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Datasheet for the decision of 25 February 2021

Case Number: T 0474/17 - 3.2.03

Application Number: 10181690.8

Publication Number: 2267182

IPC: C23C16/36, C23C30/00

Language of the proceedings: EN

Title of invention:
Coated cutting tool

Patent Proprietor:
Mitsubishi Materials Corporation

Opponent:
Sandvik Intellectual Property AB

Headword:

Relevant legal provisions:
EPC Art. 54, 123(2), 100(b), 84, 56

Keyword:

Novelty - implicit disclosure (yes/no) - main request (no) - auxiliary request (yes)
Amendments - extension beyond the content of the application as filed (no) - disclosure of amended values in examples
Grounds for opposition - clarity in opposition appeal proceedings - fresh ground raised in appeal - admittance (no)
Inventive step - non-obvious solution

Decisions cited:

G 0010/91, G 0003/14, T 0437/14, T 0909/04, T 0885/02, T 1236/03, T 1523/07, T 1085/13

Catchword:

Beschwerdekammern
Boards of Appeal
Chambres de recours

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Case Number: T 0474/17 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 25 February 2021

Appellant: (Opponent)	Sandvik Intellectual Property AB 811 81 Sandviken (SE)
Representative:	WSL Patentanwälte Partnerschaft mbB Postfach 6145 65051 Wiesbaden (DE)
Respondent: (Patent Proprietor)	Mitsubishi Materials Corporation 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo 100-8117 (JP)
Representative:	Gille Hrabal Partnerschaftsgesellschaft mbB Patentanwälte Brucknerstraße 20 40593 Düsseldorf (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 5 January 2017 rejecting the opposition filed against European patent No. 2267182 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	G. Patton
Members:	B. Miller
	E. Kossonakou

Summary of Facts and Submissions

I. European patent No. 2 267 182 ("the patent") relates to a surface coated cermet cutting tool.

II. An opposition was filed against the patent, based on the grounds of Article 100(a) EPC together with both Articles 54 and 56 EPC.
The opposition division decided to reject the opposition.

This decision was appealed by the opponent ("the appellant").

III. State of the art

The following documents are of particular importance for the present decision:

- cited already during the opposition proceedings:

E1: EP 0 685 572 B1;
E3: T. Ishli et al., "Microstructural investigation of α-$Al_2 0_3$-epitaxially coated cemented carbide cutting tools", J. Vac. Sci. Technol. A 19(2), Mar/Apr 2001, pages 633 to 639;

Annex 1: EBSD of TiCN according to E1;
Annex 2: EBSD of $TiCN+Al_2O_3$ according to E1.

- cited for the first time in the statement setting out the grounds of the appeal:

Annex 8: XRD and EBSD data of coated inserts prepared according to E1 with detailed ESBD data, maps and graphs for the individual samples attached as Annexes 8a to 8e.

- cited by the appellant in the letter dated 03 July 2018:

Annex 9: EBSD data calculated using "Texture Component" mode (1) and re-calculated using "Pole Plot" mode (2).

The admission of the various documents cited for the first time in appeal proceedings has not been contested by the respondent and the Board did not see any reason to exclude them.

IV. With the summons to oral proceedings, the Board sent a communication pursuant to Articles 15(1) and 17(2) of the Rules of Procedure of the Boards of Appeal 2020 (RPBA 2020) indicating to the parties its preliminary opinion of the case.

V. In a letter dated 25 January 2021 the appellant supplemented its arguments, in particular in regard to the alleged lack of novelty of the subject-matter of claim 1 as granted in view of E1 and E3.

VI. With the consent of both parties, oral proceedings were held on 25 February 2021 by videoconference.

At the end of the oral proceedings the following requests were maintained by the parties.

The appellant requested that the decision under appeal be set aside and that the patent be revoked.

The patent proprietor ("the respondent") requested that the appeal be dismissed, alternatively that the patent be maintained on the basis of one of auxiliary requests 3 or 6 as filed with the reply to the grounds of appeal dated 28 September 2017.

