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Datasheet for the decision of 5 October 2020

Case Number: T 0534/17 - 3.4.02

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Title of invention:
Cross-sectional profile measuring method

Patent Proprietor:
Mitutoyo Corporation

Opponent:
Carl Zeiss Industrielle Messtechnik GmbH

Relevant legal provisions:
EPC Art. 54(1), 56, 100(a), 100(c)

Keyword:
Added subject-matter (no)
Novelty and inventive step (yes)

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Case Number: T 0534/17 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 5 October 2020

Appellant: (Opponent)	Carl Zeiss Industrielle Messtechnik GmbH Carl Zeiss Strasse 22 73447 Oberkochen (DE)
Representative:	Witte, Weller & Partner Patentanwälte mbB Postfach 10 54 62 70047 Stuttgart (DE)
Respondent: (Patent Proprietor)	Mitutoyo Corporation 20-1, Sakado 1-chome Takatsu-ku Kawasaki-shi, Kanagawa 213-8533 (JP)
Representative:	Gill Jennings & Every LLP The Broadgate Tower 20 Primrose Street London EC2A 2ES (GB)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 8 December 2016 rejecting the opposition filed against European patent No. 2527782 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	R. Bekkering
Members:	F. J. Narganes-Quijano
	B. Müller

Summary of Facts and Submissions

I. The opponent lodged an appeal against the decision of the opposition division rejecting the opposition against European patent No. 2527782.

The opposition filed by the appellant against the patent as a whole was based on the grounds for opposition of added subject-matter (Article 100(c) EPC) and lack of novelty and of inventive step (Article 100(a), together with Articles 52(1), 54(1) and 56 EPC).

II. The following documents cited during the first-instance opposition proceedings have been considered by the parties during the appeal proceedings:

D1: DVD with the YouTube video "Carl Zeiss Scanning Technology", *youtube.com/watch?=v=XqtVzAqWHFw*, 29 June 2009, together with a screen dump of the video dated 7 May 2015 (document D1a), a printed sequence of pictures of the video starting at 4:59 (document D1b, 331 pages), and an affidavit by J. Lewis dated 18 June 2015

D2: US 2008 0189969 A1

D3: US 2010 0050837 A1

D4: US 2008 0083127 A1

D5: US 2009 0299692 A1

D6: US 2005 0132591 A1

D7: US 2008 0021672 A1

D8: "Koordinatenmeßtechnik", A. Weckenmann *et al.*; Carl Hanser Verlag, 1999; three bibliographic pages, and pages 116, 117 and 252

D9: "Erfassungsstrategie zur Ermittlung des Paarungsmaßes an zylindrischen Oberflächen für die mechanische Antastung", M. Gerlach; Dissertation, Technische Universität Chemnitz, 2008, pages 1 to 146, together with an extract of the catalog of the "Bibliothek der TU Chemnitz" (document D9a).

III. In its decision the opposition division held that

- the subject-matter of the patent did not extend beyond the content of the application as originally filed (Article 100(c) EPC), and
- the subject-matter of the claims as granted was new (Article 54(1) EPC), in particular over documents D1 and D2, and involved an inventive step (Article 56 EPC), in particular in view of
  - the combination of document D1 with either one of documents D6 and D7,
  - the combination of document D2 with either one of documents D1, D7, D8 and D9,
  - the combination of any one of documents D3 and D4 with either one of documents D5 and D6, and
  - the combination of any one of documents D6 and D8 with document D2.

IV. Oral proceedings before the board were held on 5 October 2020.

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

The respondent (patent proprietor) requested that the appeal be dismissed (main request) or that the decision under appeal be set aside and the patent be maintained in amended form on the basis of the claims according to

the first to third auxiliary requests, all filed with a letter dated 21 August 2017.

At the end of the oral proceedings the chairman announced the decision of the board.

