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Datasheet for the decision of 16 September 2019

Case Number: T 2634/16 - 3.2.06

Application Number: 06124337.4

Publication Number: 1788190

IPC: F01D5/00, G01N29/00, F01D21/00

Language of the proceedings: EN

Title of invention:
Method and system for assessing life of cracked dovetail in turbine

Patent Proprietor:
GENERAL ELECTRIC COMPANY

Opponent:
Siemens Aktiengesellschaft

Headword:

Relevant legal provisions:
EPC Art. 123(2)

Keyword:
Amendments - added subject-matter (yes)

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It can be changed at any time and without notice.

Decisions cited:

Catchword:

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Case Number: T 2634/16 - 3.2.06

D E C I S I O N
of Technical Board of Appeal 3.2.06
of 16 September 2019

Appellant: (Opponent)	Siemens Aktiengesellschaft Werner-von-Siemens-Straße 1 80333 München (DE)
Respondent: (Patent Proprietor)	GENERAL ELECTRIC COMPANY 1 River Road Schenectady, NY 12345 (US)
Representative:	Rüger Abel Patentanwälte PartGmbB Patentanwälte Webergasse 3 73728 Esslingen a.N. (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 5 October 2016 concerning maintenance of the European Patent No. 1788190 in amended form.**

Composition of the Board:

Chairman M. Harrison
Members: M. Dorfstätter
J. Hoppe

Summary of Facts and Submissions

I. An appeal was filed by the appellant (opponent) against the interlocutory decision of the opposition division in which it held that the patent in an amended form met the requirements of the EPC.

II. The appellant requested that the impugned decision be set aside and the patent be revoked in its entirety.

The respondent (patent proprietor) requested that the appeal be dismissed.

III. The Board issued a summons to oral proceedings and a subsequent communication containing its provisional opinion, in which *inter alia* it expressed doubts whether the subject-matter of claim 1 met the requirement of Article 123(2) EPC.

IV. The respondent stated that it would not attend the oral proceedings and withdrew its request for oral proceedings. The respondent however maintained its request for the appeal to be dismissed.

V. The oral proceedings were duly cancelled.

VI. Claim 1 of the sole request reads as follows:

"1. A method for predicting a remaining operational life of a turbine rotor (10) comprising:
(a) obtaining crack flaw data (30) regarding a current crack flaw in a dovetail connector (16) of the turbine rotor (10) and an expected propagation rate for the crack flaw;
(b) applying a probabilistic analysis (34) to the crack flaw data and expected crack propagation rate to

generate a statistical distribution (36) of the propagation of the crack flaw during a predetermined operating time period of the rotor (10);
(c) using the statistical distribution of the propagated crack flaw, data regarding the geometry of the dovetail connector (16) and operating conditions of the rotor (10) to perform Finite Element analysis to determine a load applied to a hook (18) of the dovetail connector (16) during the predetermined operating time period of the rotor (10);
(d) determining (46) whether the rotor (10), at the end of the predetermined operating time period, has reached a crack failure criteria based on the statistical distribution of the propagated crack flaw and determined hook load; and
(e) repeating steps (b) to (d) for successive periods of predetermined operating time period to determine predicted remaining life of the rotor (10)."

VII. The appellant's arguments relevant to the decision may be summarised as follows:

The subject-matter of claim 1 contravened Article 123(2) EPC. Step (e) of original claim 8 defined that the crack propagation rate was determined based on the crack flaw data. Its omission contravened Article 123(2) EPC.

VIII. The respondent's arguments relevant to the decision may be summarised as follows:

The subject-matter of claim 1 fulfilled the requirement of Article 123(2) EPC. Feature (e) of original claim 8 defined determining propagation of a crack and not a rate of propagation. There was nothing in the original description specifying that the expected propagation

rate was determined from the crack flaw data, such that there was no need to include such a feature in the claim. The crack propagation, as referred to in step (e) of original claim 8, obviously was determined from the crack flaw data by applying the previously determined expected propagation rate da/dt to the crack flaw data.

Reasons for the Decision

1. The subject-matter of claim 1 fails to meet the requirement of Article 123(2) EPC.

1.1 The repetition of steps (b) to (d) as now claimed in feature (e) does not define the same concept as disclosed in original claim 8.

1.2 Step (e) of original claim 8, on which claim 1 as found allowable by the opposition division is based, defined "determining crack propagation (38) based on the crack flaw data and a period of elapsed operating time of the component, and applying adjusting the crack data to include the determined crack propagation."

1.3 As already stated in the communication of the Board (see item 1.1), the now deleted step (e) of original claim 8 related to adjusting the actual crack data in the analysis. In step (a) of original claim 8, crack flaw data regarding current crack flaws was obtained. In original step (b), this data of the current crack flaws underwent a probabilistic analysis to generate statistical distributions of crack data and the propagation rate, which were then (in step (c)) used to determine loads on a turbine component. In step (d), based on the crack flaw data and the determined loads,

it was determined whether the turbine component had reached a crack failure criteria. This failure criteria determination was hence first performed based on a statistical distribution of crack data representing *unpropagated* cracks. Only in the last, now deleted, step (e) was the new crack propagation determined after a period of elapsed operating time and the crack data adjusted accordingly.

1.4 New feature (e) defines repeating new steps (b) to (d). Step (b) starts with the determination of the statistical distribution of the propagation of the crack flaw during a predetermined operating time. The following steps (c) and (d) - in which it is determined whether a failure criteria has been reached - are hence performed based on a statistical distribution of crack data representing the *already propagated* cracks.

1.5 Thus the repetition of steps (b) to (d) does not define the same concept as disclosed in original claim 8 but rather a (general) concept, in which the determination whether a failure criteria has been reached is already initially performed on the data of the *propagated* crack.

1.6 Another basis in the description for the now claimed concept is neither apparent nor substantiated by the respondent who did not respond to the objections raised in the Board's communication as regards this amendment. Therefore, the Board concludes that the claim defines subject-matter which extends beyond the content of the application as filed. As a consequence, the other objections in view of Article 123(2) EPC as mentioned in the communication of the Board are not relevant for this decision.

2. The Board thus concludes that the requirement of Article 123(2) EPC is not fulfilled and the patent cannot be maintained on the basis of the documents considered allowable by the Opposition Division.

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:

T. Buschek M. Harrison

Decision electronically authenticated