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D E C I S I O N
of 8 June 2006

Case Number: T 0161/05 - 3.2.06

Application Number: 95939822.3

Publication Number: 0800429

IPC: B23B 27/14

Language of the proceedings: EN

Title of invention:

Cutting insert having a chipbreaker for thin chips

Patentee:

KENNAMETAL INC.

Opponent:

Sandvik AB

Headword:

-

Relevant legal provisions:

EPC Art. 54(2), 56, 114(2)

Keyword:

"Novelty (yes)"
"Inventive step (yes)"
"Late-filed document - not admitted"

Decisions cited:

-

Catchword:

-



Case Number: T 0161/05 - 3.2.06

D E C I S I O N
of the Technical Board of Appeal 3.2.06
of 8 June 2006

Appellant: Sandvik AB
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Respondent: KENNAMATEL INC.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 23 December 2004
rejecting the opposition filed against European
patent No. 0800429 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: K. Garnett
Members: G. Pricolo
G. Kadner

Summary of Facts and Submissions

I. The appeal is from the decision of the Opposition Division posted on 23 December 2004 to reject the opposition filed against European patent No. 0 800 429, granted in respect of European patent application No. 95 939 822.3.

Claim 1 of the patent as granted reads as follows:

"1. A cutting insert (1) for cutting a workpiece (55) by removing chips (61) of material therefrom having an insert body (3) having a top surface (5) and a bottom surface (7) and a side relief surface (9) and a cutting edge (11) defined by an intersection of said top (5) and side (9) surfaces, and a chipbreaking means (23) for breaking chips (61) having a predetermined thickness formed by said cutting edge (11) including an elongated groove (25) disposed on said top surface (5) adjacent to said cutting edge (11), said groove (25) having a back wall (34) for curling and work-hardening said chips (61), said back being opposite said edge (11) and terminating at a point higher on said top surface than said edge, characterized by: a plurality of discrete recesses (27) axially spaced apart in said groove (25) having top edges for engaging and corrugating said chips (61) to facilitate chipbreaking including opposing side edges (43a,b) that are aligned orthogonally with respect to said cutting edge (11) for engaging and corrugating chips (61), and which traverse said back wall of said groove (25), wherein the width of said recesses (27) exceeds the width of said groove (25) for extending the length of said side edges (43a,b) and thereby increasing the amount of

corrugating engagement between said chips (61) and said side edges (43a,b) of said recesses (27)."

II. In coming to its decision the Opposition Division considered that the patent in suit was novel and involved an inventive step over the relevant prior art represented in particular by documents:

D1: US-A-4 215 957;

D2: US-A-4 335 984;

D3: EP-B-0 046 511;

D5: US-A-5 044 840;

of which document D1 was considered to represent the most relevant state of the art.

III. The appellant (opponent) lodged an appeal against this decision, received at the EPO on 7 February 2005, and simultaneously paid the appeal fee. With the statement setting out the grounds of appeal, received at the EPO on 26 April 2005, the appellant filed the additional document

US-A-5 074 720.

IV. In an annex to the summons for oral proceedings pursuant to Article 11(1) Rules of Procedure of the boards of appeal the Board expressed the preliminary opinion that the view expressed by the Opposition Division in the decision under appeal in respect of novelty appeared to be correct and that inventive step

would need to be discussed. Furthermore, the Board indicated that the late-filed document US-A-5 074 720 did not prima facie appear to be more relevant than D2: it likewise related to a cutting insert having recesses whose side edges were not orthogonally aligned with respect to the cutting edge. Accordingly, it appeared that the late-filed document should be disregarded pursuant to Article 114(2) EPC.

V. Oral proceedings took place on 8 June 2006.

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

The respondent (patentee) requested that the appeal be dismissed (main request) or alternatively that the patent be maintained on the basis of the first or second auxiliary requests filed with its letter of 2 May 2006.

