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Datasheet for the decision of 23 October 2019

Case Number: T 0538/16 - 3.4.02

Application Number: 07805733.8

Publication Number: 2171394

IPC: G01B5/008, G01B7/008, G01B21/04

Language of the proceedings: EN

Title of invention:
METHOD FOR COMPENSATING MEASUREMENT ERRORS CAUSED BY DEFORMATIONS OF A MEASURING MACHINE BED UNDER THE LOAD OF A WORKPIECE AND MEASURING MACHINE OPERATING ACCORDING TO SAID METHOD

Patent Proprietor:
Hexagon Metrology S.p.A.

Opponent:
Carl Zeiss Industrielle Messtechnik GmbH

Headword:

Relevant legal provisions:
EPC Art. 123(2)
EPC 1973 Art. 56

Keyword:
Amendments - added subject-matter (no) - after amendment
Inventive step - (yes) - after amendment

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 0538/16 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 23 October 2019

Appellant: (Opponent)	Carl Zeiss Industrielle Messtechnik GmbH Carl Zeiss Straße 22 73447 Oberkochen (DE)
Representative:	Brunotte, Joachim Wilhelm Eberhard Patentanwälte Bressel und Partner mbB Potsdamer Platz 10 10785 Berlin (DE)
Respondent: (Patent Proprietor)	Hexagon Metrology S.p.A. Via Vittime di Piazza della Loggia, 6 10024 Moncalieri (IT)
Representative:	Franzolin, Luigi Studio Torta S.p.A. Via Viotti, 9 10121 Torino (IT)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 4 January 2016 concerning maintenance of the European Patent No. 2171394 in amended form.**

Composition of the Board:

Chairman	R. Bekkering
Members:	A. Hornung
	B. Müller

Summary of Facts and Submissions

I. The opponent appealed against the interlocutory decision of the opposition division maintaining European patent No. 2171394 in amended form.

The opposition division had found that the patent as amended according to a new main request then on file and the invention to which it related met the requirements of the EPC.

II. Oral proceedings before the board were held on 23 October 2019.

III. The opponent-appellant requested that the decision of the opposition division be set aside and that the patent be revoked.

IV. The patent proprietor-respondent requested that the decision under appeal be set aside and that the patent be maintained as amended in the following version:

Claims: No. 1 to 10 filed during the oral proceedings of 23 October 2019 labelled "Auxiliary Request 1 - 5:45 p.m.".

Description: Pages 2 to 5 filed during the oral proceedings of 23 October 2019.

Drawings: Figures 1 to 7 of the patent specification as corrected.

V. Independent claims 1 and 10 according to the patentee's main and sole request read as follows:

Claim 1:

"A method of compensating the measurement errors of a measuring machine (1) deriving from the deformations of a machine bed (2) of the machine (1) caused by the load exerted by a workpiece to be measured on the machine bed (2), the measuring machine having a mobile unit (4) for moving a measurement sensor (11) with respect to the machine bed (2) and a compensating system operating according to the method, the method comprising a first acquisition step (15) in which data regarding the weight of the workpiece, the position of its centroid and the conditions of constraint of the workpiece on the machine bed are acquired and a second calculation step (16, 17, 18, 19) in which correction values depending upon said data are calculated,

characterized in that:

said first step (15) comprises selecting a standard load condition from among a plurality of preset standard load conditions, the standard load condition being equivalent to the condition of actual load exerted by the workpiece and representing the mode of resting of the workpiece on a working surface (3) of the machine bed (2) including the number and position of the resting points and areas, and entering data representing load per resting point or per area of uniform load distribution

and in that

said second step comprises the steps of transforming the selected standard load condition into linear combinations of predetermined basic load conditions each defined by applying a preset load (F) on a respective preset point, the preset points defining a grid on the working surface (3) of the machine bed (2) and calculating values correlated to the deformation of the machine bed (2) under the load of the workpiece as a linear combination of corresponding values

contained in a map stored in a measuring and control unit (12) of the machine and calculated previously for and resulting from said predetermined basic load conditions."

Claim 10:

"A measuring machine comprising a machine bed (2) and a mobile unit (4) for moving a measurement sensor (11) with respect to said machine bed (2), characterized by comprising a compensating system for compensating the measurement errors deriving from the deformations of the machine bed caused by the load exerted by the workpiece to be measured on the machine bed, the compensating system operating according to the method of any one of the preceding claims."

VI. The following documents relied on in the opposition proceedings will be referred to in the present decision:

D1: DE 102 14 489 A
E1: "Introduction to finite element methods", Carlos A. Felippa, 2001
E7: EP 1 655 567 A

Reasons for the Decision

1. Amendments - Article 123(2) EPC

The European patent is not amended in such a way that it contains subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC).

1.1 Present claim 1 is based essentially on the following claims and passages of the patent application as originally filed:

- claims 1, 3 to 6 and 14 as originally filed,

- page 8, lines 13 to 16 and page 10, lines 3 to 8 in relation to the step of transforming,
- page 6, lines 2 to 5, page 7, lines 8 to 13 and page 10, lines 10 to 13 in relation to the map containing previously calculated data of deformation,
- page 7, line 22, in relation to the position of the centroid,
- page 7, line 15 to page 8, line 11, in relation to the definition of the standard load condition,
- page 8, lines 26 to 29, in relation to a plurality of linear combinations of predetermined basic load conditions,
- page 9, lines 16 and 31, in relation to the step of entering data representing load per resting point; the step of entering data representing load per area of uniform load distribution is implicitly disclosed in view of the overall disclosure of the patent application as filed and, in particular, in view of page 8, lines 2 to 11.

Therefore, the subject-matter of claim 1 is directly and unambiguously derivable from the application as filed.