VII. Claim 1 as granted according to the main request including a feature analysis as proposed by the appellant reads as follows:

M1 "A surface-coated cermet cutting tool, comprising:
M2 a tool substrate; and
M3 a hard coating layer coated on the tool substrate,
M4 the hard-coating layer including a lower layer and an upper layer,
M5 the lower layer containing titanium compound layers, and
M6 the upper layer containing an aluminum oxide layer,
M7 wherein one layer of the titanium compound layers in the lower layer is a titanium carbonitride layer
M8 which has an average layer thickness of 2.5 to 15 µm, and has properties indicated by a tilt-angle frequency distribution graph in which
M9 the highest peak exists in a tilt angle section ranging 0 to 10° and
M10 the total sum of frequencies existing in the range of 0 to 10° occupies a ratio of 45% or more of the total frequencies in the tilt-angle frequency distribution graph, and wherein the tilt angle is formed by the normal line of a polished plane of the lower layer's surface and the normal line of (112) plane as a crystal plane of crystal particles of the one layer,

the tilt-angle frequency distribution graph is obtained by utilizing a field-emission scanning electron microscope, irradiating electron beams with acceleration voltage of 15 kV and an incidence angle of 70° about the polished plane to individual crystal particles with a cubic crystal lattice existing in a measurement range of the polished plane, measuring the tilt angle formed by the normal line of the polished plane and the normal line of (112) plane as the crystal plane of the crystal particles at intervals of 0.1 µm/step in an area of 30×50 µm, sectioning the measured tilt angles belonging to a range of 0 to 45° every pitch of 0.25°, and collecting the frequencies existing in each section."

Claims 2 to 5 of the main request relate to preferred embodiments of the cutting tool according to claim 1.

Claims 1 to 5 of auxiliary request 3 correspond to claims 1 to 5 of the main request with the following amendment to claim 1 in features M8 and M9:

"which has an average layer thickness of ~~2.5 to 15~~ **5 to 7.5** µm ... in which the highest peak exists in a tilt angle section ranging ~~0 to 10°~~ **3.5 to 7.0°** ...".

VIII. The appellant's arguments, as far as they are relevant for this decision, can be summarised as follows.

Claim 1 defined a coated cutting tool by an unusual parameter, i.e. its properties in the tilt-angle frequency distribution graph obtained by electron backscattering diffraction (EBSD). The texture of a thin coating was usually characterised by the texture coefficient which was obtained by X-ray diffraction

(XRD). Therefore the burden of proof was on the respondent to demonstrate that the subject-matter of claim 1 was novel.

Document E1 described cutting tools comprising a TiCN layer and an Al_2O_3 layer. E1 did not disclose the tilt-angle frequency distribution obtainable by EBSD. However, Annexes 1, 2 and 8 demonstrated that by reproducing examples of E1 cutting tools could be obtained which had the same properties with regard to the tilt-angle frequency distribution graph as defined in claim 1 of the patent. Claim 1 therefore lacked novelty over E1.

Auxiliary request 3 did not comply with the requirement of Article 123(2) EPC, since the amendments to the ranges defined in claim 1 were based on individual parameters of the examples as filed. The thickness of the TiCN layer and its properties observed by ESBD, such as the position of the highest peak in the tilt-angle frequency distribution graph, were functionally linked to the remaining features and properties of the examples, in particular the cutting properties of the cutting tool. Hence, the specific values of these parameters could not be singled-out from the teaching of the individual examples described in the application as originally filed.

The patent did not define which method was used for determining the tilt-angle frequency distribution graph, "Pole Plot" or "Texture Component" mode. Hence, the subject-matter of claim 1 of auxiliary request 3 was unclear and insufficiently described. These objections were a direct consequence of the argumentation of the respondent in appeal concerning the alleged wrong interpretation of the ESBD data for the samples manufactured according to E1. Moreover, the amendments to claim 1 moved the issues with regard to clarity and insufficiency into the focus of discussion. Hence these objections should be admitted and considered in appeal.

Claim 1 of auxiliary request 3 lacked novelty in view of E1. Annex 8a demonstrated that for sample 17ELi05-N25M corresponding to example 22 of E1 five out of ten measured areas of the TiCN layer had properties in the tilt-angle frequency distribution graph as required by claim 1.

