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# Datasheet for the decision of 20 October 2009

**Case Number:** T 0791/07 - 3.2.06

**Application Number:** 01102973.3

**Publication Number:** 1129806

**IPC:** B23C 5/00

**Language of the proceedings:** EN

**Title of invention:**
Machining tool

**Patentee:**
Sandvik Intellectual Property AB

**Opponent:**
ISCAR LTD

**Headword:**
-

**Relevant legal provisions:**
-

**Relevant legal provisions (EPC 1973):**
EPC Art. 54(2), 56

**Keyword:**
"Novelty (yes)"
"Inventive step (yes)"

**Decisions cited:**
-

**Catchword:**
-

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**Case Number:** T 0791/07 - 3.2.06

# D E C I S I O N
**of the Technical Board of Appeal 3.2.06**
**of 20 October 2009**

**Appellant**: (Opponent)
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**Decision under appeal:**
**Interlocutory decision of the Opposition Division of the European Patent Office posted 27 February 2007 concerning maintenance of European patent No. 1129806 in amended form.**

**Composition of the Board:**

**Chairman:** P. Alting van Geusau
**Members:** G. Pricolo
K. Garnett

## Summary of Facts and Submissions

I. The appeal stems from the interlocutory decision of the Opposition Division posted on 27 February 2007 maintaining European patent No. 1 129 806 in amended form on the basis of the fourth auxiliary request filed at the oral proceedings.

Claim 1 according to this request reads as follows:

"1. Tool for chip removing machining, including a rotatable head (1) having an envelope surface (2) extending rotationally symmetrically around a central, geometrical axis of rotation (C) and an end surface (5) extending transverse to said axis, as well as a plurality of tangentially spaced-apart cutting inserts (11) in connection with chip spaces (9) formed in a circumferential edge portion (8) in the transition between the envelope surface (2) and the end surface (5), whereby the head includes, on the one hand, an internal, central main duct (7) which has the purpose of receiving a cooling and/or lubricating fluid from outside, and, on the other hand, a number of branch ducts (12) corresponding to the number of cutting inserts (11) and chip spaces (9) with the purpose of individually leading out said fluid from the main duct towards the different cutting inserts, whereby the main duct (7) extends up to and ports into said end surface (5) and that each individual branch duct consists of a groove (12), at least initially open outwards, formed in the end surface (5), which groove extends from the port of the main duct (7) up to the individual chip space (9), whereby an outer end (14) of the duct is situated in front of the cutting insert (11) as seen in

the direction of rotation of the tool, characterized in that the side surfaces (16) of the individual groove being mutually parallel and oblique in relation to the axis of rotation of the tool, or the side surfaces (16) of the individual groove diverging from the end surface (5) of the tool head (1) in the direction of the common bottom surface (17)."

II. The Opposition Division held that the subject-matter of this claim was novel and involved an inventive step over the prior art including documents:

E2 : US-A-4 302 135;

E8 : DE-A-19 711 938;

E9 : US-A-960 526.

III. The opponent (appellant) lodged an appeal against the decision of the Opposition Division on 8 May 2007. The payment of the appeal fee was recorded on the same day. The statement setting out the grounds of appeal was received at the EPO on 6 July 2007.

IV. In the communication accompanying the summons to oral proceedings, the Board expressed the preliminary opinion that the claimed subject-matter was novel over E2 because the latter did not disclose the features defined in the characterizing portion of claim 1. As regards inventive step, the Board stated that it had to be discussed what was the objective technical problem solved when starting from E2 as the closest prior art.

V. Oral proceedings, at the end of which the decision of the Board was announced, took place on 20 October 2009.

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

The respondent (patentee) filed an amended set of claims numbered 1 to 11, with claim 1 being identical to claim 1 as maintained by the Opposition Division, and an amended description consisting of columns 1 to 8. The respondent requested that the decision under appeal be set aside and the patent be maintained on the basis of the set of claims filed during the oral proceedings.

