

PATENT COOPERATION TREATY

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**
(PCT Rule 43*bis*.1)

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2018/053203

International filing date (day/month/year)
27.09.2018

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28.09.2017

International Patent Classification (IPC) or both national classification and IPC
INV. G01B21/04 G01B11/00 G01B7/008 G01B5/008 G01N29/265

Applicant
HEXAGON METROLOGY, INC.

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:



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Date of completion of this opinion

see form PCT/ISA/210

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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - the international application in the language in which it was filed.
 - a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>13, 14, 37, 38, 59, 60</u>
	No: Claims	<u>1-12, 15-36, 39-58, 61-66</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-66</u>
Industrial applicability (IA)	Yes: Claims	<u>1-66</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

- D1** US 2015/362305 A1
D2 US 2017/094251 A1
D3 US 2015/178412 A1
D4 US 5 412 880 A

1 Preliminary comment

The subject-matter of claim 1 includes every technical features defined by the subject-matter of claim 23. Therefore, claim 1 is dependent on claim 23 and the claims lack conciseness.

2 Novelty (Article 33(2) PCT) / independent claims

The subject-matter of the following claims is not novel.

2.1 Claim 23

D1-D3 describe a method (**D1**: fig. 7-10; [0083]-[0095] / **D2**: fig. 3, 9, 11, 25A; [0068], [0081], [0106]-[0107], [0110], [0161]-[0167] / **D3**: fig. 1-17; [0031]-[0130]) of measuring various properties of an object, the method comprising:

- measuring three-dimensional coordinates of a surface of an object using a coordinate measuring device (**D1**: fig. 7: 70'; [0084] sentence 7 / **D2**: fig. 3: 310, 330, 350, fig. 9, 11: 900; [0068] / **D3**: fig. 3: 76, fig. 4; [0057]); and
- measuring a second property of the object using a second measuring device (**D1**: fig. 7: 55'; [0084] sentence 8 / **D2**: fig. 3: 390; [0068]: "color information" / **D3**: fig. 3: 78, fig. 4; [0057], [0063]: the second property is e.g. the dimensions of a hole) mounted to the coordinate measuring device after the three-dimensional coordinates have been measured.

2.2 Claim 47

The wording of the apparatus claim 47 corresponds, mutatis mutandis, to that of method claim 23, so that the remarks of section 2.1 apply correspondingly to claim 47.

3 Novelty (Article 33(2) PCT) / dependent claims

The subject-matter of claims 2-12, 15-22, 24-36, 39-46, 48-58, and 61-66 is not novel. The subject-matter of claims 13-14, 37-38, and 59-60 is novel.

3.1 Claims 1, 24, 48

D1-D3 describe an articulated arm coordinate measuring machine (**D1**: fig. 7 / **D2**: fig. 11; [0107] and [0110]: "robotic arm" / **D3**: [0069]).

3.2 Claims 2-4, 26-28, 50-51

D1-D3 describe a structured light scanner (**D1**: fig. 7: 70'; [0084] sentence 2: a laser scanner is per se a structured light scanner / **D2**: [0081] and [0110]: "pattern of light" / **D3**: fig. 4: 1402; [0057]: "scanner (...) pattern generator").

3.3 Claims 5, 29, 52

D1 describes mounting the second measuring device to the articulated arm CMM kinematically (**D1**: fig. 10: 510; [0094]-[0095]) .

3.4 Claims 6-12, 30-36, 53-58

D1 describes the use of an ultrasound sensor (**D1**: fig. 7: 55') for detecting cracks (**D1**: [0083] sentence 3 and [0084] sentence 8) below the surface of the object and an eddy-current sensor (**D1**: [0093]).

D2 and **D3** describe a spectral imager (**D2**: [0068]: "color information" / **D3**: [0059]: "camera").

3.5 Claim 15, 39, 61

D1-D3 describe generating a three-dimensional model of the object (**D1**: [0084]: sentences 7-8 / **D2**: [0068]: "3D image" / **D3**: fig. 4: 1404-1406).

3.6 Claims 16-20, 40-44, 62-65

D3 describes displaying to a user the portion of the object for which the second property has not yet been measured (**D3**: fig. 4: 1410; [0064])

D1-D3 describe displaying to a user the data measured by the second measuring device (**D1**: [0088]: "display the data provided by the ultrasonic flaw detection system" / **D2**: [0068]: the colour information is incorporated to the 3D image, which is implicitly displayed to a user / **D3**: fig. 4: 1410-1416; [0064], [0067]-[0070]).

3.7 Claims 21-22, 45-46, 66

D1-D3 describe generating a plurality of data over a two-dimensional area and associating the data with a three dimensional coordinate on the object (**D1**: [0084] last two sentences / **D2**: [0068] / **D3**: [0070]).

3.8 Claims 25, 49

D2 describes that the coordinate measuring machine is a retroreflector (**D2**: fig. 25A; [0167]: "SMR") associated with a laser tracker (**D2**: [0167]).

4 Inventive step (Article 33(3) PCT) / dependent claims

The subject-matter of the following claims does not involve an inventive activity.

4.1 Claims 13-14, 37-38, 59-60

Using a roughness or a hardness sensor as measuring device mounted on an articulated arm coordinate measuring machine is well-known in the art (see e.g. **D4**: fig. 23; col. 13 l. 27-38).

Re Item VII

Certain defects in the international application

1 **D1-D3** are not identified in the description and the relevant background art disclosed therein is not discussed (R. 5.1(a)(ii) PCT).

2 The features of the claims are not provided with reference signs placed in parentheses (R. 6.2(b) PCT).

3 Claim 63

The subject-matter of claim 63 refers to "the display" defined by claim 62 and is therefore dependent on claim 62.

4 Claim 64

The subject-matter of claim 64 refers to a display, which is already defined in claim 62. Therefore, it seems that claim 64 is solely dependent on claim 61.