VI. The arguments of the appellant can be summarized as follows:

D2 related to a cutting insert having chipbreaking means including a plurality of recesses adjacent the cutting edge and a groove extending from the corner of the insert to a first recess. D2 disclosed a further groove extending along the whole length of the cutting edge. The recesses extended beyond the back wall of this groove. Since the recesses were inclined with respect to the cutting edge in order to deflect the chips away from the workpiece, D2 disclosed all the features of claim 1 except the feature that the side edges of the recesses were aligned orthogonally with

respect to the cutting edge. D2 however related to an insert which was commercially used for turning operations, where it was useful to deflect the chips away from the workpiece. This was not the case for other machining operations, such as drilling. Therefore, starting from D2, the objective technical problem to be solved could be seen in adapting the cutting insert of D2 to other machining operations. D3 disclosed an insert which was commercially used for drilling and which was provided with recesses aligned orthogonally with respect to the cutting edge. Accordingly, the skilled person seeking to adapt the cutting insert of D2 to drilling operations would turn to D3 and modify the insert of D2 by providing recesses aligned orthogonally with respect to the cutting edge, thereby arriving in an obvious manner at the claimed subject-matter.

Alternatively, assuming that D1 represented the closest prior art and that the technical problem was to effectively break fine chips during fine cutting operations, as stated in the patent in suit, the skilled person would arrive at a cutting insert according to claim 1 having regard to the teaching of D3. Indeed, both D1 and D3 related to fine cutting operations and the latter showed that recesses aligned orthogonally with respect to the cutting edge were useful for that purpose. Moreover, in D3 the recesses were provided in a descending wall, which was analogous to a groove. Finally, the subject-matter of claim 1 was obvious in view of the combination of D2 and D5, the latter document disclosing depressions aligned orthogonally with respect to the cutting edge.

VII. In support of its main request the respondent relied essentially on the following submissions:

In accordance with the view of the Opposition Division in the decision under appeal, document D1 rather than document D2 represented the closest prior art. D2 did not disclose a groove in which the recesses were disposed. In D2 the chipbreaking groove extended from the corner of the insert to a first recess only. The appellant's reference to a further groove extending along the whole length of the cutting edge was incorrect. It was true that in the manufacturing process a grinding operation was carried out along the cutting edge of the insert. However, this grinding operation did not provide a groove but rather a step having perpendicular walls. The provision of such a step along each cutting edge resulted in the formation of a raised center of the insert, which enabled the protection of the cutting edges when inserts were stacked. Accordingly, the function of the step was not to facilitate chipbreaking. The chipbreaking-means configuration in accordance with the patent in suit, including a groove adjacent the cutting edge and a plurality of recesses traversing the back wall of the groove, was neither disclosed nor suggested by the available prior art and therefore the claimed subject-matter involved an inventive step.

Reasons for the Decision

1. The appeal is admissible.

2. *Prior art - novelty*

2.1 With the statement of grounds of appeal the appellant submitted that the subject-matter of claim 1 was not novel over D1 and D2. This objection was no longer maintained during the oral proceedings. The appellant indeed accepted that neither D1 nor D2 disclosed the feature of claim 1 according to which the recesses have opposing side edges aligned orthogonally with respect to the cutting edge.

However, this is not the only feature distinguishing the subject-matter of claim 1 from the cutting inserts according to D1 and D2, as shown by the following analysis of the relevant prior art disclosures.

2.2 Document D1

2.2.1 Using the wording of claim 1, D1 indisputedly discloses, in the embodiment of Fig. 6, a cutting insert for cutting a workpiece by removing chips of material therefrom having an insert body having a top surface (12A) and a bottom surface and a side relief surface (13 in Fig. 2) and a cutting edge (11 in Fig. 2) defined by an intersection of said top and side surfaces, and a chipbreaking means (20, col. 3, line 48) for breaking chips having a predetermined thickness formed by said cutting edge including an elongated groove (20) disposed on said top surface adjacent to said cutting edge, said groove (20) having a back wall (terminating at 12B) for curling and work-hardening said chips, said back being opposite said edge, the insert further comprising a plurality of discrete recesses (19) axially spaced apart in said groove (20)

having top edges for engaging and corrugating said chips (since the recesses are spaced part, the chips will be provided with a corrugation) to facilitate chipbreaking (col. 5, lines 1,2).

In agreement with the view expressed by the Opposition Division in the decision under appeal, D1 does not disclose, in this embodiment, the features of claim 1 that the recesses include opposing side edges that are aligned orthogonally with respect to said cutting edge for engaging and corrugating chips, and which traverse said back wall of said groove, wherein the width of said recesses exceeds the width of said groove for extending the length of said side edges and thereby increasing the amount of corrugating engagement between said chips and said side edges of said recesses.

Recesses (18) including opposing side edges that are (essentially) aligned orthogonally with respect to the cutting edge are shown in the separate embodiment of Figs. 4 and 5. However, no chipbreaking groove is provided in that embodiment.