V. Claim 1 of the patent as granted (main request) reads as follows:

"A cross-sectional profile measuring method of measuring cross-sectional profiles (F1, F2, ...) of an object (30) at plural measurement sections (S1, S2, ...) of the object (30) with a contact probe (17), the method comprising:

moving the probe (17) along a route around a circumference of the object (30) at one of the measurement sections (S1, S2, ...), a distance of the moving being longer than the circumference of the object (30) by a predetermined overlapping range; and

moving the probe (17) to next one of the measurement sections (S1, S2, ...) in a movement direction oblique to a direction (L) in which the cross-sectional profiles (F1, F2, ...) are adjacent to one another to offset a distance corresponding to the overlapping range."

The claims of the patent as granted also include dependent claims 2 and 3 referring back to claim 1.

Reasons for the Decision

1. The appeal is admissible.

2. *Main request - Article 100(c) EPC*

2.1 The appellant has submitted that, contrary to the opposition division's view, the omission in claim 1 as granted of the term "circularly" in the feature "circularly moving the probe (7) along a route around a circumference of the object" of claim 1 as originally filed constituted an unallowable generalization of the content of the application as originally filed (Article 100(c) EPC).

2.1.1 According to a first argument of the appellant the omission of the term "circularly" in claim 1 extended the circular shape of the motion of the probe to arbitrary shapes, and there was no basis in the application as originally filed for this generalization.

The board notes that in the embodiment disclosed in the application as originally filed with reference to Fig. 2 and relating to a cylindrical body the probe is circularly moved along a route around a circumference of the body. However, according to the description as originally filed the method of the invention is also applicable to a "turbine blade" (Fig. 4, and page 12, lines 18 to 20), to "elongated articles", and "to any object like a block or a lump" (page 12, lines 21 to 23). The skilled person would therefore understand that in the case of these alternative applications the probe would still be generally moved along a route around a circumference of the body (see lines S1 and S2 in Fig. 4) as required by claim 1 of the application as originally filed, but that the probe would generally no longer be moved "circularly" as specified in claim 1 as originally filed.

In addition, contrary to the appellant's submissions, the deletion of the term "circularly" does not have the effect that the subject-matter of claim 1 is extended to arbitrary movements of the probe around the object because, as submitted by the respondent, the claim does not only require the movement of the probe along a route around the object at one of the measurement sections, but specifically "along a route around a circumference of the object" at the measurement section. In the opinion of the board the person skilled in the technical field under consideration would understand this feature in the context of the claimed method as referring to a movement of the probe along a route around a linear perimeter of the object, and therefore along a closed "straight" line in the sense referred to by the appellant, i.e. in the sense that the route would be seen as a straight line when viewed from the side of the object. In particular, the movement of the probe "along a route around a circumference of the object" excludes, as submitted by the respondent, movements along a route having a zigzag or stepped shape departing from the mentioned closed "straight" line, and also excludes movements along a spiral route of the type mentioned by the appellant with reference to Fig. 23 on page 42 of document D9 and with reference to the passage on page 2, lines 10 to 12, of the application as originally filed and relating to the prior art, and movements in a serpentine manner of the type mentioned by the appellant with reference to the passage on page 1, lines 13 to 16, of the application as originally filed and also relating to the prior art. Therefore, notwithstanding the deletion of the term "circularly" - and independently of the parties' submissions relating to the question of whether the claimed "measurement sections" consist or

not of cross-sections defined by the intersection of the object with a plane -, claim 1 as granted still implicitly requires - as submitted by the respondent - that the movement of the probe is along a closed "straight" line in the sense mentioned above.

2.1.2 According to a second argument of the appellant the term "circularly" of claim 1 as originally filed, together with the disclosure of the application as originally filed relating to the embodiment of Fig. 2 involving a cylindrical body, implied that the cross-sectional profiles to be measured according to the claimed method were orthogonal to the elongation axis L of the cylindrical body. The deletion of the term "circularly" in claim 1 therefore had the effect of omitting this condition implicit in claim 1 as originally filed so that the cross-sectional profiles could be tilted with respect to the elongation axis, and also the effect of omitting any relationship between the cross-sectional profiles and the shape of the body, thus resulting in an unallowable generalization.

