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**Datasheet for the decision
of 11 January 2024**

Case Number: T 1335/21 - 3.2.03

Application Number: 14705391.2

Publication Number: 2956261

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B33Y30/00, B33Y50/02

Language of the proceedings: EN

Title of invention:

SELECTIVE LASER SOLIDIFICATION APPARATUS AND METHOD

Patent Proprietor:

Renishaw Plc.

Opponents:

- 1) TRUMPF Laser-und Systemtechnik GmbH (opposition withdrawn on 9 January 2024)
- 2) SLM Solutions Group AG (opposition withdrawn on 11 May 2020)
- 3) Concept Laser GmbH

Relevant legal provisions:

EPC Art. 100(a), 52(1), 54, 56, 123(2)
RPBA 2020 Art. 13(2)

Keyword:

Main request - novelty (no)

Auxiliary request 1 - inventive step (no)

Auxiliary request 3 - added subject-matter (yes)

Auxiliary request 4new - exceptional circumstances (yes) -
admitted (yes) - inventive step (yes)

Decisions cited:

T 2007/19, T 1473/19



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Case Number: T 1335/21 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 11 January 2024

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
10 June 2021 concerning maintenance of the
European Patent No. 2956261 in amended form.**

Composition of the Board:

Chairman C. Herberhold
Members: M. Olapinski
N. Obrovski

Summary of Facts and Submissions

- I. Appeals were filed by the patent proprietor and opponents 1 and 3 against the interlocutory decision of the opposition division finding that, account being taken of the amendments made by the proprietor in auxiliary request 2 then on file, the patent in suit (the patent) met the requirements of the EPC.

The opposition division had concluded, *inter alia*, that the subject-matter of claim 11 as granted lacked novelty in view of document E1 and that the subject-matter of claims 1, 11 and 12 according to auxiliary request 1 filed during the oral proceedings did not involve an inventive step in view of E1 in combination with the common general knowledge.

- II. Opponent 1 withdrew its opposition and appeal, opponent 2 withdrew its opposition. Opponents 1 and 2 are thus not parties to the appeal proceedings.

As both remaining parties are appellants, they are referred to in the following by their roles in the opposition proceedings as patent proprietor and opponent.

- III. Oral proceedings were held before the Board.

- IV. At the end of the oral proceedings, the requests were as follows.

The patent proprietor requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or, as an auxiliary measure, on the basis of one of the following auxiliary requests

in the following order: 1, 3, 4new (filed with letter dated 14 December 2023), 2, 4 and 5.

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

V. The claims under consideration are the following.

1. Main request

Independent claims 1, 11 and 13 as granted (main request) read as follows:

"1. A selective laser solidification apparatus, comprising; a powder bed (104) onto which a powder layer can be deposited, a gas flow unit for passing a flow of gas over the powder bed (104) along a gas flow direction (118), a laser scanning unit (106) for scanning a laser beam over the powder layer to selectively solidify at least part of the powder layer to form one or more objects (103),

characterised by

a processing unit (131) for selecting a scanning sequence of the laser beam based on the gas flow direction (118)."

"11. A method of selecting a scanning sequence of a laser beam in a selective laser solidification process, in which one or more objects (103) are formed layer-by-layer by, repeatedly, depositing a layer of powder on a powder bed (104) and scanning a laser beam over the deposited powder to selectively solidify at least part of the powder layers, wherein a gas flow is passed over the powder bed (104) in a gas flow direction (118),

characterised by

the method comprising selecting a scanning sequence of the laser beam based on the gas flow direction (118)."

"13. A data carrier having instructions stored thereon, the instructions, when executed by a processor (131), cause the processor to carry out the method of claim 11."

2. Auxiliary request 1

Auxiliary request 1 differs from the main request in that independent method claim 11 further specifies the additional feature from claim 12 as granted: "wherein the method is carried out by a computer".

Independent data carrier claim 12 (renumbered accordingly) recites the individual method steps of granted claim 11 instead of making reference to claim 11.