- 2.2.2 The appellant submitted that the feature of claim 1 according to which "the width of the recesses exceeds the width of said groove" could also be understood as implying that the total width of the recesses exceeded the width of the groove, which was certainly the case for the insert shown in Fig. 6 of D1. In the Board's view, however, the claim can only be understood as implying that the **width of each recess** (as seen in the width direction of the groove, i.e. perpendicular to the cutting edge) exceeds the width of the groove. The appellant's interpretation does not find any support in

the patent in suit, wherein a specific wording ("a combined length" in dependent claim 5; "the aggregate width" in col. 5, line 25 of the description) is used to identify the total width of the recesses.

Furthermore, contrary to the appellant's opinion, D1 does not disclose that the back wall of the groove terminates at a point on the top surface of the insert which is higher than the cutting edge. This feature cannot be directly and unambiguously derived from the passage of D1 (col. 3, lines 49-50), also referred to by the Opposition Division, according to which "*the grooves (20) can be formed so that a positive, neutral or negative rake face is obtained*". In fact, the inclination of the rake face does not necessarily imply a particular position of the edges 12B in relation to the cutting edge (as seen in a cross-section of the insert such as in Fig. 2 or 3 of D1).

2.3 Document D2

2.3.1 Using the wording of claim 1, D2 discloses (see Figs. 1 and 2) a cutting insert for cutting a workpiece by removing chips of material therefrom having an insert body having a top surface (66) and a bottom surface and a side relief surface and a cutting edge (48) defined by an intersection of said top and side surfaces, and a chipbreaking means for breaking chips having a predetermined thickness formed by said cutting edge including an elongated groove (46) disposed on said top surface adjacent to said cutting edge, said groove having a back wall (50) for curling and work-hardening said chips, said back being opposite said edge and terminating at a point higher on said top surface than

said edge (see col. 3, lines 40 to 43), the insert further comprising a plurality of discrete recesses (56, 58, 62) axially spaced apart having top edges for engaging and corrugating said chips (col. 1, lines 50 to 57) to facilitate chipbreaking including opposing side edges for engaging and corrugating chips.

D2 does not disclose that the side edges of the recesses are aligned orthogonally with respect to said cutting edge. In fact, D2 teaches that the longitudinal axes of the recesses (depressions 56, 58, 62) intersect the cutting edge at an acute angle in order to deflect the chip away from the workpiece (see col. 1, lines 53 to 57).

D2 further does not disclose that the recesses are disposed in the chipbreaking groove and that the width of said recesses exceeds the width of said groove for extending the length of said side edges. Indeed, the groove (46) extends from a finishing depression (20), provided at the insert corner, to a first recess (56; see col. 3, lines 8 to 10), i.e. it terminates where the plurality of recesses begins.

2.3.2 The appellant referred to the continuous line adjacent the cutting edge shown in the drawings of D2 and submitted that this line represented the edge of the back wall of a chipbreaking groove. The line referred to by the appellant is obtained, in accordance with the teaching of D2 on col. 4, lines 4 to 11, as a result of a grinding operation necessary for forming an edge-protecting island constituted by a raised central portion on the insert (see col. 3, lines 40 to 43). The purpose of the edge-protecting island is to protect the

cutting edges if inserts are stacked or placed upon hard surfaces prior to use (col. 3, lines 41, 42). Since the grinding operation is carried out with a cylindrical grinding wheel having the axis of rotation parallel to the rake face (40) of the insert (see Fig. 4 and col. 4, lines 6 to 11), it results in a step having a first surface parallel to the rake face (40) and a second surface slanted thereto. This step has neither the form of a groove (i.e. of a channel) nor the function of breaking chips. Accordingly, it does not correspond to a groove of the chipbreaking means of the cutting insert.

2.4 As regards the other available prior art, the following is observed:

2.4.1 D3 discloses (see Figs. 1 and 2) a cutting insert having chipbreaking means including a plurality of axially spaced apart discrete recesses (18) having top edges for engaging and corrugating chips to facilitate chipbreaking, including opposing side edges that are aligned orthogonally with respect to the cutting edge (17) (see column 2, lines 45 to 49; col. 4, lines 9 to 13).

D3 discloses that the insert is provided with a planar descending wall (20) extending inwardly from a land area (21), until it meets a planar floor (22) that extends toward the centre of the insert (see col. 2, lines 50 to 57). The appellant referred to the descending wall (20) and the planar floor (22) as constituting a chipbreaking groove. However, these two portions of the insert do not form the shape of a groove, nor could they perform the function of breaking

chips. In fact, according to the teaching of D3, this function is only performed by the recesses (18, see col. 4, lines 20 to 29).

