

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 17P00102W00	FOR FURTHER ACTION		See item 4 below
International application No. PCT/JP2017/004224	International filing date (<i>day/month/year</i>) 06 February 2017 (06.02.2017)	Priority date (<i>day/month/year</i>) 05 February 2016 (05.02.2016)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant KYOCERA CORPORATION			

<p>1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).</p> <p>2. This REPORT consists of a total of 15 sheets, including this cover sheet.</p> <p>In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.</p>																								
<p>3. This report contains indications relating to the following items:</p> <table> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> <p>4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).</p>	<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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	Date of issuance of this report 07 August 2018 (07.08.2018)
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PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing (day/month/year)	09.05.2017
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Applicant's or agent's file reference 17P00102W00

FOR FURTHER ACTION See paragraph 2 below
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International application No. PCT/JP2017/004224	International filing date (day/month/year) 06.02.2017	Priority date (day/month/year) 05.02.2016
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International Patent Classification (IPC) or both national classification and IPC B23B27/22 (2006.01) i

Applicant KYOCERA CORPORATION

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 43bis.1(a)(i) with regard to novelty, inventive step or 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 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 66.1bis(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/JP	Date of completion of this opinion	Authorized officer
Facsimile No.		Telephone No.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2017/004224

Box No. I Basis of this 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:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No. PCT/JP2017/004224
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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)	Claims <u>2-8, 11-15</u>	YES
		Claims <u>1, 9-10, 16-17</u>	NO
	Inventive step (IS)	Claims <u>5-7, 11, 13-15</u>	YES
		Claims <u>1-4, 8-10, 12, 16-17</u>	NO
	Industrial applicability (IA)	Claims <u>1-17</u>	YES
		Claims _____	NO

2. Citations and explanations:

Document 1: Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 103967/1984 (Laid-open No. 20204/1986) (DIJET INDUSTRIAL CO., LTD.) 05 February 1986, specification, page 4, line 19 to page 9, line 20, fig. 1-4 (Family: none)

Document 2: JP 5187447 B2 (TUNGALOY CORP.) 24 April 2013, paragraphs [0054]-[0060], fig. 6 (Family: none)

Document 3: WO 2014/192798 A1 (KYOCERA CORP.) 04 December 2014, paragraph [0055], fig. 7-8, 11 & US 2016/0082518 A1, paragraph [0065], fig. 7-8, 11

The invention as in claims 1-4, 8-10, 12, and 16-17 does not involve an inventive step in the light of document 1.

<Claim 1>

Document 1 discloses providing a first slope surface 15 ("first corner surface") having a slope θ_a in the same

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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

direction as a land, a second slope surface 15a ("second corner surface") having a slope θ_b ("slope angle θ_{12} ") toward the periphery side of the tip, and a rear end slope surface 15b ("fourth corner surface") having a slope θ_c ("slope angle θ_{14} ") in the same direction as the second slope surface. Document 1 also indicates that the second slope surface 15a and the rear end slope surface 15b are continuously connected through the second bottom surface 16a ("third corner surface"), and in the A-A cross section, the slope θ_b of the second slope surface 15a is 20° in the examples and the slope θ_c of the rear end slope surface 15b is 40° in the examples.

Document 1 does not mention the specific relationship between the slope θ_b of the second slope surface 15a and the slope θ_c of the rear end slope surface 15b in the C-C cross section. However, setting the angles for the slopes is merely a design matter that could be selected, as appropriate, by a person skilled in the art in consideration of the efficiency of the cutting process and the like, and the example of the A-A cross section indicates that the slope θ_c is larger than the slope θ_b , and therefore it would not be particularly difficult in the invention of document 1 to, for example, set the slope θ_c to be larger than the slope θ_b in the C-C cross section.

Furthermore, what type of surface to use for the second bottom surface 16a is merely a design matter that could be selected, as appropriate, by a person skilled in the art taking into account the efficiency of the cutting

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

process and the like, and it would not be particularly difficult to configure the second bottom surface 16a to slope upwards slightly more than a flat surface while moving away from the second sloping surface 15a in the C-C cross section.

As a result, the slope θ_b is considered to be larger than the slope angle of the second bottom surface 16a.

<Claim 2>

In the B-B cross section of document 1, the first slope surface 15 is considered to be the "first surface", the second slope surface 15a is considered to be the "second surface", the second bottom surface 16a is considered to be the "third surface", and the rear end slope surface 15b is considered to be the "fourth surface".

Document 1 does not mention the specific relationship between the slope θ_b of the second slope surface 15a and the slope θ_c of the rear end slope surface 15b in the B-B cross section. However, setting the angles for the slopes is merely a design matter that could be selected, as appropriate, by a person skilled in the art taking into account the efficiency of the cutting process and the like, and the example of the A-A cross section indicates that the slope θ_c is larger than the slope θ_b , and therefore it would not be particularly difficult in the invention of document 1 to, for example, set the slope θ_c to be larger than the slope θ_b in the B-B cross section.