The board, however, does not find this argument persuasive either. As noted by the appellant, in the embodiment of Fig. 2 the probe is circularly moved and the planes of the cross-sectional profiles F1 and F2 and of the measurement sections S1 and S2 are orthogonal to the direction L of elongation of the cylindrical body, this direction being coincident with the direction L in which the cross-sectional profiles are adjacent to one another. However, these features are specific to this embodiment, and the mere fact that in this specific embodiment encompassed by claim 1 as originally filed the object has an elongated cylindrical shape and the cross-sectional profiles and

the measurement sections S1 and S2 are orthogonal to the direction L of elongation of the body does not *per se* imply that these features - and in particular the elongated shape of the body - are a requirement implicit in the subject-matter of claim 1 as originally filed.

In addition, the fact that claim 1 as originally filed requires "circularly" moving the probe does not imply that the claim implicitly requires that the cross-sectional profiles to be measured are orthogonal to an elongation axis of the body because claim 1 as originally filed is not restricted to objects having an elongated shape, or to cross-sectional profiles and/or measurement sections orthogonal to a direction of elongation of the object. In any case, claim 1 as originally filed is relatively broad and it already encompasses embodiments involving an object having a shape such that all the claimed features (in particular, the circular motion of the probe around a circumference of the object at measurement sections of the object, and the cross-sectional profiles being adjacent to one another in a predetermined direction) are satisfied, without however fulfilling the conditions mentioned by the appellant. This is in particular the case, for instance,

- when the claimed body has the shape of an elongated cylinder with an ellipsoidal base (i.e. with an elliptic cross-section in a plane orthogonal to the axis of the cylinder), it being noted that in this case the cross-section of the cylinder body in each of a series of parallel planes perpendicular to a direction having a predetermined inclination with respect to the axis of the prism is circular, and also
- when the claimed object has a generally non-elongated and irregular serpentine shape having a

circular cross-section in each of a series of parallel planes.

For these reasons, the omission of the term "circularly" in the claimed subject-matter does not cause the generalization by way of omission of the implicit requirement referred to by the appellant because the mentioned requirement is not implicit in claim 1 as originally filed.

2.2 In view of all these considerations, the board concludes that the subject-matter of claim 1 as granted constitutes a generalization of the subject-matter of claim 1 as originally filed that is directly and unambiguously derivable from the content of the application as originally filed, and that therefore the subject-matter of the patent as granted does not extend beyond the content of the application as originally filed within the meaning of Article 100(c) EPC.

3. *Main request - Novelty*

3.1 The appellant has also disputed the opposition division's finding that the subject-matter of claim 1 was new over the video shown in D1 and over document D2.

3.2 Video D1

3.2.1 It has been undisputed on appeal that the video D1 was rendered available to the public before the priority date of the contested patent and that the video (see in particular the sequence starting at time 4:59 of the video and the corresponding screen shots shown in document D1b) displays the movement of a probe along a

circumference of the inner cylindrical surface of a hollow object followed by a movement on the mentioned cylindrical surface in a direction oblique to the elongated axis of the cylindrical surface, and subsequently followed by a movement of the probe along a second circumference of the cylindrical surface. It is also undisputed that the probe moves along the first of the mentioned circumferences of the cylindrical surface a distance longer than the length of the circumference by an overlapping range, and that the mentioned oblique movement moves the probe to offset a predetermined distance.

However, claim 1 requires that the probe is moved in a movement in the oblique direction "to offset a distance corresponding to the overlapping range", and in the video D1 the magnitude of the oblique movement is not sufficient to offset a distance corresponding to the overlapping range because the offsetting distance is substantially different from - and in particular, as held by the opposition division, smaller than - the length of the overlapping range. Therefore, the mentioned claimed requirement is not satisfied by the movement shown in the video D1.

3.2.2 The appellant has contested this view and has submitted that the claimed feature "moving the probe [...] to offset a distance corresponding to the overlapping range" was not necessarily to be interpreted in the sense that the offsetting distance was exactly equal to the overlapping range in view of the fact that the overlapping range was defined in claim 1 as "a distance [...] longer than the circumference of the object (30) by a predetermined overlapping range". More particularly, the appellant has submitted that the overlapping range was defined in claim 1 as "a

distance" and the offset was then subsequently also defined in the claim as "a distance", and not as "the distance" corresponding to the overlapping range, with the consequence that the two distances were not necessarily exactly the same, but only approximately. For these reasons, the last of the features of claim 1 would, according to the appellant, not allow to directly and unambiguously distinguish the claimed method over the method shown in the video D1 in which these two distances were approximately the same.