3. Auxiliary request 3

Claim 1 of auxiliary request 3 differs from claim 1 as granted by the following additional features:

"wherein the processing unit (131) selects to scan one area before another area because the area is located downwind in the gas flow direction of the other area such that debris produced during a scan is carried away from areas of the powder layer which are yet to be scanned"

Independent claims 9 and 10 (renumbered) differ from claims 11 and 12 of auxiliary request 1 by corresponding additional features.

4. Auxiliary request 4new

Claim 1 of auxiliary request 4new differs from claim 1 as granted by the following additional features:

"wherein the scanning sequence is selected such that debris produced during a scan is carried away from areas of the powder layer which are yet to be scanned, and the processing unit (131) selects to scan one area before another area because the area is located downwind in the gas flow direction of the other area"

Claims 9 and 10 differ from claims 11 and 12 of auxiliary request 1 by corresponding additional features.

VI. In this decision, reference is made to the following document:

E1: S. Dadbakhsh et al., "Effect of selective laser melting layout on the quality of stainless steel parts", Rapid prototyping Journal, Vol.18, No.3, 2012, pages 241-249, ISSN: 1355-2546, DOI: 10.1108/13552541211218216

VII. The opponent's arguments can be summarised as follows.

Main request

The subject-matter of claims 1 and 11 as granted was not novel. E1 disclosed the step of "selecting a scanning sequence of the laser beam based" in a selective laser solidification process in which a gas flow is passed over the powder bed to be - indirectly via a correspondingly selected part layout - "based on the gas flow direction". Also, the processing unit disclosed in E1 was suitable for selecting a scanning sequence accordingly.

Auxiliary request 1

The subject-matter of claims 1 and 11 of auxiliary request 1 did at least not involve an inventive step because the mere automation of the known step of selecting a part layout based on the gas flow direction in E1 would have led the skilled person in an obvious manner to the claimed subject-matter.

Auxiliary request 3

Claims 1, 9 and 10 of auxiliary request 3 were amended with a new recombination of the features from original claims 2 and 3 which added subject-matter extending beyond the content of the application as filed.

Auxiliary request 4new

There were no exceptional circumstances justifying the admittance of auxiliary request 4new under Article 13(2) RPBA. The objection under Article 123(2) raised in the Board's communication was merely a refinement of the opponent's previously raised objections. The patent proprietor did not demonstrate that auxiliary request 4new was *prima facie* allowable in view of all

outstanding issues. Hence, auxiliary request 4new should not be admitted.

The subject-matter of claim 1 of auxiliary request 4new did not involve an inventive step because it was obvious that debris had to be carried away from areas yet to be scanned, as was the logic of how to select the scanning sequence accordingly.

VIII. The patent proprietor's arguments can be summarised as follows.

Main request

The subject-matter of claims 1 and 11 as granted was novel because it required that the step of "selecting the scanning sequence" itself, not the preceding definition of a part layout, be "based on the gas flow direction". Furthermore, the processing unit of E1 was not disclosed for selecting the part layout based on the gas flow direction.

Auxiliary request 1

The subject-matter of claims 1 and 11 of auxiliary request 1 involved an inventive step as E1 merely related to cylindrical parts in an experimental study. An automation of the selection of a general, more complex part layout was not obvious.

Auxiliary request 3

The recombination of the features from original claims 2 and 3 in claim 1 represented an originally disclosed restriction in view of the disclosure on page 2, lines 21 to 27 of the application as filed.

Auxiliary request 4new

Auxiliary request 4new represented a timely reaction to the new objections under Article 123(2) against claim 1 of auxiliary request 3 raised in the Board's communication. These objections were *prima facie* overcome by the amendments in auxiliary request 4new. Admittance of this request was thus justified by exceptional circumstances under Article 13(2) RPBA.

The subject-matter of claim 1 of auxiliary request 4new involved an inventive step in view of E1 because the problem of a potential redeposition of debris onto areas yet to be scanned was not generally known. It was thus not obvious to select a scanning sequence with the "such that" condition from original claim 2.

Reasons for the Decision

1. Main request - Novelty, E1
 - 1.1 Document E1 is a study on the "effect of selective laser melting layout on the quality of stainless steel parts" (title) carried out using the "MCP Realizer 250" selective laser melting (SLM) machine and a gas flow unit for passing argon over the powder bed across the build platform (section 2 on page 242, left-hand column).