Starting from E1 the subject-matter of claim 1 of auxiliary request 3 was obvious, since it came within routine experimentation of the skilled person to produce a further cutting tool based on the examples of E1 and similar to sample 17ELi05-N25M wherein not only five out of ten but all measured areas of the TiCN layer had properties in the tilt-angle frequency distribution graph as required by claim 1.

IX. The respondent's respective arguments can be summarised as follows.

Claim 1 defined the TiCN layer of a coated cutting tool by reference to its properties in the tilt-angle frequency distribution graph obtained by ESBD, a commonly known and accepted method for analysing textures of crystalline material. Therefore the burden of proof was on the appellant to demonstrate that the subject-matter of claim 1 was not novel.

E1 did not disclose the orientation of the TiCN layer by reference to EBSD. The samples obtained by the experiments reported in Annexes 1, 2 and 8 were not accurately based on an example according to E1, since they did not comprise the exactly same substrate and layered structure. Moreover, it had not been demonstrated that the TiCN layer of a cutting tool reworked according to the disclosure of E1 had a texture as defined therein.

The amendments to claim 1 of auxiliary request 3 complied with the requirements of Article 123(2) EPC. The thickness of the TiCN layer and its individual properties in the tilt-angle frequency distribution graph were not functionally linked to the remaining features of the examples.

The ground of opposition pursuant to Article 100(b) EPC had not been raised in opposition proceedings. The amendment of end values of parameter ranges did not create an unclarity, nor did it cause the alleged problem of the missing definition of the method for determining the tilt-angle frequency distribution graph. Hence, the objections with regard to clarity and insufficiency, which were raised for the first time in appeal proceedings, were not to be admitted.

Annex 8a did not demonstrate that the TiCN layer of sample 17ELi05-N25M fulfilled all features of claim 1. The tilt angle position of the highest peak was rather 7.3° as calculated by the appellant and thus outside the range of 3.5° to 7° as defined in claim 1.

E1 did not teach or at least suggest that by adjusting the TiCN orientation as defined in claim 1, in particular the tilt angle position of the highest peak, the chipping resistance could be improved. Hence, starting from E1 the subject-matter of claim 1 of auxiliary request 3 was not obvious.

Reasons for the Decision

1. Main request - Article 100(a) EPC in conjunction with Article 54 EPC

1.1 Claim 1 is defined by properties derived from the tilt-angle frequency distribution graph obtained by electron backscattering diffraction (EBSD).

Features M9 and M10 of claim 1 describe a preferred crystallographic orientation of the (112) planes relative to the surface plane compared to each of the other crystal planes of the TiCN crystals.

A (112) texture of the TiCN layer characterized by EBSD - due to inversion symmetry of the cubic cell - is equal to a (422) texture characterized by X-ray diffraction (XRD).

It is common practice to characterize a crystalline layer by its texture, i.e. the preferred orientation of crystallographic planes in the crystals of the deposited layers by using XRD and EBSD.

Hence, no reason exists which could justify a shift of the burden of proof from the appellant to the respondent for demonstrating that the subject-matter of claim 1 is novel.

1.2 Novelty with regard to E1

1.2.1 E1 discloses in the examples a cemented cutting tool comprising an inner TiCN layer and an outer Al_2O_3

layer. Further TiC, TiN or TiCN layers can be present as innermost, outermost or intermediate layers.

E1 does not disclose a texture analysis on the basis of EBSD in regard to the tilt-angle frequency distribution graph.

The TiCN layer obtained by the process of E1 is characterized by reference to properties in the XRD spectrum. Several of the TiCN layers of the examples presented in tables 4 to 19 are indicated to show a "(111)(222)(200) orientation".

The expression "(111)(222)(200) orientation" as used in E1 does not describe a pronounced layer texture or fiber texture but refers to "relative intensities" of the (111), (200) and (220) peaks in the XRD spectrum. This becomes apparent from paragraph [0016] of E1:

"Furthermore, during the coating of the TiCN, if the reaction temperature or the amount of CH_3CN is increased, the (200) plane component of the X-ray diffraction pattern of the TiCN becomes weaker than the (111) and (220) plane components, the bonding strength with the Al_2O_3 in the upper layer which has κ as its main form increases, and the wear resistance goes up."

and paragraph [0028]:

"[...] by forming coating layers under the special coating conditions shown in Tables 3(a) and 3(b) and having the compositions, crystal structures, orientation of TiCN (shown, starting from the left, in the order of the intensity of the corresponding X-ray diffraction peak) and average thicknesses shown in Table 4 [...]".