The board, however, does not find this argument persuasive because, as submitted by the respondent, the use of the indefinite article "a" in the expression "to offset a distance corresponding to the overlapping range" qualifies the distance in the second of the measurements sections referred to in claim 1 as constituting "a" distance, this distance corresponding in length to the distance of the overlap in the first of the measurement sections. The skilled person would therefore read claim 1 in its technical context as requiring that the offsetting distance corresponds in length to the overlapping range, and this requirement is, as noted above, not derivable from the movement of the probe shown in the video D1.

3.2.3 The appellant has also submitted that in the video D1 the starting points in the movement of the probe in each of the first and the second of the mentioned circumferences of the inner cylindrical surface were positioned at least approximately parallel to the elongation axis of the cylindrical surface, and that this arrangement was sufficient to inherently satisfy the claimed requirement mentioned above. However, as submitted by the respondent, the mentioned starting points are shown in the video substantially displaced

from the arrangement mentioned by the appellant, and already for this reason the appellant's argument cannot be followed.

3.2.4 Therefore, the method of claim 1 is new over the method shown in the video D1 at least in that the probe, by virtue of the claimed movement in an oblique direction, is offset a distance corresponding to the overlapping range.

3.3 Document D2 (Fig. 2)

3.3.1 Document D2 discloses a method of probing a workpiece comprising scanning a surface of the workpiece with a probe (abstract).

3.3.2 The appellant has referred to the spiral scanning of the surface of the workpiece disclosed in document D2 with reference to Fig. 2 (paragraph [0030]) and has submitted that the probe was first moved from point 81 to point X and then from point X to point Z of the spiral (see re-labelled copy of Fig. 2 on page 12 of the notice of opposition), and that this movement satisfied the features of the first and the second moving steps defined in claim 1.

The board first notes that in Fig. 2 of document D2 the probe is moved along a route corresponding to the spiral on the surface of the object for the purposes of scanning and measuring the object (abstract), but that the document does not specifically disclose the measurement and/or the determination of cross-sectional profiles as required by the claimed method. The fact that, as submitted by the appellant with reference to the common general knowledge exemplified by document D9 (section 2.7.1.1 on pages 40 to 43, and Fig. 22 and

23), the cross-sectional profiles of an object might be determined (for instance, by computation, possibly involving interpolation) on the basis of a spiral scanning of the object of the type disclosed in document D2 is not pertinent to the issue of novelty because document D2 is silent as to the determination of the cross-sectional profiles of the object. Therefore, already for this reason the method of claim 1 is new over the disclosure of document D2.

In addition, the spiral path disclosed in document D2 is a regular spiral having a predetermined pitch (half the value of "2h" in Fig. 2), and - contrary to the appellant's submissions - this spiral cannot realistically be considered as a mere deviation from a set of parallel circumferences, each of the circumferences being connected to the adjacent ones by segments of a spiral. In particular, the fact that the description of the patent specification (see also dependent claim 3 as granted) discloses the correction of measurement errors resulting from deviations from a closed loop of the probe movement defined in claim 1, i.e. from misalignments between the start and end points of the movement of the probe (see Fig. 3 and paragraphs [0053] to [0056] of the patent specification), does not mean that the method of claim 1 extends to methods substantially departing from the features actually claimed, at least not to the extent of also encompassing the movement of the probe along a regular spiral having a predetermined, finite pitch as that disclosed in document D2.

3.3.3 The appellant has also submitted - as an argument subordinated to the argument considered in point 3.3.2 above and found unconvincing by the board - that the path segment Lv shown in Fig. 2 of document D2 could be

considered to constitute a scanning measurement path, that the angle α could take a bigger value than that shown in Fig. 2, and in particular a value of 720°, that the path segment Lv would then cover twice the periphery of the object - i.e. a first time corresponding to a measurement and a second time determining an overlap range of 360° -, and that the path from point 75 to point 77 and the subsequent path segment Ln - which can also be much bigger than represented in Fig. 2 and define a movement along the whole periphery of the object - would then correspond, respectively, to an oblique movement and to a second cross-sectional measurement as claimed.