It was common ground that E1 discloses a selective laser solidification apparatus according to the preamble of granted claim 1 and a corresponding selective laser solidification process.

- 1.2 Claim 1 as granted further requires a "processing unit for selecting a scanning sequence of the laser beam based on the gas flow direction".

Claim 11 as granted is directed to a method of selecting a scanning sequence of a laser beam in such a laser solidification process with the characterising step of "selecting a scanning sequence of the laser beam based on the gas flow direction".

- 1.3 In this regard, E1 discloses that two identical sets of (cylindrical) parts were manufactured "with different layouts", i.e. "parallel and perpendicular to the gas flow" (page 242, left-hand column, second and second-last paragraph; page 244, left-hand column, "carry a comparison study on the influence of the processing gas"; "The [...] stainless steel parts were

manufactured in two directions, one perpendicular to the gas flow direction and one parallel to it", see abstract under "Design/methodology/approach"; Figure 2). Figure 4 and page 243, right-hand column, first paragraph in E1 disclose that the areas corresponding to the parts were solidified in each layer according to a "fabrication sequence" (see numbers in Figure 4(b) and figure caption). Moreover, the SLM machine in E1 "had a scanning strategy" defining the sequence and pattern of the individual (microscopic) scan lines within each area to be solidified (section 2, page 242, left-hand column; Figure 1). The same scanning strategy was applied to all specimens, i.e. per part (page 244, left-hand column).

- 1.4 It was common ground that the following subject-matter can be derived from the disclosure of E1.

The authors of the study selected the part layout based on the gas flow direction. The SLM machine of E1 implicitly comprises a processing unit for implementing the scanning strategy for each part. Whether the fabrication sequence was selected by the processing unit or prescribed by a user is not derivable from E1.

- 1.5 The meaning and interpretation of the characterising features of claims 1 and 11 was disputed by the parties and is dealt with in the following subsections in view of the above disclosure of E1.

1.5.1 "scanning sequence"

The patent proprietor initially argued that the noun "sequence" meant "a particular order in which related things follow each other" and that "scanning", in the

sense of the patent, referred to the solidification of entire areas of the powder layer. Hence, taking account of paragraph [0001] of the patent, a "scanning sequence" referred to "an order in which objects or part of objects are built".

The proprietor's understanding of a "scanning sequence" corresponds to the "fabrication sequence" in E1.

In the Board's view, the term "scanning sequence" must be understood more broadly. When interpreting this claim feature in comparison to the disclosure of document E1, it is not limited to "fabrication sequences" within the meaning of this document but additionally covers sequences such as the (low-level, microscopic) scan vectors defined by the "scanning strategy" of E1. The Board notes that paragraph [0001] of the patent does not contain a definition of the term "scanning sequence" (understood as a statement explaining the meaning of a term used in the patent in a lexicographic and general manner; see T 450/20, Reasons 2.6). Hence, even if the statement in paragraph [0001] referring to the "order in which objects or part of objects are built" were to be understood the way the patent proprietor understands it, a limitation not reflected in the claims could not be read into the claims solely based on the description (see Case Law of the Boards of Appeal of the EPO, 10th edition 2022 (Case Law), II.A.6.4.3).

1.5.2 "processing unit for"

Under the established practice at the EPO (see T 410/95, Reasons 4 to 6 and the decisions citing it), features of a data processing system defined in terms of "means for" carrying out a specific function are

construed as means adapted for carrying out the claimed function. Accordingly, claim 1 requires a processing unit which is not only suitable (as put forward by the opponent) but specifically adapted, e.g. by a corresponding programming, for "selecting a scanning sequence of the laser beam based on the gas flow direction".

1.5.3 "based on the gas flow direction"

The opponent submitted that "based on" was broader than "in dependence of" in that it did not specify whether and in which way the information about the "gas flow direction" was used. Hence, "based on" also encompassed an inherent (e.g. static) relationship between the scanner and the gas flow unit or an indirect or implicit relationship between the selected scanning sequence and the gas flow direction (for example, due to the fact that the scanning sequence implemented a part layout based on the gas flow direction as in E1).

