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**Datasheet for the decision  
of 5 March 2024**

**Case Number:** T 0780/22 - 3.4.01

**Application Number:** 17879712.2

**Publication Number:** 3555890

**IPC:** G21D3/00, G06Q50/06, G06F30/20

**Language of the proceedings:** EN

**Title of invention:**

INTEGRATION OF REAL-TIME MEASUREMENTS AND ATOMISTIC MODELING  
TO LICENSE NUCLEAR COMPONENTS

**Applicant:**

Westinghouse Electric Company LLC

**Headword:**

Licencing of nuclear components / Westinghouse Electric

**Relevant legal provisions:**

RPBA 2020 Art. 12(4)  
EPC Art. 123(2), 52(1), 56

**Keyword:**

Amendment to case - amendment admitted (yes)  
Amendments - added subject-matter (yes)  
Inventive step - (no)

**Decisions cited:**

G 0001/19, T 0154/04



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Case Number: T 0780/22 - 3.4.01

**D E C I S I O N**  
**of Technical Board of Appeal 3.4.01**  
**of 5 March 2024**

**Appellant:** Westinghouse Electric Company LLC  
(Applicant) 1000 Westinghouse Drive  
Suite 141  
Cranberry Township, PA 16066 (US)

**Representative:** Fleuchaus & Gallo Partnerschaft mbB  
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**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 24 November  
2021 refusing European patent application No.  
17879712.2 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chair** P. Scriven  
**Members:** T. Petelski  
R. Winkelhofer

## **Summary of Facts and Submissions**

- I. The applicant appealed the Examining Division's decision to refuse the application.
- II. The appellant requested that the decision be set aside and that a patent be granted on the basis of a set of claims filed, for the first time, on appeal.
- III. Although the appellant had not requested oral proceedings, the Board arranged for oral proceedings to be held, and informed the appellant of its preliminary opinion on the case.
- IV. Five weeks after receiving the summons and the preliminary opinion, the appellant announced that they would not attend the oral proceedings. They did not comment on the Board's preliminary opinion; nor did they announce any intention of submitting comments.
- V. The Board cancelled the oral proceedings.
- VI. The parts of the communication containing the Board's preliminary opinion that are relevant to this decision are points 4 to 37. They read as follows.

*Feature table - claim 1*

4. The features of claim 1 are labelled as follows:

- F1: *A process for demonstrating parameters required for licensure of components for use in a nuclear reactor comprising:*
- F2: *atomistic modeling of at least one physical property of a component to predict component behavior under conditions of interest in the operation of a nuclear reactor;*
- F3: *preparing and submitting a preliminary application for license of the component to a regulatory body responsible for approval of use of the component in a nuclear reactor using the atomistic modeling and predicted behavior modeling of the component;*
- F4: *in parallel with the modeling and preparing a preliminary application:*
- F5: *preparing component samples;*
- F6: *placing the component samples in a nuclear reactor;*
- F7: *placing sensors in the nuclear reactor to monitor parameters of*

*interest during operation of the nuclear reactor;*

F8: *operating the nuclear reactor for a predetermined period of time;*

F9: *retrieving data from the sensors in the reactor in real time to measure the parameters of interest;*

F10: *comparing the retrieved real time sensor data to the physical property and component behavior models;*

F11: *using the real time sensor data as soon as it is received to validate the atomistic model used in the preliminary application for license, or*

F12: *adjusting one or both of the physical property and the component behavior models to conform to the retrieved real-time sensor data;*

F13: *preparing and submitting a final application for license of the component to the regulatory body using the compared retrieved real-time sensor data and the adjusted physical property and component behavior models.*

*Admission of the new set of claims*

5. The new set of claims is an amendment, the admission of which is subject to the Board's discretion under Article 12(4) RPBA 2020.

6. The fact that the claims underlying the decision were replaced by a single set of claims is conducive to procedural efficiency. Since, in addition, the amendments address the objections identified in the decision, the set of claims is likely to be admitted into the proceedings.

*Basis for the amendments*

7. Claim 1 is substantially identical to claim 8 as originally filed, except for the following amendments in F2, F4, and F11. The amendments are marked with respect to claim 8 as originally filed:

(a) The first step is defined in F2 as

*... atomistic modeling of at least one physical property of a component ~~and~~ to predict component behavior under conditions of interest in the operation of a nuclear reactor; ... .*

(b) F4 defines that the third and all further steps (F5 to F13) are carried out

*... in parallel with the modeling and preparing a preliminary application: ... .*

(c) The previously defined step of "optionally adjusting one or both of the physical property and the component behaviour models" is now amended to be one of two alternatives to a mandatory step (F11 or F12):