However, this argument relies on a specific scanning path configuration that is not disclosed in document D2. In particular, while document D2 discloses a radius of 25 mm for the cylindrical object (see Table 3, together with paragraph [0046]), the configuration mentioned by the appellant would require, as already noted by the opposition division in its decision by reference to the formula in paragraph [0047] of document D2, a choice of a radius for the object of 5 mm, and this value is not disclosed in document D2. Therefore, also for these reasons the appellant's submissions in respect of Fig. 2 of document D2 fail to convince the board.

3.3.4 As a consequence, the method of claim 1 is new over the disclosure of document D2.

3.4 The board concludes that the method of claim 1 as granted is new over the prior art referred to by the appellant (Articles 52(1) and 54(1) EPC). The same conclusion applies to dependent claims 2 and 3 as granted.

4. *Main request - Inventive step*

4.1 The appellant has also disputed the opposition division's view that the method of claim 1 involved an inventive step. In particular, the appellant has submitted that the method of claim 1 did not involve an inventive step in respect of document D1 alone, and also in respect of the combination of document D1 with document D6 or document D7, and the combination of either one of documents D5, D6 and D8 with document D2 (Fig. 5 and 6). However, none of the appellant's arguments are found persuasive for the following reasons:

4.1.1 Video D1 alone

The appellant has submitted that the distinguishing feature of claim 1 over the video shown in D1 (see point 3.2.4 above) did not bring about a technical effect and that for this reason the claimed method did not involve an inventive step. More particularly, the appellant has submitted that the claimed value of the offsetting distance and also the effect mentioned in the patent specification and relating to the alignment of the scanning start points (paragraph [0017] of the patent specification) only constituted a technically arbitrary selection, and in any case an obvious selection among a limited number of possibilities.

However, according to the patent specification the distinguishing feature mentioned above results in the scanning start points at the different scanning cycles to be aligned with respect to each other (paragraph [0017]), and, as submitted by the respondent, the

corresponding scanning and measurement configuration reduces the computational complexity in the processing of the measurement data (see paragraph [0013] of the patent specification). Therefore, the claimed method does achieve a technical effect and solves the objective technical problem of reducing the computational complexity in the processing of the measurement data. In addition, as noted by the respondent, there is no teaching provided by the video D1 as to the reasons for the offset movement shown in the video and the technical significance thereof, and the skilled person would have no motivation to consider modifications of the movements shown in the video.

For these reasons, the distinguishing feature under consideration is, contrary to the appellant's submissions, not technically arbitrary, but solves a technical problem, and in the absence in the video D1 of any technical teaching that would suggest the mentioned feature, the method of claim 1 involves an inventive step when considering the video D1 alone.

4.1.2 Video D1 in combination with document D6

With reference to Fig. 10 document D6 discloses the scanning of the surface of a workpiece having a cylindrical tube shape by rotating the workpiece with respect to a detector so as to collect circle data (see paragraph [0089]). The scanning is performed circularly in different parallel planes, and the scanning start points in the different planes are aligned in the direction (Z) of the axis of the cylindrical workpiece (Fig. 10 and paragraph [0090]).

According to the appellant the skilled person would apply the teaching of document D2 to the scanning

movement shown in the video D1 and would align the scanning start points in the different scanning cycles in the direction of the axis of the cylindrical hollow surface of the body, this alignment requiring offsetting the probe as claimed.