In the Board's view, in the general expression "selecting a scanning sequence based on [...]", it is not defined whether "based on" applies to the activity of "selecting" (which requires an explicit consideration of the gas flow direction) or to the resulting "scanning sequence". In the latter case, an indirect relationship with the gas flow direction would be sufficient to fulfil the condition "based on the gas flow direction".

However, in claim 1, "based on the gas flow direction" is part of the required "adaptation" of the processing unit. Accordingly, claim 1 requires an adaptation (e.g. programming) of the processing unit in which the gas flow direction is taken into account in selecting the

scanning sequence. By contrast, an indirect or inherent relationship between the scanning sequence and the gas flow direction, which is not under the control of the processing unit, would not be part of the required adaptation of the processing unit and would thus not fall within the terms of claim 1 as granted.

- 1.6 With the above understanding of the claim language, it follows that the subject-matter of claim 1 as granted is novel.

E1 discloses a "processing unit for selecting a scanning sequence of the laser beam" in the form of the "scanning strategy" but does not disclose that the gas flow direction is taken into account by the processing unit in this selection. Hence, the step of "selecting a scanning sequence" performed by the processing unit is not based on the gas flow direction.

While, according to E1, the part layout is selected based on the gas flow direction, neither is it selected by the processing unit, nor does the layout alone imply a scanning sequence. Finally, E1 does also not disclose that the "fabrication sequence" (which also falls within the claimed term of a "scanning sequence" as set out above under point 1.5.1) is selected by the processing unit or based on the gas flow direction.

- 1.7 However, in the Board's view, claim 11 lacks novelty in view of E1 for the following reasons.

Claim 11 does not require that the step of "selecting a scanning sequence of the laser beam based on the gas flow direction" be carried out by a processing unit. In this case, as discussed above, the claimed condition is fulfilled if the result of selecting, i.e. the scanning

sequence, is (even indirectly) "based on the gas flow direction".

The automatic application of the scanning strategy to the prescribed part layout determined (e.g. by the user) based on the gas flow direction results in the selection of a scanning sequence, which is - via the selected part layout - based on the gas flow direction. So the scanning sequence depends on the part layout, and the part layout is selected based on the gas flow direction. Thus, the scanning sequence is "based on the gas flow direction". Accordingly, E1 discloses "selecting a scanning sequence [which is, indirectly,] based on the gas flow direction".

Hence, E1 discloses the characterising step of claim 11.

1.8 The patent proprietor submitted the following counter arguments.

In the patent proprietor's view, "selecting" meant "to choose from a number of given available possibilities", i.e. it implied that the available possibilities were predefined before the selection. This meant that the selection of a part layout, by which the objects and areas to be scanned were created, could not be considered part of the claimed step of "selecting a scanning sequence".

The question of novelty of claim 11 thus depended on the correct interpretation of "selecting". The proprietor referred to T 1473/19, confirming the finding in T 2007/19 that there was no general principle of interpreting claims in the broadest possible way and according to which a claim feature had

to be interpreted in the context of the patent. In the case at hand, the patent clearly distinguished between the definition of areas on the powder layer (which corresponds to the definition of a "part layout" in E1) and the subsequent selection of a scanning sequence for those areas. This differentiation was also why claim 1 used the term "selecting" and not a more general term such as "determining". Accordingly, at least in case of a contentious claim construction, the skilled person would have consulted the patent specification, which unequivocally supported the interpretation set out by the patent proprietor. With this understanding, E1 did not disclose the characterising feature of claim 11.

1.9 The Board is not convinced by these arguments for the following reasons.

Most importantly, the Board's reasoning is not based on the assumption that the selection of the part layout is part of the step of selecting a scanning sequence. The fact that the part layout was selected based on the gas flow direction, irrespective of when, by whom and as part of which activity, *indirectly* leads to the *result* that the scanning sequence selected for this particular part layout by the processing unit according to the "scanning strategy" in E1 is "based on the gas flow direction". This is independent of whether "selecting a scanning sequence" is deemed to include the selection of the part layout or not.

The Board is also not convinced that "selecting" always presupposes a predefined choice. As an example, the patent proprietor itself uses the term "selecting" for the determination of the "part layout", which is not limited to a choice from a specific number of given possibilities. Hence, in this example, "selecting" is

not based on a set of previously defined items to choose from but involves the definition of the selected choice.