... using the real time sensor data as soon as it is received to validate the atomistic model used in the preliminary application for license, or

~~optionally adjusting one or both of the physical property and the component behavior models to conform to the retrieved real-time sensor data; ... .~~

8. According to the appellant, amendment (a) in F2 was based on page 3, lines 10 - 11 of the application as filed, which reads (including preceding line 9):

*..., the process for use in securing a license for nuclear components may be characterized as preparing atomistic models to predict predetermined physical properties of at least a portion of a nuclear reactor component ....*

9. This passage says that atomistic models are prepared to predict physical properties of a component. This is different from amendment (a), which says that at least one physical property of a component is modelled to predict component behaviour. Original claim 8 is also different from amendment (a), because it says that at least one



physical property of a component and component behaviour are modelled.

10. Hence, the definition, in claim 1, of what is modelled and of what is predicted (amendment (a) in F2) has no basis in the application as filed.

11. According to the appellant, amendment (b) in F4 was based on page 6, lines 15 - 16 of the application as filed, which reads:

*In parallel with the modeling and preliminary application tasks in the first step, test samples may be designed and manufactured and the calculations required to allow them into the reactor may be performed.*

12. This passage corresponds with the figure of the "ideal timeline of the improved approach". The figure shows that the first steps of modelling ("Develop atomic scale models and predict component behaviour") and preparing a preliminary application ("Data evaluation and NCR submittal generation"), corresponding to F2 and F3, are performed in parallel with the preparation of samples ("Design, build and qualify for testing new technology"), corresponding to F5, during the first two years of the process. Later steps, which correspond to F6 to F13, are performed during the third to seventh years, not in parallel with the first steps.

13. This, however, is different from amendment (b). According to amendment (b), all steps of F5 to F13 are performed in parallel with the steps of F2 and F3 of modelling and preparing a preliminary

application, even step F13 of preparing and submitting a final application.

14. Hence, also amendment (b) in F4, which defines the process steps that are performed in parallel, has no basis in the application as filed.

15. According to the appellant, amendment (c) in F11 was based on page 12, lines 32 - 33. Together with the subsequent lines bridging pages 12 and 13, this passage reads:

*The data can be used as soon as it is received to validate the atomic scale models used in the preliminary licensing applications. If the data does not match predictions, then the models can be re-evaluated and new models generated to incorporate the actual data from the ongoing tests and new predictions made as to future data readings which can then be used to validate or invalidate the new models.*

16. This means that the adjustment of the models only happens conditionally if the sensor data does not match the predictions. This is not the same as the unconditional "or"-combination between the two process steps in claim 1.

17. Therefore, amendment (c) in F11 is not originally disclosed as a non-conditional alternative to the following step of adjusting one or both models.

18. It follows that the subject-matter of claim 1 extends beyond the application as filed (Article 123(2) EPC). The application is therefore not allowable.

*Inventive step*

19. Irrespective of its extension of subject-matter, the subject-matter of claim 1 does not involve an inventive step in view of D1, for the following reasons.

20. D1 is an overview article that describes developments of how to discover and design new fuels for nuclear reactors. It also proposes initiatives that could accelerate such discovery and design, but these are not relevant to the present case. Use is made of high-performance computer simulations (abstract and first section on pages 20 and 21) that are based on multi-scale models. The multi-scale models rely, amongst others, on atomistic models, which are necessary to predict the behaviour of the components in the reactor (page 21, section "Conventional nuclear fuels"; also page 25, first two bullet points). Typically, the development of realistic models involves the comparison of the models with experimental results, and a consequent adjustment of the models. This process can be iterative (see Box 1 and Figure 1, and the passages on validation in Box 2).

21. D1 mentions that the development of new nuclear fuels by the process of modelling and simulation "is expected to become an integral

component of nuclear fuels design, licensing, ..." (page 27, section "Summary and outlook"; see also last paragraph before the section "Education" on page 26 and the last sentence in Box 3). This means that the licensing is not disclosed as part (or purpose) of the featured process, but merely as a future application to which such processes may be applied. However, new nuclear fuels are developed with precisely the purpose that some of them will actually be used. This means that an application for a license is implicit because it will sooner or later be made for such fuels.

22. Summarized, D1 discloses a process of modelling physical properties of a nuclear fuel component to predict its behaviour in a nuclear reactor, wherein the model is matched to experimental results, and the result of the comparison is used to adjust the model. No details of the experimentation are disclosed. It is implicit that samples of the nuclear fuel component are prepared and placed in a nuclear reactor for measurement during operation, and that at least some of the parameters used in the model correspond to parameters required for licensure of the nuclear fuel. It is also implicit that at some later point in time an application for license for such a fuel will be filed.