However, document D6 discloses how the scanning is performed in the different parallel planes, but - as submitted by the respondent - the document is silent as to a scanning movement with an overlapping range of the type shown in the video D1 and therefore the document provides no teaching as to how to move between adjacent scanning cycles each involving an overlapping range. In addition, as also submitted by the respondent, in the absence of any teaching in the video D1 relating to the technical significance of performing scanning cycles with an overlapping range and of moving the probe between scanning cycles in an oblique direction, the application of the teaching of document D6 to the scanning movement shown in the video D1 would, at the most, suggest the skilled person to start and end each of the scanning cycles shown in the video at the same point and to translate the probe from each end point to the start point of the subsequent scanning cycle in the most direct route, i.e. in the direction of the axis of the cylindrical hollow surface, and this approach would require neither the claimed overlapping range, nor the claimed oblique movement, nor the claimed offsetting distance.

Therefore, the claimed method is not obvious in view of the combination of the video D1 with the disclosure of document D6.

4.1.3 Video D1 in combination with document D7

Document D7 discloses scanning a cylindrical object with a surface scanning probe, and in a particular embodiment a side portion of the surface of the object is scanned by the probe along a zigzag or spiral route extending along a direction parallel to an axis of rotation (Fig. 3 and paragraph [0042]).

The appellant submitted that the vertices or edges of the spiral route (Fig. 3) constituted an arrangement of scanning start points aligned in the direction of the axis of rotation and that it would be obvious to the skilled person to apply this teaching to the movement shown in the video D1.

However, the alignment of the edge scanning points shown in Fig. 3 of document D7 results from an oscillatory rotational movement (see "rotated a part revolution" in paragraph [0042], page 2, right column, lines 15 to 18) of the probe relative to a side portion of the surface of the body, and this arrangement is not consistent with the full rotational scanning movement of the type shown in document D1 and involving closed scanning circles around a cylindrical surface. In particular, the mentioned embodiment of document D7 (see Fig. 3) does not concern cross-sectional measurements of the object. In addition, there is no specific disclosure in document D7 relating to a technical effect or advantage associated with the mentioned alignment of edges of a spiral route that would suggest the skilled person to extract this feature from its technical context and to incorporate it in the arrangement shown in the video D1. Therefore, the board sees no reason why the skilled person would consider document D7 when considering the objective problem to be solved (point 4.1.1 above, second paragraph). As submitted by the respondent, it is not

even clear how the disclosure of document D7 might be combined with the scanning movement shown in the video D1 so as to result in the claimed method.

Therefore, the claimed method is not obvious in view of the video D1 and document D7.

4.1.4 Document D8 in combination with document D2 (Fig. 5 and 6)

Document D8 is a textbook on coordinate measurement techniques and discloses scanning the surface of a cylindrical body along each of a series of parallel circles (Table 4.4 on page 117).

With reference to Fig. 5 and 6 document D2 discloses the introduction of an overlapping range (see angles α and γ in Fig. 5 and 6) in each of the circular scanning measurement cycles of a cylindrical body (paragraphs [0049] to [0051]).

According to the appellant, the overlapping range disclosed in document D2 improved the scanning measurement of the cylindrical body, and the skilled person would consider the application of this teaching to the scanning measurement method disclosed in document D8 in order to improve the precision in the measurement. In addition, the probe would necessarily have to be moved from each scanning circle to the next one and, since the probe moved in each scanning circle from a start point 81 to an end point 87 shifted from point 81 by the overlapping range (see Fig. 5 and 6), the probe would have to be moved from point 87 of a first scanning cycle to point 81 of the subsequent scanning cycle, and therefore in an oblique direction satisfying the claimed conditions.

However, as noted by the opposition division in its decision, documents D2 and D8 are silent as to how the probe is moved between scanning cycles and also silent as to any aligned arrangement of the scanning start points in the sequence of scanning cycles. In addition, as submitted by the respondent, there is no indication in either one of documents D2 and D8 that would suggest an oblique movement of the probe between scanning cycles to offset a distance corresponding to the overlapping range disclosed in document D2. The board also notes in this respect that Fig. 5 and 6 of document D2 and the corresponding description in paragraphs [0049] to [0051] only disclose the route of the probe for one single scanning closed circle (Fig. 5 and 6) starting and ending at points outside the surface of the body ("intermediate point" 79 and "intermediate point" 89, respectively) and the document is silent as to how the probe is moved from one scanning cycle to the next one; therefore, the application of the teaching of document D2 to document D8 would, at the most, result in the probe being moved along an indeterminate route between intermediate points located outside the surface of the body and corresponding to adjacent scanning cycles, and neither document D2 nor document D8 nor the combination of these documents would suggest to the skilled person specifically moving the probe as claimed.