Furthermore, the Board does not agree with the patent proprietor's interpretation of T 1473/19. In the current case, as explained above, the patent does not contain any definition for the term "selecting". Also in line with T 1473/19, Reasons 4.4, last paragraph, the examples in the patent referred to by the proprietor do not provide sufficient reason for a limited reading of generic claim language in view of the primacy of the claims under Article 69 EPC (T 1473/19, Catchword 2; see also Case Law, II.A. 6.4.3). In the current case, there is no restrictive definition of the claim language in the patent that would exclude the skilled person's understanding of the feature in question as set out in the Board's reasoning in point 1.7 above.

1.10 Consequently, the subject-matter of claim 11 as granted is not novel over the method of E1.

1.11 Therefore, the maintenance of the patent as granted is prejudiced by the ground for opposition under Article 100(a) in conjunction with Articles 52(1) and 54 EPC. Hence, the patent proprietor's main request cannot be granted.

2. Auxiliary request 1

2.1 Claim 11 - Novelty, E1

Claim 11 of auxiliary request 1 differs from the main request in that it further specifies that "the method is carried out by a computer".

The expression "carried out by a computer" in claim 11 requires that the computer carry out each and every step of the method due to its programming. This requires an adaptation of the computer (and its implicit processing unit) for "selecting a scanning sequence of the laser beam based on the gas flow direction". In other words, the computer must perform the activity of "selecting" in such a way that the resulting scanning sequence is "based on the gas flow direction" as a matter of the computer's adaptation. Accordingly, the subject-matter defined by the characterising feature of claim 11 of auxiliary request 1 corresponds to that of the characterising feature of claim 1 as granted.

Hence, the subject-matter of claim 11 is novel over E1 for the same reasons, *mutatis mutandis*, as set out above for claim 1 as granted (main request).

2.2 Inventive step, E1

2.2.1 Distinguishing features

As set out above for claim 11 as granted (main request), E1 discloses a step of "selecting a scanning sequence of the laser beam based on the gas flow direction", but this step is not carried out entirely by a computer (as required by claim 11) and is not part of the processing unit's adaptation (as required by claim 1).

Accordingly, the distinguishing feature of the subject-matter of claims 1 of auxiliary request vis-à-vis E1 can be seen in the adaptation of the processing unit to carry out the known selecting step of E1, that is, in

the automation of the selection of a part layout based on the gas flow direction. Correspondingly, the distinguishing feature of claim 11 can be seen in the fact that the selection of the part layout is carried out by a computer.

2.2.2 Technical effect and technical problem to be solved

Computerisation of the selection of a part layout based on the gas flow direction with the subsequent selection of a scanning sequence based on the part layout as disclosed in E1 provides the typical effects of automation such as less time and effort for the human user (improved user-friendliness) and potentially advantages in speed or precision. The objective technical problem to be solved could thus be formulated as how to improve the operation of the method of E1.

2.2.3 Obviousness

E1 discloses that part quality can be improved (stronger bonding and fewer delaminations) when the parts are laid "perpendicular to the gas flow direction" or, more precisely, "with a view of producing a less temperature gradient" (the paragraph bridging pages 243 and 244; abstract under "Findings"; page 247, right-hand column, last sentence; and section 4, "Conclusions" on page 248, third and third-last sentence). E1 even suggests that "the procedure introduced here can be applied to other machines" (last sentence of section 1, page 242, left-hand column).

In view of the well-known advantages of automation and the advantages of the part layout taught by E1, the skilled person would have sought to implement the teaching of E1 in the processing unit (computer) of a

known laser solidification machine (such as that disclosed in E1). Under established case law, the mere automation of functions previously performed by human operators is in line with the general trend in technology and thus cannot be considered inventive (see Case Law, I.D.9.21.6).

2.2.4 The patent proprietor submitted that an automation of the teaching of E1 was not straightforward for the following reasons.

Firstly, E1 only concerned an experimental study on cylindrical parts. However, in practice, these would instead be manufactured by subtractive techniques or at least be oriented vertically to reduce thermal curling. Hence, there was no need to automate the part layout for these objects and doing so would take more time than could be saved in the experiments.

