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**Datasheet for the decision  
of 26 May 2021**

**Case Number:** T 1478/19 - 3.2.01

**Application Number:** 12193804.7

**Publication Number:** 2735400

**IPC:** B23Q17/09, B23F23/00

**Language of the proceedings:** EN

**Title of invention:**

An arrangement for controlling the process of rotary chip removing machining of a workpiece, and a cutting tool for rotary chip removing machining

**Applicant:**

Sandvik Intellectual Property AB

**Headword:**

**Relevant legal provisions:**

EPC Art. 84, 123(2), 52(1), 54, 111(1)  
RPBA 2020 Art. 11

**Keyword:**

Claims - clarity (yes)

Amendments - added subject-matter (no)

Novelty - (yes)

Remittal - special reasons for remittal

**Decisions cited:**

**Catchword:**



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Case Number: T 1478/19 - 3.2.01

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.01**  
**of 26 May 2021**

**Appellant:** Sandvik Intellectual Property AB  
(Applicant) 811 81 Sandviken (SE)

**Representative:** Sandvik  
Sandvik Intellectual Property AB  
811 81 Sandviken (SE)

**Decision under appeal:** **Decision of the Examining Division of the European Patent Office posted on 19 December 2018 refusing European patent application No. 12193804.7 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** G. Pricolo  
**Members:** V. Vinci  
A. Jimenez

## **Summary of Facts and Submissions**

I. The appeal was filed by the appellant (applicant) against the decision of the examining division to refuse the European patent application EP 12 193 804.

II. In the decision under appeal the examining division found that the subject-matter of the independent claims 1 and 8 of the sole request on file submitted in preparation for the oral proceedings lacked novelty pursuant to Articles 52(1) and 54 EPC in view of the following prior art:

D1: DE 102 27 677 A1

III. With a communication according to Rule 100(2) EPC dated 24 April 2020 the Board informed the appellant of its preliminary assessment of the case.

IV. Oral proceedings pursuant to Article 116 EPC were held before the Board on 26 May 2021 by videoconference.

V. The appellant requested that the decision under appeal be set aside and that the case be remitted to the examining division for further prosecution on the basis of the main request filed during the oral proceedings.

VI. Independent claim 1 of the main request reads as follows:

*"An arrangement for controlling the process of rotary chip removing machining of a workpiece (W), wherein the arrangement comprises a monitoring system for monitoring the rotary chip removing machining, wherein the arrangement comprises at least one cutting tool (1;*

101; 201), wherein the monitoring system comprises at least one surface acoustic wave sensor (48; 148; 248) mounted to the cutting tool (1; 101; 201) for rotary chip removing machining of the workpiece (W), wherein each surface acoustic wave sensor is arranged to detect at least one parameter of a group of parameters consisting of strain, temperature and pressure, wherein the at least one surface acoustic wave sensor (48; 148; 248) is mounted to the cutting tool at a position where the at least one parameter is detected, wherein the at least one surface acoustic wave sensor (48; 148; 248) is mounted

- on a cutting insert or on a shim, or

- adjacent to at least one cutting edge or at least one seat for detecting parameters related to the cutting edge, or

- on a shaft of the cutting tool or on one end portion of the cutting tool for detecting parameters related to deflection or bending of the cutting tool, or

- adjacent to a cooling fluid channel providing cooling fluid for detecting parameters related to the cooling, e.g. the pressure of the cooling fluid, or

- on at least one seat surface of at least one seat for detecting parameters related to the cutting insert,

wherein the monitoring system comprises at least one first antenna (50; 150; 250) mounted to the cutting tool, the at least one first antenna being connectable to the at least one surface acoustic wave sensor,

*wherein the monitoring system comprises at least one second antenna (52), the at least one first antenna being arranged for wireless communication with the at least one second antenna, wherein the at least one surface acoustic wave sensor and the at least one first antenna are arranged to transmit the detected at least one parameter to the second antenna in response to an interrogation signal received by the first antenna from the second antenna, wherein the at least one surface acoustic wave sensor and the at least one first antenna are arranged to receive energy from the interrogation signal in order to transmit the detected at least one parameter to the second antenna, wherein the monitoring system comprises a processing unit (60) connected to the at least one second antenna, wherein the processing unit is arranged to transmit the interrogation signal and transmission energy to the at least one first antenna and to the at least one surface acoustic wave sensor via the at least one second antenna, wherein the processing unit is arranged to receive the detected at least one parameter via the at least one second antenna, wherein the arrangement comprises a control system (62) arranged to communicate with the monitoring system, wherein the control system is arranged to control the rotary chip removing machining of the workpiece at least partially based on the detected at least one parameter, and wherein the cutting tool comprises a tool body (40; 140; 240) which is connectable to a holder or a rotatable spindle, the tool body defining a center axis (C1; C4; C5) and being provided with at least one cutting edge (42; 142; 242) or at least one seat (19; 119) for receiving a cutting insert (20; 120) having at least one cutting edge (42; 142; 242)."*