For these reasons, the claimed method is also not obvious over a combination of document D8 with document D2.

4.1.5 Document D6 in combination with document D2 (Fig. 5 and 6)

The appellant has also submitted that, in view of the disclosure of document D6 relating to the circular scanning of a body in different parallel planes (see point 4.1.2 above, first paragraph) and the teaching of document D2 relating to the introduction of an overlapping range in each of a series of circular scans (Fig. 5 and 6, and point 4.1.4 above, second paragraph), the skilled person would consider the application of the teaching of document D2 to the scanning method disclosed in document D6 for the purpose of improving the precision in the measurement. According to the appellant, this approach would inevitably lead to a movement of the probe between two scanning circles along an oblique direction as claimed.

However, as held by the opposition division in its decision and as also submitted by the respondent, there is no indication in document D6 that would suggest oblique movements of the probe or an alignment of the start points of different circular scanning cycles. In addition, assuming that the skilled person would consider the introduction of the overlapping ranges disclosed in document D2 into the circular scans of document D6, there is no disclosure in document D2 or in document D6 as to how the probe would then be moved between the corresponding scanning cycles; see also in this respect the considerations in point 4.1.4 above, fourth paragraph.

Therefore, the claimed method is not obvious in view of a combination of the disclosure of document D6 and the teaching of document D2.

4.1.6 Document D5 in combination with document D2 (Fig. 5 and 6)

Document D5 discloses scanning the surface of a body with a probe along a series of parallel circles, the probe being moved from one parallel circle to the next one in the direction orthogonal to the plane of the circles (Fig. 4A and paragraphs [0061] to [0063]).

The appellant has submitted that the claimed method was rendered obvious by the combination of the disclosure of document D5 with the teaching of document D2 relating to the introduction of an overlapping range in each of a series of circular scans (Fig. 5 and 6, see point 4.1.4 above, second paragraph) when considering the problem of the improvement of the precision in the measurement. According to the appellant, this approach would inevitably lead to a movement of the probe between two scanning circles not in the direction orthogonal to the planes of the circles as in document D5, but along an oblique direction as claimed. In particular, document D2 already taught avoiding oscillations caused by abrupt movements of the probe (paragraphs [0032] and [0035]), and in this context the skilled person would discard movements of the probe in the direction orthogonal to the plane of the scanning circle after completion of each scanning cycle in order to avoid abrupt movements of the probe that would induce unwanted oscillations.

However, assuming that the skilled person would consider the introduction of the overlapping ranges disclosed in document D2 into the scanning cycles of the method disclosed in document D5, the skilled person would be confronted with the problem of how to move the probe from one scanning circle to the next one. As submitted by the respondent, the skilled person would then consider moving the probe either directly - i.e. in the direction orthogonal to the plane of the

scanning circles - to the next scanning circle as taught in document D5, or directly away from the surface of the body to the intermediate position 89 disclosed in document D2 (see point 4.1.4 above, fourth paragraph) and then to the intermediate position 79 of the next scanning cycle before the probe is then again brought into contact with the surface of the body, and there is no indication in documents D2 and D5 that would suggest the skilled person to depart from these possibilities and to move the probe between two scanning circles specifically in a movement direction oblique to the direction orthogonal to the plane of the scanning circles, let alone to an extent such as to offset the probe a distance corresponding to the length of the overlapping range (see also the considerations in point 4.1.4, fourth paragraph).

As regards the further argument submitted by the appellant during the oral proceedings that claim 1 was not restricted to movements of the probe in contact with the object, the board notes that the claim requires moving the probe "to next one of the measurement sections [...] in a movement direction oblique to a direction (L) in which the cross-sectional profiles [...] are adjacent to one another" and that, as already noted above, this specific movement is neither disclosed in, nor results in an obvious from the combination of, documents D5 and D2.

Therefore, the claimed method does not result in an obvious way from the combination of the disclosure of document D5 with the teaching of document D2.