Furthermore, the second bottom surface 16a is considered to be a flat surface and the slope angle is

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

considered to be approximately zero degrees, and therefore the slope θ_b is considered to be larger than the slope angle of the second bottom surface 16a.

<Claim 3>

As described for <Claim 1>, in the invention of document 1, when the second bottom surface 16a is configured to slope upwards slightly more than a flat surface while moving away from the second slopping surface 15a in the C-C cross section, the second bottom surface 16a in the vicinity of the C-C cross section thereby slopes downwards while moving further away from the rear end slope surface 15b and the second bottom surface 16a of the C-C cross section (and become closer to the second slope surface 15a side). Furthermore, the second bottom surface 16a in the vicinity of the C-C cross section is between the rear end slope surface 15b and the second bottom surface 16a of the C-C cross section and the rear end slope surface 15b and the second bottom surface 16a of the B-B cross section, and therefore the second bottom surface 16a in the vicinity of the C-C cross section is considered to be the "fifth surface".

<Claim 4>

Document 1 (in particular, fig. 4) is considered to indicate that the edge regions are positioned on both sides of a corner surface.

<Claim 8>

In document 1, the upper end of the rear end slope

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

surface 15b in the C-C cross section is the flat surface 11 and the upper end of the rear end slope surface 15b in the B-B cross section is also the flat surface 11, and therefore the height of the upper end of the rear end slope surface 15b ("fourth corner surface") in the C-C cross section is the same as the height of the upper end of the rear end slope surface 15b ("fourth surface") in the A-A cross section.

<Claim 9>

Document 1 (fig. 4) is considered to indicate that the second bottom surface 16a ("third corner surface") in the vicinity of the nose B becomes wider while moving away from the corner part.

<Claim 10>

In the invention of document 1, setting the width of the rear end slope surface 15b in the vicinity of the nose B is merely a design matter that could be selected, as appropriate, by a person skilled in the art in consideration of the shape of the protrusion part 18 and the projected part 17 and the like, and setting the width, for example, as in claim 10 would not be particularly difficult.

<Claim 12>

From document 1 (fig. 1, 3(b), 4) the slope θ_a , the slope θ_b , and the slope θ_c are considered to be constant along the edge part in the vicinity of the B-B cross section.

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

<Claims 16-17>

From the disclosures on cutting experiments in document 1, the invention of document 1 is considered to have the invention-specifying feature of claims 16 and 17.

The invention as in claims 1-2, 4, 8-10, 12, and 16-17 does not involve an inventive step in the light of documents 1 and 2.

<Claim 1>

Document 1 discloses providing a first slope surface 15 ("first corner surface") having a slope θ_a in the same direction as a land, a second slope surface 15a ("second corner surface") having a slope θ_b ("slope angle θ_{12} ") toward the periphery side of the tip, and a rear end slope surface 15b ("fourth corner surface") having a slope θ_c ("slope angle θ_{14} ") in the same direction as the second slope surface. Document 1 also indicates that the second slope surface 15a and the rear end slope surface 15b are continuously connected through the second bottom surface 16a, and in the A-A cross section, the slope θ_b of the second slope surface 15a is 20° in the examples and the slope θ_c of the rear end slope surface 15b is 40° in the examples.

Document 2 indicates that the erect wall surface 132a has two surfaces 132d, 132e, the slope angle β_a of the first erect wall surface 132d is larger than the slope angle β_b of the second erect wall surface 132e, and thereby the area of contact between the erect wall surface 132a and the cutting chips is minimized and

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

smooth discharge of the cutting chips is achieved.

Document 1 does not mention the specific relationship between the slope θ_b of the second slope surface 15a and the slope θ_c of the rear end slope surface 15b in the C-C cross section. However, setting the angles for the slopes is merely a design matter that could be selected, as appropriate, by a person skilled in the art taking into account the efficiency of the cutting process and the like, and the example of the A-A cross section indicates that the slope θ_c is larger than the slope θ_b , and therefore it would not be particularly difficult in the invention of document 1 to, for example, set the slope θ_c to be larger than the slope θ_b in the C-C cross section.

Considering the technical matters of document 2, it would not be particularly difficult in the invention of document 1 to form the second slope surface 15a from the first erect wall surface and the second erect wall surface, and set the slope θ_b that is the slope angle of the first erect wall surface to be larger than the slope angle of the second erect wall surface.

The second erect wall surface and the second bottom surface 16a that is connected thereto are considered to be the "third corner surface", and the slope θ_b is considered to be larger than the slope angle of the second erect wall surface ("slope angle θ_{13} of the third corner surface").