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

The Opposition Division considered that the two alternatives recited in the characterizing portion of claim 1 solved the problem of providing a tool which was able to direct the requisite fluid to the different cutting inserts in an effective and powerful manner so as to optimize the cooling and/or lubricating effect of the fluid. However, it was clear from the patent specification that the specific shape of the individual grooves and particularly the orientation of the side surfaces did not contribute to solving this problem. The patent specification disclosed that the individual grooves and their spaced-apart side surfaces might have almost any conceivable shape or orientation without indicating that a specific shape or orientation would bring with it specific technical advantages. The features of the characterizing portion of claim 1 thus constituted an arbitrary selection amongst the limited

choice of possible shapes and orientations of the side surfaces. E2, which disclosed a tool in accordance with the preamble of claim 1 of the patent in suit, referred to the need to control the amount of cooling fluid escaping from the open side of the grooves and taught that the specific configuration of the grooves might be varied. Accordingly, the arbitrarily selected inclinations of the side surfaces of the grooves defined in the characterizing portion of claim 1 were implicitly disclosed by E2. In any case, claim 1 lacked an inventive step in the light of the disclosure of E2. E2 was silent about a specific configuration of the grooves and disclosed that the specific configuration of the grooves might be varied. Accordingly, the skilled person would be faced with the problem of finding an appropriate geometry for the grooves. It was immediately apparent that appropriate geometries involved not only grooves with side surfaces parallel to the axis of rotation of the tool, but also grooves with side surfaces oblique in relation thereto. In fact, since it was clear for the skilled person that the cross-section of the groove was determining for the flow characteristics of the coolant, the disclosure in E2 that the specific configuration of the grooves might be varied clearly indicated to the skilled person that the cross-section of the groove could be modified. The manufacture of a groove having side surfaces oblique in relation to the axis of rotation of the tool was certainly not more complex than the manufacture of a groove whose side surfaces were parallel to the axis of rotation of the tool. The specific geometries of the grooves recited in claim 1 did not provide any advantages over other possible geometries. The effect invoked by the respondent, that the claimed groove

configurations allowed a precise control of the amount of cooling fluid escaping from the end face of the tool, was achieved by any groove configuration. Furthermore, the claim was silent about any specific details of the geometry allowing such precise control, such as the degree of inclination of the side surfaces. Clearly, with a very small inclination of the side surfaces, which was encompassed by claim 1, no technical effect would be achieved as compared to a groove with no inclination of the side surfaces. In any case, the person skilled in the art wishing to control, i.e. to limit the outflow of coolant from the open side of the groove, was aware of the fact that the orientation of a surface moving relative to a fluid influenced the direction of flow of the fluid. This was known for instance from fan blades, which propelled air in a specific direction. Specific examples of the application of this principle in the field of tools for chip-removing machining were to be found in documents E8 and

E11 : US-A-5 941 664.

Based on this common general knowledge it was clear for the skilled person that the orientation of the side surfaces of the groove had an influence on the direction of flow of the coolant. Accordingly, he would choose an appropriate orientation of the side surfaces, in particular one preventing an excess outflow of cooling liquid from the open side of the grooves. This orientation was obviously an oblique orientation tending to lead or direct the fluid away from the end surface of the tool.

Finally, document E9, which related to rotary cutters such as milling cutters, disclosed various shapes for radial grooves suitable for directing a fluid from a central main duct towards radially arranged inserts. E9 disclosed in particular a groove with diverging side surfaces. Accordingly, claim 1 lacked inventive step in view of a combination of the teachings of E2 and E9.