According to the teaching of E1 the bonding strength of the TiCN layer with the Al_2O_3 layer increases and the wear resistance of the cutting tool goes up, if the intensity of the (200) XRD peak is lower than the intensities of the (111) and (220) XRD peaks.

This essential aspect of the teaching of E1 is also reflected by its claim 3:

"A coated hard alloy blade member according to claim 1 and/or 2, wherein the TiCN in said elongated crystals of said inner layer has X-ray diffraction peaks such that strength (200) plane is weak compared to strengths at (111) and (220) planes."

The relative intensities of the three peaks (111), (220) and (200) do not define a fiber texture in the sense of a pronounced crystallographic layer orientation relative to any other crystal planes.

E1 is also silent about the relation of the (111), (220) and (200) peaks compared to any other peaks in the XRD spectrum of the TiCN layer.

Hence, E1 does not describe which overall texture is obtained for the TiCN layer.

1.2.2 The appellant performed experiments on the basis of the examples of E1 comprising a TiN innermost layer and a TiCN layer having (111)(222)(200) orientation. The results of these experiments are reported in Annexes 1, 2 and 8.

The following reasoning focuses on sample 17ELi05-N25M, which is considered by the Board to represent a fair repetition of example 22 of table 6 of E1.

The sample 17ELi05-N25M produced according to Annex 8 comprises a cemented carbide substrate having the composition 5.35 wt% Co, 2.70 wt% Ta, 0.42 wt% Nb, 1.80 wt% Ti and balance W+C, an innermost TiN layer having a thickness of 0.5 µm and an inner TiCN layer having a thickness of 6.4 µm.

Annex 8 confirms on page 1 in regard to the methods for forming the coatings, that

- the TiN layer was made using the reaction conditions disclosed in Table 3(a) of E1, lines 11 to 13 and
- the TiCN layer was made using the two step reaction conditions disclosed in Table 3(a) of E1, lines 16 to 18.

Processing the EBSD data of the TiCN layer of sample 17ELi05-N25M in "Texture Component" mode, the appellant has demonstrated that the highest peak in the tilt-angle frequency distribution graph is at 7.3° and that the total sum of frequencies existing in the range of 0 to 10° occupies 61.2% (table on page 4 of Annex 8).

Using "Pole Plot" mode for the processing of the EBSD data, the TiCN layer of sample 17ELi05-N25M has the highest peak in the tilt-angle frequency distribution graph at 1.15° whereby the total sum of frequencies existing in the range of 0 to 10° occupies 56.6% (table on page 1 of Annex 9).

Hence, this sample reproduced by the appellant according to the teaching of E1 fulfils the texture requirements of features M9 and M10 of claim 1 of the patent irrespective of the method used for processing the EBSD data.

The parameters defined in claim 1 are therefore implicitly disclosed by E1 in line with established case law such as T 1523/07 and T 1085/13 cited by the respondent.

1.3 The respondent argued that sample 17ELi05-N25M is not an accurate and slavish repetition of a specific example of E1, since

- the composition of the substrate differs,
- the thickness of the TiN and TiCN layers differs,
- it has not been demonstrated that the ratio of the intensities of (111), (200) and (220) peaks in the XRD spectrum is obtained as required by E1,
- the sample does not comprise an alumina layer as required by example 22.

Therefore in their opinion the reproduced sample 17ELi05-N25M was not to be taken into account for proving the implicit disclosure of E1 in line with established case law such as T 1236/03, T 909/04, T 885/02, T 437/14.

1.4 The Board agrees with the conclusions presented in the case law cited by the respondent that only a true repetition of an example of the prior art can be taken into account for proving that a parameter is implicitly met by an example of the prior art. However, the technical particularities of the specific example, the technical field and the practical implications thereof have to be taken into account.

In the present case, the Board concludes that sample 17ELi05-N25M is sufficiently close to example 22 of E1 to prove, that the texture parameters defined in features M9 and M10 of claim 1 are unambiguously fulfilled by said example.