4.2 In the statement of grounds of appeal the appellant also contested the opposition division's view in respect of inventive step of the claimed method over

the combination of the disclosure of document D2 relating to Fig. 5 and 6 with any of documents D1, D7 (Fig. 3), D8 (Table 4.4 on page 117) and D9 (Fig. 23), the combination of the disclosure of document D2 relating to Fig. 2 with document D9 (Fig. 23 on page 42), and the combination of any of documents D3 (Fig. 6) and D4 (Fig. 26 to 28) with document D5 (Fig. 4A) or document D6 (see decision under appeal, reasons for the decision, points 43 to 51).

However, none of the appellant's counter-arguments are found convincing in view of the reasons given by the opposition division in points 45, 48 and 51 of the decision under appeal and of considerations analogous to those set forth in points 3.2, 3.3 and 4.1.3 to 4.1.6 above in respect of documents D1, D2 and D5 to D8. More particularly, the board notes the following:

- The appellant's line of argument that the combination of the scanning movement shown in the video D1 with the disclosure of document D2 relating to Fig. 5 and 6 would result in the claimed method is not persuasive, among other reasons, because some of the elements of this line of argument presuppose that document D1 discloses the distinguishing feature of claim 1 identified in point 3.2.4 above.

- The combination of the spiral scanning represented in Fig. 2 of document D2 with the teaching of document D9 relating to the spiral scanning of an object represented in Fig. 23 (page 40 *et seq*.) would not go beyond a spiral scanning, so that similar considerations to those noted in point 3.3.2 above (second and third paragraphs) in respect of document D2 apply to the mentioned combination.

- Document D3 (Fig. 6, together with paragraph [0079]) and document D4 (Fig. 26 and 27, together with paragraph [0125]) disclose the circular scanning of an

object with an over-scanning defining a scanning overlapping range (D3, paragraph [0020], and D4, Fig. 28, together with paragraph [0133]), and the combination of any of documents D3 and D4 with document D5 (Fig. 4A and paragraphs [0061] to [0063]) would result in the circular scanning of the object with a scanning overlapping range in each one of a series of parallel planes, but none of the mentioned combinations would result in an obvious way in the claimed features relating to moving the probe to the next measurement section in an oblique direction to offset a distance corresponding to the overlapping range for reasons analogous to those given in points 4.1.4 (fourth paragraph), 4.1.5 (second paragraph) and 4.1.6 (third and fourth paragraphs) above.

- The combination of the disclosure of document D2 relating to Fig. 5 and 6 with document D7 (Fig. 3) does not result in an obvious way in the claimed method, among other reasons, because - as submitted by the respondent - none of these two documents disclose or suggest the measurement or determination of cross-sectional profiles of an object (see in this respect the considerations in points 3.3.2 (second paragraph), 4.1.3 (third paragraph) and 4.1.6 (third and fourth paragraphs) above).

- Neither the disclosure of document D2 relating to Fig. 5 and 6, nor the disclosure of document D8 (Table 4.4 on page 117) and document D9 (Fig. 22 and 23, together with the corresponding description) teach the alignment of the start points of subsequent scanning cycles or how to move the probe between two scanning cycles, and the combination of the mentioned disclosure of document D2 with the teaching of either one of documents D8 and D9 does not result in an obvious way in the claimed method; see in this respect the considerations in point 4.1.4 (fourth paragraph) above

in respect of the combination of document D8 with the mentioned disclosure of document D2, and the considerations in point 4.1.5 (second paragraph) above.

- No counter-argument has been submitted by the appellant during the appeal proceedings in respect of the combination of any of documents D3 and D4 with the disclosure of document D6.

4.3 It follows that the subject-matter of claim 1 as granted - and therefore also that of dependent claims 2 and 3 as granted - does not result in an obvious way from any of the different alternative combinations of the prior art disclosures submitted by the appellant (Article 56 EPC).

5. In view of all the considerations above, the board concludes that none of the grounds for opposition raised by the appellant prejudices the maintenance of the patent as granted and that, consequently, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

L. Gabor R. Bekkering

Decision electronically authenticated