Secondly, E1 did not teach how to orient more complex, realistic parts. E1 merely stated that "process conditions need to be carefully selected" (last sentence of section 4) but did not disclose what exactly had to be taken into account. E1 did not teach a particular orientation for other parts, and the suggested reduction of temperature gradients for more complex parts would require complex models and simulations of the gas flow and thermal transport depending on part shape. Therefore, it was not obvious for the skilled person how to implement the teaching of E1 for objects other than cylinders.

Thirdly, there were other, more significant factors for reducing thermal defects than the horizontal orientation of the parts. For example, elongated objects should be oriented vertically to reduce curling

up. Hence, it would not have been obvious for the skilled person to adopt the teaching of E1 in view of its small effect and in view of well-known, more relevant effects speaking against laying the parts perpendicular to the gas flow direction.

2.2.5 These arguments are not convincing.

In the Board's view, the teaching of E1 is not restricted to cylindrical parts in an experimental study. The skilled person understands that the study aims at "desirable properties" and "quality improvements of SLM parts" in general (see abstract, first and last sentence). This is also why E1 suggests that the "process conditions" (a term used in E1 as referring to the part layout and its relation to the gas flow direction) be carefully selected (section 4, last sentence), without specifying an orientation valid for all kinds of parts.

As acknowledged by the patent proprietor, E1 teaches that the advantage of fewer delaminations is achieved by reducing temperature gradients across the parts. Although it may be difficult to predict the optimal layout in this regard for parts with complex geometries, E1 discloses that the best orientation for the cylindrical samples of the study is perpendicular to the gas flow direction (e.g. page 244, left-hand column; page 247, right-hand column, last sentence). E1 even generally states that "[t]he manufacturing of parts perpendicular to gas flow seems to be more advantageous rather than parallel to gas flow" (abstract under "Findings"). The skilled person thus understands that the principle of laying the long axis perpendicular to the gas flow direction at least applies for other elongated parts of simple geometry.

Hence, for parts of simple geometry, the teaching of E1 is straightforward and does not require numerical simulation and calculation of the temperature gradients across the samples. As the claims are not limited to parts with complex geometries, the simple teaching of orienting parts with the long axis (of their horizontal cross-section, see below) perpendicular to the gas flow direction would not have been ruled out by the skilled person.

Whether the effect of such an orientation is small is immaterial for inventive step as the skilled person would also seek to implement small improvements. Moreover, E1 explicitly refers to the gas flow direction "significantly" influencing the quality and the mechanical properties of stainless steel parts produced by the SLM technique (E1, section 4, "conclusion", first sentence).

The proprietor, however, also refers to potential contradictions of the teaching of E1 with other, more significant effects, such as the alleged practice that elongated objects should be oriented vertically to avoid curling, which would have discouraged the skilled person from adopting the teaching of E1. The Board disagrees. Firstly, there is no proof on file for the mentioned or other - allegedly commonly known - effects contradicting the teaching of E1. Moreover, the skilled person understood that the cylinders in E1 were chosen as examples of parts with different extensions in the plane of the powder layer, irrespective of their shape and extension in the height direction. This is apparent because only the shape in the current layer matters for the temperature gradients. Hence, even if elongated objects had to be oriented vertically, the skilled person would have adopted the teaching of E1 at least

for the automatic orientation of the parts in the plane of the powder layer.

Likewise, it does not matter whether the skilled person would have adopted the automation of the part layout for all kinds of parts irrespective of their shape or only for certain parts and whether the automation would lead to a final layout immediately used in the process or only to a proposal for the user. In all these cases, the processing unit is generally adapted for selecting a part layout based on the gas flow direction and is thus adapted for "selecting a scanning sequence of the laser beam based on the gas flow direction" (and the respective step is carried out by the computer).

2.2.6 Accordingly, the subject-matter of claims 1 and 11 of auxiliary request 1 does not involve an inventive step.

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

3.1 Claim 1 of auxiliary request 3 differs from claim 1 of auxiliary request 1 by the following additional characterising features:

"wherein the processing unit selects to scan one area before another area because the area is located downwind in the gas flow direction of the other area such that debris produced during a scan is carried away from areas of the powder layer which are yet to be scanned"

3.2 According to the patent proprietor, these additional features derived from original claims 2 and 3 and page 2, lines 21 to 22 and 25 to 27 of the application as filed.