1.4.1 The cutting tool according to example 22 comprises a cemented carbide substrate D having the composition 5.2 wt% Co, 2.5 wt% Ta, 1.70 wt% Ti, 0.3 wt% Nb and balance W+C (table 2 on page 12 of E1).

The composition of the substrate D is therefore very close to the composition of the substrate used for sample 17ELi05-N25M comprising 5.35 wt% Co, 2.70 wt% Ta, 1.80 wt% Ti, 0.42 wt% Nb and balance W+C. In terms of practical feasibility to repeat an example of the prior art, it is considered to be a true repetition of E1, since the differences in the composition are marginal. Moreover, taking into account that a further TiN layer is present between the substrate layer and the critical TiCN layer, it is also not credible that the minimal difference in the composition of the substrate has an influence on the texture of the TiCN layer due to a hypothetically possible diffusion of the Co into the subsequent layers.

1.4.2 Also the thickness of the TiN and the TiCN layers of the tool of example 22 of E1 and of sample 17ELi05-N25M differ only by 0.1 µm. These layers are applied by a CVD process where such differences in the coating thickness are unavoidable within normal experimental routines. Moreover, a marginal difference in the thickness cannot be expected to have any impact on the texture of the TiCN layer.

1.4.3 Annex 8 clearly indicates on page 1 that exactly the same coating conditions have been used as in E1 and refers explicitly also to the corresponding text passages in E1. Hence there is no reason to doubt that the texture required by E1 was obtained, since exactly the same CVD conditions, decisive for forming a specific texture, are used as described in E1.

Furthermore, E3 confirms in table II on page 635 that it is possible to achieve a TiCN layer having a (422) texture with the relative intensities of I(111) > I(220) > I(200) as required by E1. E3 therefore confirms that the texture determined for sample 17ELi05-N25M is not contradictory to the teaching of E1, contrary to the argument of the respondent.

1.4.4 Although required according to example 22 of E1, sample 17ELi05-N25M of Annex 8 does not comprise an upper layer of Al_2O_3 which has κ as its main form.

However a further coating of Al_2O_3 does not change the texture of the already formed TiCN layer. A further κ-Al_2O_3 coating is therefore not required to demonstrate that the previously formed TiCN layer of example 22 has the texture as defined in claim 1 of the patent.

1.5 In summary, the Board concludes that sample 17ELi05-N25M is a repetition of example 22 of E1 as far as it can be reasonably expected in the technical field of CVD coated cutting tools and credibly demonstrates that features M9 and M10 of claim 1 are implicitly met by example 22.

The ground of opposition pursuant to Article 100(a) EPC in combination with Article 54 EPC therefore prejudices the maintenance of the patent.

2. Auxiliary request 3 - Article 123(2) EPC

2.1 Claim 1 has been amended by limiting the range of the average layer thickness of the TiCN layer from "2.5 to 15 µm" to "5 to 7.5 µm" and by limiting the range for the position of the highest peak in the tilt-angle frequency distribution graph from "0 to 10°" to "3.5 to 7.0°".

These amendments to the parametric ranges in claim 1 are based on isolated values taken from examples 5 and 10 as originally filed, see table 5.

2.2 According to established case law, individual values disclosed in the examples of the application can be used for amending a parametric range, if the parameter is not closely associated with the other features of the example (Case Law of the Boards of Appeal, 9th edition, 2019, Chapter II.E.1.5.2).

This scenario applies to the present case.

The limitation of the range indicating the position of the highest peak in the tilt-angle frequency distribution graph represents merely a quantitative reduction of a range to a value already envisaged within the application. The thickness of the TiCN layer, which might have an influence on the texture of the TiCN layer, has been limited accordingly to the thickness of the corresponding examples 5 and 10.
The remaining features of the examples as summarized in table 5 as filed, such as the composition of the substrate, the type, number and thickness of Ti-containing inner layers do not appear to be structurally or functionally linked to the texture of the TiCN layer and thus to the position of the highest

peak in the tilt-angle frequency distribution graph. The examples as filed also do not provide any pointer, that the sum of frequencies in tilt angle sections ranging from 1 to 10° is functionally linked to the position of the highest peak in the tilt-angle frequency distribution graph. This is also not evident taking into account the common general knowledge nor has it been demonstrated by the appellant.