VII. The arguments of the respondent may be summarized as follows:

As stated by the Opposition Division in the decision under appeal, the objective technical problem solved in the light of the closest prior art E2 consisted in controlling the amount of cooling fluid escaping from the end face of the tool. There was no hint in E2 that this problem would be solved by a suitable inclination of the side surfaces of the grooves, as defined in claim 1. The general disclosure in E2 that the specific configuration of the grooves might be varied did not constitute a suggestion to provide inclined side surfaces. Since the grooves shown in E2 were shallow, the skilled person would not even consider such a measure. There were many possible modifications of the configuration of the grooves that did not involve inclining the side surfaces thereof. Moreover, the skilled person faced with the problem of controlling the amount of cooling fluid escaping from the end face of the tool would not necessarily consider modifying the configuration of the groove; he would rather consider other, more easily implementable options, such as changing the nature of the fluid.

E9 disclosed a rotary cutter in which grooves with diverging side surfaces were provided at the cutting edges. However, the grooves were not located at the end surface of the tool. Instead they were distributed along the cylindrical envelope surface of the tool where they provided nicks preventing chips from becoming too large in the longitudinal direction of the tool. The diverging side surfaces of the grooves served to support the cutting corners of the nicks. Accordingly, the skilled person would not be prompted by E9 to provide the grooves of the tool according to E2 with diverging side surfaces.

## Reasons for the Decision

1. The appeal is admissible.

2. *Amendments*

2.1 During the oral proceedings before the Board, the respondent amended the patent documents as allowed by the Opposition Division in response to the Board's objection according to which dependent claims 4 and 5, which referred to "widening grooves", were inconsistent with the alternative of claim 1 according to which the side surfaces of the individual grooves were "mutually parallel", and in response to the appellant's objection that not all the aims of the invention mentioned in paragraph [0005] of the description were achieved when taking document E2 as the starting point.

The amendments made by the respondent to overcome these objections consisted of deleting dependent claims 4 and

5 and renumbering the subsequent dependent claims, and deleting two sentences in paragraph [0005] of the description. Claim 1 is identical to claim 1 as allowed by the Opposition Division.

Since they consist only of deleting two dependent claims and a passage of the description, the amendments made do not give rise to objections under Articles 123(2) or (3) EPC.

3. *Novelty*

3.1 It is not disputed that Document E2 discloses a tool according to the preamble of claim 1, namely (see Figs. 1 and 2) a tool for chip removing machining, including a rotatable head (A) having an envelope surface extending rotationally symmetrically around a central, geometrical axis of rotation (16) and an end surface (14) extending transverse to said axis, as well as a plurality of tangentially spaced-apart cutting inserts (B) in connection with chip spaces (30, 32, 34, 36) formed in a circumferential edge portion (20) in the transition between the envelope surface and the end surface, whereby the head includes, on the one hand, an internal, central main duct (50) which has the purpose of receiving a cooling and/or lubricating fluid from outside, and, on the other hand, a number of branch ducts (54) corresponding to the number of cutting inserts and chip spaces with the purpose of individually leading out said fluid from the main duct towards the different cutting inserts, whereby the main duct (50) extends up to and ports into said end surface (14) and that each individual branch duct consists of a groove (54) open outwards, formed in the end surface

(14), which groove extends from the port of the main duct (50) up to the individual chip space, whereby an outer end (14) of the duct (i.e. the branch duct 54) is situated in front of the cutting insert (B) as seen in the direction of rotation of the tool (see in particular col. 3, l. 64 - col. 4, l. 4 and col. 5, l. 49 - col. 6, l. 2).

3.2 Figures 1 and 2 of E2 are a side view and an end view, respectively, of the cutting tool. In these figures the grooves 54 are represented with straight lines and the end surface 14 of the tool is planar. This means that the grooves extend longitudinally along a straight line and that the depth of each groove is constant along its length. A specific cross-section of the grooves cannot however be inferred from the figures. The side surfaces might well be planar and parallel to the axis of rotation 16 (the grooves having e.g. a substantially rectangular cross- section), or non parallel (e.g. diverging from the end surface 14 in the direction of the shank 18), or curved (the grooves having e.g. a round cross-section). Further details about the configuration of the side surfaces of the grooves cannot be inferred from the description either, since the latter only discloses that "*other configurations and specific locations for branches 54 may be advantageously utilized*" (col. 4, l. 6-10) and that "*the specific configuration of radial branches 54 may be varied*" (see col. 6, l. 49-52) and therefore leaves open how the grooves are shaped in cross-section.