<Claim 2>

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

In the B-B cross section of document 1, the first slope surface 15 is considered to be the "first surface", the second slope surface 15a is considered to be the "second surface", the second bottom surface 16a is considered to be the "third surface", and the rear end slope surface 15b is considered to be the "fourth surface".

Document 1 does not mention the specific relationship between the slope θ_b of the second slope surface 15a and the slope θ_c of the rear end slope surface 15b in the B-B cross section. However, setting the angles for the slopes is merely a design matter that could be selected, as appropriate, by a person skilled in the art taking into account the efficiency of the cutting process and the like, and the example of the A-A cross section indicates that the slope θ_c is larger than the slope θ_b , and therefore it would not be particularly difficult in the invention of document 1 to, for example, set the slope θ_c to be larger than the slope θ_b in the B-B cross section.

Furthermore, the second bottom surface 16a is considered to be a flat surface and the slope angle is considered to be approximately zero degrees, and therefore the slope θ_b is considered to be larger than the slope angle of the second bottom surface 16a.

<Claim 4>

Document 1 (in particular, fig. 4) is considered to indicate that the edge regions are positioned on both sides of a corner surface.

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

<Claim 8>

In document 1, the upper end of the rear end slope surface 15b in the C-C cross section is the flat surface 11 and the upper end of the rear end slope surface 15b in the B-B cross section is also the flat surface 11, and therefore the height of the upper end of the rear end slope surface 15b ("fourth corner surface") in the C-C cross section is the same as the height of the upper end of the rear end slope surface 15b ("fourth surface") in the A-A cross section.

<Claim 9>

Document 1 (fig. 4) is considered to indicate that the second bottom surface 16a in the vicinity of the nose B becomes wider while moving away from the corner part, and therefore as described for Claim 1, the third corner surface that comprises the second erect wall surface and the second bottom surface 16a that is connected thereto is considered to widen while moving away from the corner part.

<Claim 10>

In the invention of document 1, setting the width of the rear end slope surface 15b in the vicinity of the nose B is merely a design matter that could be selected, as appropriate, by a person skilled in the art in consideration of the shape of the protrusion part 18 and the projected part 17 and the like, and setting the width, for example, as in claim 10 would not be particularly difficult.

<Claim 12>

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

From document 1 (fig. 1, 3(b), 4) the slope θ_a , the slope θ_b , and the slope θ_c are considered to be constant along the edge part in the vicinity of the B-B cross section.

<Claims 16-17>

From the disclosures on cutting experiments in document 1, the invention of document 1 is considered to have the invention-specifying feature of claims 16 and 17.

The invention as in claims 1, 9-10, and 16-17 is disclosed in document 3, and therefore lacks novelty and does not involve an inventive step.

<Claim 1>

Document 3 indicates that a cutting face 5 ("first corner surface") slopes downwards while moving away from the corner cutting blade 61 to the inside, and the slope angle α_{71} ("slope angle θ_{14} ") of a first bulge 71 ("fourth corner surface") is larger than the slope angle α_{73} ("slope angle θ_{12} ") of a third bulge 73 ("second corner surface").

Document 3 (fig. 8) indicates that the portion ("third corner surface") from the upper surface portion 73a to the first bulge 71 slopes upwards while moving away from the third bulge 73, and the slope angle of the portion from the upper surface portion 73a to the first bulge 71 is smaller than the slope angle α_{73} of the third bulge 73 (the slope angle α_{73} is larger than the slope angle of the portion from the upper surface portion 73a to the first bulge 71).

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

<Claim 9>

Document 3 (fig. 7) indicates that, in a top surface view, the width of a portion that is close to the upper surface portion 73a at the portion from the upper surface portion 73a to the first bulge 71 widens while moving away from a corner part 21 ("corner part").

<Claim 10>

Document 3 (fig. 7) indicates that the width of the first bulge 71 becomes narrower while moving away from the corner part 21.

<Claims 16-17>

Refer to document 3 (fig. 11).

The invention as in claims 5-7, 11, and 13-15 is not disclosed in any of the documents cited in the ISR, and is novel and involves an inventive step. In particular, none of the documents indicate that the upper end of the second corner surface is positioned below the upper end of the second surface, the upper end of the third corner surface is positioned above the upper end of the third surface, the slope angle θ_{13} of the third corner surface is larger than the slope angle θ_{23} of the third surface, the slope angle θ_{12} of the second corner surface is larger than the slope angle θ_{22} of the second surface, the difference between the slope angle θ_{12} of the second corner surface and the slope angle θ_{14} of the fourth corner surface is smaller than the difference between the slope angle θ_{22} of the second surface and the slope angle

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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

θ_{24} of the fourth surface, and the slope angle θ_{13} of the third corner surface is larger than the slope angle θ_{23} of the third surface and is smaller than the slope angle θ_{22} of the second surface and the slope angle θ_{24} of the fourth surface.