2.3 The appellant rather argued in this regard that the position of the highest peak in the tilt-angle frequency distribution graph is functionally linked to the cutting properties of the cutting tool.

The desired better cutting properties such as the chipping resistance are indeed linked to the position of the highest peak in the tilt-angle frequency distribution graph. However, the application as filed is based on this finding. Thus a limitation of the critical parameter range simply limits the scope of protection towards the best working examples already described therein but does not extend beyond the teaching as filed.

Moreover, the cutting properties represent the result to be achieved by the cutting tool defined in claim 1. They are neither technical features of the claim nor features of the examples which need to be adapted when focusing on cutting tool inserts having a TiCN layer defined by the limited range in regard to the position of the highest peak in the tilt-angle frequency distribution graph.

Hence, the argument of the appellant is not convincing.

2.4 The Board therefore concludes, that the amendments to claim 1 according to auxiliary request 3 fulfil the requirements of Article 123(2) EPC.

3. Auxiliary request 3 - Articles 83, 84 and 100(b) EPC

3.1 The opposition leading to the contested decision is based only on the ground of opposition pursuant to Article 100(a) EPC.

The objection concerning sufficiency of disclosure raised in the last paragraph on page 16 of the statement setting out the grounds of appeal and in point 1.4 of the letter dated 3 July 2018 has been submitted for the first time in the appeal proceedings. Therefore it constitutes a fresh ground of opposition.

The respondent did not give its consent to the introduction of a new ground of opposition into the proceedings (page 2, first paragraph of the statement in the letter of reply to the grounds of appeal dated 28 September 2017).

Hence, in line with the ruling in G 10/91, EPO OJ, 1993, 420 (headnote, point 3), the ground of opposition pursuant to Article 100(b) EPC cannot be discussed in appeal proceedings.

3.2 This applies even though the appellant considers that they could not raise this issue during the opposition proceedings since they allegedly became aware of it for the first time during the appeal proceedings as a result of the respondent's argumentation.

3.3 The appellant's argument concerning insufficiency of disclosure relates to the fact that the patent does not specify which of the two existing methods should be used for processing the EBSD data referred to by claim 1: "Pole Plot" or "Texture Component" mode. The position of the highest peak in the tilt-angle frequency distribution graph depends on the method for analysing the ESBD data as evidenced by the table on page 1 of Annex 9. The same applies to the total sum of frequencies existing in the range of 0° to 10°.

This deficiency would also imply a lack of clarity of claim 1.

3.4 The appellant considers that the amendments made to claim 1 would legitimate a discussion on lack of clarity and insufficiency of disclosure.

However, a patent may be examined for compliance with the requirements of Article 84 EPC only when, and then only to the extent that the amendments introduce non-compliance with Article 84 EPC, G 3/14, EPO OJ, 2015, A102.

In a similar manner, the above conclusion with respect to Article 100(b) EPC concerns the subject-matter of the claims of the patent as granted. It has also to be examined whether the amendments as such would introduce non-compliance with Article 83 EPC such that the skilled person would no longer be able to carry out the claimed invention.

3.5 The alleged insufficiency of disclosure and alleged lack of clarity resulting from the lack of information in regard to the method for determining the tilt-angle frequency distribution graph, even if they were to be acknowledged, were already present in the claims as granted, since the properties of the tilt-angle frequency distribution graph were defined in claim 1 as granted in exactly the same manner.

Changing merely the numerical end values for the ranges of the highest peak in the tilt-angle frequency distribution graph and of the TiCN layer thickness does not change the line of argument in regard to the alleged missing information concerning the method for analysing the ESBD data.

3.6 Hence, the objections of the appellant concerning lack of clarity and insufficiency of disclosure in regard to claim 1 of auxiliary request 3 are not linked to the specific amendments in claim 1 and therefore are not to be discussed in opposition appeal proceedings.

For these reasons, the objections under Article 84 and 83 EPC in regard to auxiliary request 3 are not admitted into the proceedings.

4. Auxiliary request 3 - Article 100(a) EPC in combination with Article 54 EPC

Claim 1 requires in features M9 and M10 that the cutting tool comprises a TiCN layer which has certain properties in the tilt-angle frequency distribution graph. In this context, claim 1 defines in feature M10 how this property is to be measured, namely the measurement takes place "in an area of 30x50µm".

