.
- 4.7 In view of the above, the board does not admit the auxiliary request into the appeal proceedings (Article 12(4) RPBA 2020).

Conclusion

5. Since the main request is not allowable and the auxiliary request is not admitted into the proceedings, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



B. Brückner

J. Geschwind

Decision electronically authenticated