23. Hence, D1 discloses at least F1 (in parts, as the parameters in D1 are not "demonstrated"), F2, F5 (implicit), F6 (implicit), F8 (implicit and without the "predetermined period of time"), F9 - F12 (implicit and without the "real-time" aspect and the reference to the preliminary application

for license in F11), and F13 (only the first part of preparing and submitting a final application).

24. The features, or parts of features, of claim 1, which are not disclosed by D1, fall in two categories:

(a) Those that relate to the adjustment of the models through experimentation (the part of F4 referring to the modelling, F7, parts of F8 - F12); and

(b) those that relate to the process of preparing and submitting an application for license of the component in question (part of F1, F3, those parts of F4 and F11 relating to the application for license, and those parts of F13 relating to the bases of the application for license).

25. The features in category (a) have the effect of enabling the iterative comparison of the models with measurement data of the parameters of interest. This effect is technical and leads to the technical problem of finding a way to realize the empirical validation and adjustment of the models through experimentation.

26. In view of this problem, it would have been obvious, for the skilled person starting from D1, to resort to the common way of monitoring parameters of interest during operation of the reactor by using sensors placed in the reactor. Considering the necessary iterations, the skilled person would have repeatedly compared the model with real-time sensor data, and adjusted the model

accordingly, during the operation of the reactor. Starting a new operation of the reactor for a new iterative improvement of the model would have been absurd. Hence, these features do not contribute to an inventive step.

27. The features in category (b) have the effect of preparing and submitting a preliminary and a final application for license of the nuclear fuel component as early as possible. This effect leads to the problem of how to accelerate the conventional process of applying for a licence for a nuclear fuel component. This effect and problem are purely administrative. Therefore, these cannot contribute to an inventive step.

28. The effects and the corresponding problems of the features of category (b) are different from those of category (a) because the empirical validation and the adjustment of the models is independent of the administrative use, to which the models are put. This means that there is no inextricable link between them, and the separate consideration of the two groups of features is justified.

29. Therefore, the subject-matter of claim 1 lacks an inventive step (Article 123(2) EPC) in view of D1, and the application is not allowable for this reason as well.

*The appellant's arguments on inventive step*

30. The appellant is of the view that even if the problem of reducing the time required to obtain a

licence for a new nuclear fuel was not technical, its solution was. This was sufficient to confer a technical character on the invention. Regardless of that, the problem could also be formulated in a more technical way, "as seeking to improve a process for demonstrating parameters required for license so as to make the process faster". It was commonly accepted that the problem of accelerating a manufacturing processes was technical, and the same should apply to accelerating administrative tasks. The appellant emphasized that the documents for licensing of components for use in a nuclear reactor were highly technical.

31. It has never been contested that claim 1 contains technical features. It therefore defines an invention within the meaning of Article 52(1) EPC. More precisely, due to the inclusion of non-technical features, the invention is what is commonly referred to as a "mixed-type invention" (see the Case Law of the Boards of Appeal, 10th edition, I-D.9.1).

32. According to the same Article 52(1) EPC, the invention must make a technical contribution over the prior art that involves an inventive step.

33. It is established case law, summarized in part in decision G 0001/19 (OJ EPO 2021, 77), that only those features which contribute to the technical solution of a technical problem can contribute to an inventive step (see G 0001/19, points 24, 30, 39, and 79; see also T 0154/04, headnote II).

34. Thus, features which may *per se* be of technical nature, but which have no technical effect or function, cannot contribute to inventive step (see G 0001/19, points 33, and 80).

35. Applied to the present case, this means that the non-distinguishing features of category (b), which solve the non-technical problem of accelerating the application for license without any contribution to the solution of the technical problem solved by the other group of features (a), must be disregarded for the assessment of inventive step.

36. In the light of the foregoing, the alleged analogy drawn by the appellant between accelerating a manufacturing process and accelerating an administrative task does not exist. That is so because a manufacturing process, and its acceleration, is typically a technical problem, whereas an administrative task, and its acceleration, is not. Regardless of how the problem is reformulated.

37. Therefore, the appellant's argument is not persuasive, and the above approach of not taking into account the features related to the licensing process (category (b)) is justified.



### **Reasons for the Decision**

4. In the above points 4 to 37 of its preliminary opinion, the Board expressed its intention to admit the new set of claims, and found that the subject-matter of claim 1 extended beyond the content of the application as filed (Article 123(2) EPC), and did not involve an inventive step (Articles 52(1) and 56 EPC).
5. The applicant did not comment on these findings.
6. After reviewing the case once more, the Board sees no reason to deviate from its previous findings.
7. Hence, the set of claims is admitted into the proceedings, but is not allowable.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chair:



D. Meyfarth

P. Scriven

Decision electronically authenticated