However, since claim 1 is directed to a surface-coated cermet cutting tool, the skilled person would immediately have realised that the coating as a whole, i.e. in average, has to fulfil the requirements according to features M9 and M10. The definition that the actual measurement is performed in an area of

30x50µm does not imply that the whole TiCN layer is considered to have the required property if only in one single area of 30x50µm a corresponding parameter is fulfilled. This is neither defined by the claim nor does it correspond to the common understanding of a skilled person.

Consequently, contrary to the appellant's view, it cannot be concluded in view of the individual measurements shown in Annex 8a that the skilled person would inevitably arrive at a cutting tool as defined in claim 1 when reproducing example 22 of E1, since rather the average of the measurements shown on page 4 of Annex 8 has to be considered.

In this respect, using "Pole Plot" mode for the processing of the EBSD data, the TiCN layer of sample 17ELi05-N25M has the highest peak in the tilt-angle frequency distribution graph at 1.15° which is clearly outside the range indicated in claim 1 of auxiliary request 3.

Processing the EBSD data of the TiCN layer of sample 17ELi05-N25M in "Texture Component" mode, the appellant has demonstrated that the TiCN layer is characterized in that the highest peak in the tilt-angle frequency distribution graph on average is at 7.3°, which is also outside the range indicated in claim 1 of auxiliary request 3.

Hence it is not inevitable that the skilled person reproducing example 22 would obtain a cutting tool according to claim 1.

The subject-matter of claim 1 of auxiliary request 3 is therefore novel in view of E1.

5. Auxiliary request 3 - Article 100(a) EPC in combination with Article 56 EPC

E1, similar to the patent, aims at providing cutting tools for intermittent cutting of steel, see paragraph [0001] of E1 and the patent.

The Board therefore agrees with the argument of both parties that E1 is an appropriate starting point for the assessment of inventive step of the subject-matter of claim 1 of auxiliary request 3.

The subject-matter of claim 1 differs from the cutting tools disclosed in E1 in that the TiCN layer has properties in the tilt-angle frequency distribution graph as defined in features M9 of claim 1.

Table 7 of the patent demonstrates that a cutting tool comprising a TiCN layer as defined by claim 1 (examples 1, 3, 5, 10 and 11) achieves better chipping resistance during high speed-intermittent cutting than cutting tools comprising a conventional TiCN layer (comparative conventional examples 1 to 13) or cutting tools comprising a TiCN layer which does not show the highest peak in the tilt-angle frequency distribution graph at a position as defined in claim 1 (examples 2, 4, 6 to 9, 12 and 13).

The objective technical problem can therefore be seen as providing a cutting tool having an improved chipping resistance.

As already discussed above in point 1.2.1, E1 is based on the finding that the bonding strength of the TiCN layer with the Al_2O_3 layer increases and the wear resistance goes up, if the intensity of the (200) XRD peak is lower than the intensities of the (111) and (220) XRD peaks. E1 neither teaches nor provides any hint that the properties of the TiCN layer with respect to the tilt-angle frequency distribution graph in relation with a (422) texture obtained by EBSD have an influence on the chipping resistance and the cutting properties of the cutting tool.

This teaching is also not within the common general knowledge. Hence the skilled person would have no motivation or incentive to pay attention to the properties of the TiCN layer with respect to the tilt-angle frequency distribution graph in relation with a (422) texture, let alone to change the coating conditions to achieve a layer for which the highest peak in the tilt-angle frequency distribution graph is between 3.5 and 7°.

Therefore the subject-matter of claim 1 of auxiliary request 3 is not obvious when starting from E1.

6. Auxiliary request 3 - description

The respondent filed during the oral proceedings an adapted description to the claims of auxiliary request 3 against which neither the appellant nor the Board had objections.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division with the order to maintain the patent in the following version:
   - claims 1 to 5 filed as auxiliary request 3 with the reply to the grounds of appeal dated 28 September 2017,
   - description pages 2 to 13 filed at the oral proceedings before the Board on 25 February 2021 and
   - figures 1(a), 1(b), 2 and 3 of the patent specification.

The Registrar: The Chairman:

C. Spira G. Patton

Decision electronically authenticated