Independent claim 8 of the main request reads as

follows:

*"A cutting tool (1; 101; 201) for use in an arrangement according to any one of the claims 1 to 7, the cutting tool comprising a tool body (40; 140; 240) which is connectable to a holder or a rotatable spindle, the tool body defining a center axis (C1; C4; C5) and being provided with at least one cutting edge (42; 142; 242) or at least one seat (19; 119) for receiving a cutting insert (20; 120) having at least one cutting edge (42; 142; 242), wherein the cutting tool is provided with at least one surface acoustic wave sensor (48; 148; 248) and at least one first antenna (50; 150; 250) connectable to the at least one surface acoustic wave sensor, the at least one first antenna being arranged for wireless communication with at least one second antenna (52), wherein each surface acoustic wave sensor is arranged to detect at least one parameter of a group of parameters consisting of strain, temperature and pressure, wherein the at least one surface acoustic wave sensor (48; 148; 248) is mounted to the cutting tool at a position where the at least one parameter is detected, wherein the at least one surface acoustic wave sensor (48; 148; 248) is mounted*

*- on the cutting insert or on a shim provided between the cutting insert and a seat surface, or*

*- adjacent to the at least one cutting edge or the at least one seat for detecting parameters related to the cutting edge, or*

*- on a shaft of the cutting tool or on one end portion of the cutting tool for detecting parameters related to deflection or bending of the cutting tool, or*

- adjacent to a cooling fluid channel providing cooling fluid for detecting parameters related to the cooling, e.g. the pressure of the cooling fluid, or

- on at least one seat surface of the at least one seat for detecting parameters related to the cutting insert,

wherein the at least one surface acoustic wave sensor and the at least one first antenna are arranged to transmit the detected at least one parameter to the second antenna in response to an interrogation signal received by the first antenna from the second antenna, and wherein the at least one surface acoustic wave sensor and the at least one first antenna are arranged to receive energy from the interrogation signal in order to transmit the detected at least one parameter to the second antenna."

## **Reasons for the Decision**

### **Admissibility of the main request**

1. The main requested has been filed in reaction to an objection under Article 84 EPC raised for the first time by the Board during oral proceedings in respect of the expressions "*in close proximity*" and "*where the at least one parameter is mostly efficiently detected*" of claims 1 and 8 of the main request. These expression were already present in the corresponding independent claims underlying the decision under appeal and of the



auxiliary requests III filed with the statement of the grounds of appeal. The fact that this objection has not been raised by the examining division in the decision under appeal nor by the Board in the communication pursuant to Rule 100(2) EPC is regarded as an exceptional circumstance of the appeal proceedings justifying the submission of the amended main request at this late stage of the proceedings, whereby this submission is to be considered as a legitimate reaction of the appellant to the objection of the Board in a fair attempt to restore compliance with the requirements of Article 84 EPC.

- 1.1 In view of the above considerations the main request filed at the oral proceedings is admitted to the appeal proceedings (Article 13(1) and (2) RPBA 2020).

**Article 84 EPC**

2. The Board considers that the proposed amendment to claims 1 and 8 overcomes the objection of lack of clarity raised during the oral proceedings, thereby clarifying that the mounting of the at least one surface acoustic wave sensor (hereinafter referred to as SAW sensor) to the cutting tool take place at a position where the at least one parameter is detected.

- 2.1 As no further issues of clarity being apparent, the Board concludes that the subject-matter of the independent claims 1 and 8 meets the requirements of Article 84 EPC.