2.4.2 D5 discloses (see Fig. 1, 4) a cutting insert having a chipbreaking groove constituted by a number of concave depressions (14a, 14b) intersecting each other (see col. 3, lines 13 to 22). Since the groove is formed by a continuous sequence of depressions, D5 does not disclose a groove in which a plurality of discrete, axially spaced apart recesses are provided.

2.4.3 None of the remaining prior art available to the Opposition Division discloses a cutting insert having chipbreaking means comprising an elongated groove disposed adjacent to the cutting edge and a plurality of discrete recesses axially spaced apart in said groove including opposing side edges that are aligned orthogonally with respect to said cutting edge. The subject-matter of claim 1 is therefore novel in respect of the cited prior art.

2.5 *The late-filed document*

Document US-A-5074720 was filed with the grounds of appeal only and must therefore be regarded as late filed. The Board takes the view as expressed and explained in the communication annexed to the summons for oral proceedings (cf. under IV above), which view was not contested by the appellant, that this document is not *prima facie* more relevant than the prior art already on file. The late-filed document is therefore disregarded pursuant to Article 114(2) EPC.

3. *Inventive step*

3.1 The problem underlying the patent in suit is to provide a cutting insert having a chipbreaker configuration that effectively breaks thin chips generated as a result of fine-cutting operations (see par. [0006] and [0007] of the patent in suit).

3.2 Although the appellant's argument that D1 and D2 both relate to inserts for fine-cutting operations (see in particular D1: col. 3, line 66; D2: col. 2, line 43) can be accepted, it is document D1 which is representative of the closest prior art. Amongst all the cited documents (see under 2 above), D1 is indeed the one that, in the embodiment of Fig. 6, discloses a chipbreaking configuration which, by having a plurality of discrete recesses axially spaced in a groove, has the most similarities with that of the insert according to claim 1 of the patent in suit.

3.2.1 The features distinguishing the subject-matter of claim 1 from the cutting insert of D1 (see under 2.2 above), namely:

the back wall of the groove terminates at a point on the top surface of the insert which is higher than the cutting edge; and

the recesses include opposing side edges that are aligned orthogonally with respect to the cutting edge for engaging and corrugating chips, and which traverse said back wall of said groove; and

wherein the width of said recesses exceeds the width of said groove for extending the length of said side edges and thereby increasing the amount of corrugating

engagement between said chips and said side edges of said recesses;

result, in use, in a combination of corrugating and curling forces that effectively work-hardens thin foil-like chips generated during a fine-cutting operation, thereby embrittling them and causing them to continuously break into small segments that are easily expelled from the vicinity of the cutting operation (see paragraph [0007] of the patent in suit).

Accordingly, starting from the closest prior art disclosed by D1, the cutting insert in accordance with claim 1 of the patent in suit effectively solves the objective problem posed. This was not contested by the appellant.

3.2.2 The solution to the above-mentioned problem in accordance with claim 1 of the patent in suit is not obvious in the light of the prior art. None of the cited documents discloses or suggests, in a chipbreaking means having axially spaced apart recesses in an elongated groove as in D1, opposing side edges of the recesses which are aligned orthogonally with respect to the cutting edge and which traverse the back wall of said groove such that the width of said recesses exceeds the width of said groove.

Recesses which are substantially orthogonal to the cutting edges are shown in the embodiment of Figs. 4 and 5 of D1 and in D3, where the chipbreaking means does not include a groove. Since the teaching of D1 is restricted to the provision of recesses which do not extend beyond the back wall of the groove (see Fig. 6),

even if the skilled person would have considered the provision of such orthogonal recesses in the embodiment of Fig. 6 of D1, there is no reason why he should have considered the provision of recesses extending beyond the back wall of the groove. The other documents D2 and D5 referred to by the appellant do not include any useful indications to that effect, since D2 does not disclose a groove as a constituent feature of the chipbreaking means (see above point 2.3) and D5 discloses a groove formed by a series of depressions, but which is not provided with a plurality of discrete recesses axially spaced apart (see point 2.4.2 above).

3.3 For these reasons, the subject-matter of claim 1 involves an inventive step.

4. Therefore, the Opposition Division's decision to reject the opposition must, in effect, be confirmed.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar:

The Chairman:

M. Patin

K. Garnett