3.3 The appellant submitted that the above-mentioned statements in the description constituted implicit disclosures of grooves having side surfaces mutually

parallel and oblique in relation to the axis of rotation of the tool. However, the appellant's interpretation of these statements is based on hindsight. Saying that the configuration of the radial branches may be varied does not necessarily imply that it is the configuration of the side surfaces of the grooves that should be varied. In fact, there are many possibilities when varying the configuration of the radial branches irrespective of the configuration of the side surfaces of the grooves: as compared to the grooves shown in Fig. 2, the grooves could be curved rather than straight, they could have a different offset from the centre of the tool, they could have a greater, smaller or even a varying depth. Moreover, the configuration of the radial branches could be varied by varying the cross-section of the groove. This does not necessarily involve providing side surfaces that are mutually parallel and oblique, or diverging, since also square, rectangular or rounded cross-sections constitute technically feasible options.

3.4 Therefore, E2 does not disclose the features defined in the preamble of claim 1 according to which the side surfaces of the individual grooves are mutually parallel and oblique in relation to the axis of rotation of the tool, or the side surfaces of the individual grooves diverge from the end surface of the tool head in the direction of the common bottom surface.

3.5 The Appellant did not challenge novelty on the basis of the other documents cited during opposition proceedings.

4. *Inventive step*

4.1 The closest prior art in respect of the subject-matter of claim 1 is undisputedly represented by a tool according to document E2.

4.2 According to the first alternative of claim 1, the side surfaces of the individual grooves are oblique in relation to the axis of rotation of the tool. As explained in the patent in suit (see col. 5, l. 4 to 16), when the tool is rotated the fluid is pressed rearwards towards the rear side surface and at the same time is slung radially outwards by the centrifugal force. Thus the oblique rear side surface, in particular, will influence the fluid flow. For a given amount of fluid supplied through the central main duct, the amount of fluid reaching the chip spaces and the amount of fluid flowing outwardly from the open grooves can be varied depending on the degree and direction of inclination of the rear side surface. An analogous effect is achieved with the second alternative of claim 1, which is not limited to both side surfaces being oblique but also includes the case in which one side surface is parallel to the axis of rotation of the tool and the other is oblique. Here the amount of fluid reaching the chip spaces and the amount of fluid flowing outwardly from the open grooves can be varied depending on the degree of divergence and the direction of inclination of the rear side surface. It is correct, as pointed out by the appellant, that claim 1 does not specify the degree of inclination of the side surfaces or the depth of the grooves. Nonetheless the technical teaching of the claim is of a qualitative rather than a quantitative nature and, in any case, it is clear that

the characterizing features must be such as to produce an appreciable technical effect (this means, in particular, that there must be a certain degree of inclination which is greater than e.g. an inclination of the side surfaces due to manufacturing tolerances and which has technically no significance). Therefore, the assessment of the objective technical problem made by the Opposition Division, namely controlling the amount of cooling fluid escaping from the end face of a tool with grooves in the end face (see page 8 of the decision under appeal), is correct.

4.3 An essential aspect of the appellant's submissions in respect of lack of inventive step is that the disclosure in E2 that the configuration of the radial branches can be varied would suggest, to the skilled person faced with the above-mentioned technical problem, the provision of grooves with oblique side surface(s). The provision of inclined side surfaces is indeed a possibility for varying the configuration of the radial branches. However, as explained above, there are many possibilities when varying the configuration of the radial branches other than the provision of mutually parallel and oblique or diverging side surfaces as required by claim 1 of the patent in suit. In fact, the relevant question is whether the skilled person would, rather than could, consider providing inclined side surfaces to solve the technical problem.