1.2 During the appeal proceedings, both in writing and orally during the oral proceedings, the opponent had raised various objections under Article 123(2) EPC against independent claims 1 and 10. In view of the amendments made by the patentee during the oral proceedings to present claim 1, the opponent withdrew all its previously raised objections under Article 123(2) except for the following objections:

1.2.1 According to the opponent, the compensating system mentioned in claims 1 and 10 carried out automatically the entire method of claim 1 including the steps of selecting a standard load condition from a plurality of preset standard load conditions and of transforming the selected standard

load condition into a linear combination of predetermined basic load conditions.

1.2.2 However, the application as filed did not disclose that the selection of a standard load condition and its transformation into a linear combination of predetermined basic load conditions was performed fully automatically by the compensating system. In particular, the application as filed did not disclose that the rules which define the standard load conditions (page 7, line 36 to page 8, line 11) or the rules of interpolation (page 8, lines 13 to 29) were performed automatically by the compensation system. On the contrary, it was derivable from the application as filed (page 9, line 16; last word on page 10, line 8) that the intervention of an operator was required to carry out the method steps of claim 1 including the selection of a standard load condition and its transformation.

1.2.3 Since the application as filed did not disclose that the selection and transformation steps were performed fully automatically by the compensating system, claim 1 infringed the requirement of Article 123(2) EPC.

1.2.4 A corresponding objection was raised by the opponent with respect to the device claim 10 comprising a compensating system operating according to the method of claim 1.

1.3 The board of appeal is not convinced by the opponent's argumentation. While the compensating system defined in claims 1 and 10 is specifically adapted to automatically perform all the method steps of claim 1, it is not excluded by the wording of claims 1 and 10 that certain steps or sub-steps of the method of claim 1 are carried out by the compensating system with a manual input, such as explicitly disclosed on page 9, line 16, or that they are carried out at a point in time before the first and/or second steps of

claim 1, for instance, the definition as such of the types of standard load conditions (page 7, line 36 to page 8, line 11) or the definition as such of the rules of interpolation (page 8, lines 18 to 29).

2. Extension of the scope of protection, clarity and sufficiency of disclosure

During the appeal proceedings, the opponent had raised various objections under Article 123(3) EPC, Article 84 EPC 1973 and Article 83 EPC 1973 against claim 1 in previous versions. In view of the amendments made by the patentee during the oral proceedings to present claim 1, the opponent withdrew all its previously raised objections.

The board also does not see any reason for objecting to the present set of claims under Article 123(3) EPC, Article 84 EPC 1973 or Article 83 EPC 1973.

3. Inventive step

3.1 The subject-matter of claim 1 involves an inventive step in view of the closest prior art as represented by either D1 or E7 (Article 56 EPC 1973).

3.1.1 At least the following features of claim 1 are novel and involve an inventive step over the available prior art documents:

"said first step (15) comprises selecting a standard load condition from among a plurality of preset standard load conditions, the standard load condition being equivalent to the condition of actual load exerted by the workpiece and representing the mode of resting of the workpiece on a working surface (3) of the machine bed (2) including the number and position of the resting points and areas, and

entering data representing load per resting point or per area of uniform load distribution
and
said second step comprises the steps of transforming the selected standard load condition into linear combinations of predetermined basic load conditions each defined by applying a preset load (F) on a respective preset point, the preset points defining a grid on the working surface (3) of the machine bed (2) and calculating values correlated to the deformation of the machine bed (2) under the load of the workpiece as a linear combination of corresponding values contained in a map stored in a measuring and control unit (12) of the machine and calculated previously for and resulting from said predetermined basic load conditions".

3.1.2 The technical effect of the differing features is to model the workpiece and its effect on the deformation of the machine bed and to use the model to compensate the measurement errors caused by the load exerted by the workpiece. The objective technical problem consists, therefore, in the practical implementation of a compensation of the measurement errors.

3.1.3 Both D1 and E7 relate to the technical field of compensating the measurement errors of a measuring machine deriving from the deformations of a machine bed of the machine caused by the load exerted by a workpiece to be measured on the machine bed. However, neither D1 nor E7 discloses any details about how the error induced by the weight of the object is calculated.

As already stated in the annex to the summons to oral proceedings, point 8.6.4, "D1, even in combination with E1 and E7, does not seem to comprise a hint to model the workpiece and its effect on the deformation of the machine bed by calculating values correlated to the deformation of

the machine bed as linear combinations of values calculated beforehand, and once and for all, for predetermined basic load conditions".

In view of the amendments made by the patentee during the oral proceedings to present claim 1, the opponent withdrew its previously raised objection of lack of inventive step against the subject-matter of claim 1.

3.1.4 The board maintains its preliminary opinion according to which the subject-matter of claim 1 involves an inventive step with respect to the available prior art.

3.2 Claim 10 comprises "a compensating system for compensating the measurement errors deriving from the deformations of the machine bed caused by the load exerted by the workpiece to be measured on the machine bed, the compensating system operating according to the method of [claim 1]". The compensating system is specifically configured to operate according to the method of claim 1, thereby representing a limiting feature of the measuring machine of claim 10. Therefore, the subject-matter of claim 10 involves an inventive step for reasons corresponding to those given in point 3.1 above.

4. It follows that independent claims 1 and 10 of the present request meet the requirements of the EPC and that the patent can be maintained on the basis thereof.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent as amended in the following version:

Claims:
No. 1 to 10 according to the first auxiliary request labelled 5:45 p.m. filed during the oral proceedings of 23 October 2019.

Description:
Pages 2 to 5 filed during the oral proceedings of 23 October 2019.

Drawings:
Figures 1 to 7 of the patent specification as corrected.

The Registrar: The Chairman:

M. Kiehl R. Bekkering

Decision electronically authenticated