**Article 123(2) EPC**

3. The subject-matter of independent claims 1 and 8 of the main request is based on claims 1 and 8 as originally filed amended by including the feature that the at least one SAW sensor is mounted to the cutting tool at a position where the at least one parameter is detected, and by specifying the different alternative locations where the SAW sensor/s can be located. In the Board's view these features are directly and unambiguously disclosed for example on page 5, lines 32 to 35 and on page 9, line 18 to page 10 line 15 of the originally filed description respectively. Furthermore, it has been specified in claim 1 that the claimed arrangement comprises at least one cutting tool as originally disclosed for example in claim 16 as filed.
- 3.1 The subject-matter of claims 1 and 8 of the main request thus meets the requirements of Article 123(2) EPC.

**Novelty: Article 52(1) and 54 EPC**

4. The subject-matter of claims 1 and 8 of the main request is novel in the meaning of Articles 52(1) and 54 EPC.
5. The examining division came to the conclusion that the subject-matter of claim 1 and 8 underlying the contested decision lacked novelty in view of document D1. In particular it was argued that SAW sensor (S2) provided in the arrangement disclosed in this prior art document was also arranged to detect at least one parameter of a group of parameters consisting of strain and temperature as required by the independent claims at stake (reference was made to paragraph [0055] of the

description of D1). This contested feature is also included in claims 1 and 8 of the main request at stake.

- 5.1 The Board judges that the subject-matter of claim 1 according to the appellant's request in appeal proceedings is novel over D1 for the following reasons:

There is no passage in D1 from which a person skilled in the art could directly and unambiguously derive that the SAW sensor (S2) is arranged to detect strain, temperature or pressure at a position where it is mounted to the cutting tool. From the passage of paragraph [0055] of D1 (see lines 45-49) cited in the decision under appeal it can be only derived that changes in the characteristics of a wiring (2), which is connected to the SAW sensor (S2) and is not part thereof, due to wear or deformation which take place at the cutting edge of the cutting insert, or e.g. due to changes in the properties of the wiring (2) caused by temperature, will be monitored/detected by the SAW sensor (S2) and transmitted to the primary monitoring unit (S1).

- 5.2 As convincingly explained by the appellant during the oral proceedings, D1 discloses in fact a passive SAW sensor (S2) and a separate conductive wiring (2) coupled to an interference transducer (14) of the SAW sensor (see for example figure 3). D1 aims at providing a correct and reliable monitoring of the (wear) conditions at the cutting edge where the wiring (2) is provided, and thus what is detected according to the teaching of D1 are the changes of the characteristics of the wiring. Any parameters at the location where the SAW sensor is provided are of no interest in D1. Actually, the skilled person would rather consider that

the control signal derived from the changes in the characteristics of the wiring (2) and sent back from the SAW sensor (S2) to the primary monitoring unit (S1) should not be perturbed by any change of physical parameters (for example strain, temperature and pressure) which might affect the piezoelectric substrate (12) of the SAW sensor (S2). This rather suggests that the SAW sensor (S2) should be mounted to the cutting tool at a position where such physical parameters do not change, and this in order to avoid any influence on the piezoelectric substrate which might affect the control signal to be transmitted to the primary monitoring unit (S1). In any case, physical parameters such as strain, temperature and pressure which might affect the piezoelectric substrate of the SAW sensor of D1 are anyway not detected simply for the fact that there is no teaching in D1 concerning how to distinguish changes in the piezoelectric substrate of the SAW sensor from changes in the characteristics of the wiring.

- 5.3 In conclusion, the subject-matter of claims 1 and 8 of the main request differs from the technical content of D1 in that:

*"each surface acoustic wave sensor is arranged to detect at least one parameter of a group of parameters consisting of strain, temperature and pressure, wherein*

*the at least one surface acoustic wave sensor is mounted to the cutting tool at a position where the at least one parameter is detected",*

and is thus novel in view of document D1.

5.4 No further novelty attack has been raised by the examining division and the Board cannot identify any other available prior art document disclosing the combination of the features of independent claims 1 and 8 of the main request.

**Remittal of the case pursuant to Article 111 EPC**

5.5 Inventive step has been assessed by the examining division only in respect of dependent claims 3, 5-6, 7 and 11 to 15 underlying the contested decision. The Board observes that the features now introduced in the independent claims 1 and 8 of the main request are not derived from these dependent claims, but essentially from the description only. These circumstances are considered to represent "special reasons" in the meaning of Article 11 RPBA justifying a remittal of the case to the first instance department for further prosecution under Article 111(1) EPC as requested by the appellant, namely for assessing inventive step.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the examining division for further prosecution.

The Registrar:

The Chairman:



A. Vottner

G. Pricolo

Decision electronically authenticated