In the passage of E2 on col. 5, l. 63 ff., referred to by the appellant, it is disclosed that "*...since branches 54 and insert flow channels 90 comprise open grooves in the preferred arrangement, there will be some coolant flow outwardly therefrom. Nevertheless,*

*coolant is advantageously supplied directly and indirectly to the inserts themselves and along the coolant flow channels included therein...*". E2 thus explicitly discloses that there is a certain amount of fluid reaching the chip spaces and a certain amount of fluid flowing outwardly from the open grooves. However, contrary to the appellant's opinion, there is no link in E2 between this disclosure and the disclosure that the specific configuration (and location) of the radial branches may be varied. In fact, the disclosure of varying the configuration of the radial branches does not necessarily imply that the purpose of this measure is to control the amount of fluid reaching the chip spaces and the amount of fluid flowing outwardly from the open grooves. Other purposes are plausible, such as directing the coolant towards the inserts in a different direction than that shown in the figures of E2, or adapting the radial branches to cooperate with inserts other than those shown in the figures of E2. The disclosure of E2 would not, therefore, directly prompt the skilled person to solve the technical problem by varying the configuration of the radial branches.

Assuming however that the skilled person would consider varying the configuration of the radial branches in order to solve the technical problem, there is no suggestion in E2 that the orientation of the side surfaces of the grooves would contribute significantly to controlling the amount of cooling fluid escaping from the end face of the tool. In fact, there is no reason for the skilled person to consider that the provision of oblique walls would result in any advantages, because the grooves shown in the figures

are relatively short and shallow. Moreover, the provision of grooves with inclined side surfaces is technically more complex than the provision of grooves perpendicular to the end surface 14 of the tool according to E2 (this is true also for a groove having oblique and mutually parallel side surfaces, as the cutting, e.g. milling operation, required for manufacturing a groove which is perpendicular to the plane of an object is generally more delicate than the cutting operation required for manufacturing a groove inclined with respect to the plane), and the skilled person would not consider a more complex technical option if he could not reasonably expect any substantial advantages therefrom. Nor it is immediately apparent to make a connection between the side walls of the grooves and the blades of fans, compressors or turbines, as the function of the grooves in E2 is to guide the fluid to the inserts and not to impart any particular properties to the fluid flow, in particular accelerate the fluid, such as shown in E11. In this document (see Fig. 3) impeller blades 58 are provided for receiving and pressurizing a coolant stream (see col. 5, l. 45 - 49). Similarly, in E8 (see Fig. 1) blades 18 are provided to generate a flow of cooling air towards the cutting zone (see col. 2, l. 43-51).

The appellant also referred to E9. This document discloses (see Figs. 1 - 8) a milling cutter having a main duct f and radially extending holes h. In Fig. 12, the holes have diverging side walls. The holes, or nicks, which intersect the teeth (see page 1, l. 106-11), have diverging side walls only to better support the cutting corners of the nicks (see page 3, l. 47 to 72). Accordingly, there is nothing in E9 which would

suggest to the skilled person that the shape of the grooves shown in Fig. 12 would provide a solution to the above-mentioned technical problem.

5. It follows from the above that the appellant's arguments do not succeed in persuading the Board that the Opposition Division's conclusions in respect of the subject-matter of claim 1 as regards novelty and inventive step were incorrect. Therefore claim 1, together with dependent claims 2 to 11, the amended description filed at the oral proceedings, and the drawings as granted, form a suitable basis for maintenance of the patent in amended form.

## 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 on the basis of:

(a) Claims 1 to 11 according to the request filed during oral proceedings;
(b) The amended description columns 1 to 8 as filed during the oral proceedings;
(c) Figures 1 to 13 as granted.

The Registrar: The Chairman:

M. Patin P. Alting van Geusau