3.3 The decision under appeal states that the features of original claims 2 and 3 were "*expressis verbis* copied into claim 1". However, this statement is not correct.

Original claims 2 and 3 specify that "a scanning sequence is selected such that debris produced during a scan is carried away from areas of the powder layer which are yet to be scanned" and that "the processing unit selects to scan one area before another area, because the area is located downwind in the gas flow direction of the other area".

The amendment in claim 1 of auxiliary request 3 thus contains a new recombination of the original phrases, according to which the "such that" clause of original claim 2 no longer specifies the result of selecting the "scanning sequence" but instead the result of the processing unit's adaptation to "select one area before another area" according to their positions relative to the gas flow direction.

3.4 The originally disclosed "such that" clause requires that "debris produced during a scan is carried away from areas yet to be scanned".

In the context of original claim 2 and from page 2, lines 21 to 22, the term "during a scan" applied to the scan according to the scanning sequence and any debris formed thereby. In current claim 1, the term "during a scan" applies to the scan of at least "one" area, maybe also "another area", but not to the (unrelated) scan according to the "scanning sequence" defined in a different feature.

Hence, the amendment in current claim 1 at least omits the limitation of the "such that" clause on the

"scanning sequence" from the application as filed and applies it to a different selection. Accordingly, the new combination of subclauses from original claims 2 and 3 in claim 1 of auxiliary request 3 adds subject-matter extending beyond the content of the application as filed.

3.5 The patent proprietor submitted that page 2, lines 25 to 27, introduced with "For example", disclosed to "select one area before the other area" as an example of "selecting a scanning sequence". Specifying the more specific example instead of the more generic disclosure could thus not lead to added subject-matter. Therefore, applying the "such that" clause to the more specific example was in line with the content of the application as filed.

3.6 This argument is not convincing.

The sentence on page 2, lines 25 to 27 starts with "For example", but this does not specify that the feature "the processing unit may select one area before another area because the area is locate downwind in the gas flow direction of the other area" is *an example of* the adaptation of the processing unit for "selecting a scanning sequence of the laser beam based on the gas flow direction". Rather, the skilled person understands that selecting "one area before another because [...]" is an example of steps or considerations that must be applied *pairwise* between *all* areas (and all subareas down to all individual scan lines) on a powder layer to satisfy and arrive at the "such that" condition.

It is also apparent that a sequence of "one area before another" is not necessarily *more specific* than a

"scanning sequence" of individual scan lines or of more than two areas.

Hence, the Board does not agree that the features of claim 3 are disclosed as a more specific example for the selection of a scanning sequence and could be used to replace the latter. Hence, the proprietor's argument cannot invalidate the findings and reasoning set out under point 3.4 above.

3.7 Accordingly, the subject-matter of claim 1 of auxiliary request 3 extends beyond the content of the application as filed contrary to the requirements of Article 123(2) EPC. Auxiliary request 3 is thus not allowable.

4. Auxiliary request 4new

4.1 Admittance

Auxiliary request 4new was filed with the patent proprietor's letter of 14 December 2023 and thus represents an amendment of the appeal case under Article 13(2) RPBA.

The proprietor submitted that auxiliary request 4new was filed as a reaction to the new objection under Article 123(2) EPC against claim 1 of auxiliary request 3 raised for the first time in the Board's communication. Auxiliary request 4new *prima facie* overcame this objection as it literally recited the features of original claims 2 and 3.

The opponent submitted that objections under Article 123(2) EPC against auxiliary request 3 had been raised in the opposition proceedings and that the Board's refinement of these objections did not

represent exceptional circumstances justifying the admittance of late-filed auxiliary request 4new. In addition, auxiliary request 4new did not *prima facie* overcome all other outstanding issues such as lack of inventive step.

The Board agrees with the patent proprietor that the objection under Article 123(2) EPC against claims 1 of auxiliary request 3 discussed above and raised for the first time in the Board's communication under Article 15(1) RPBA was not just a refinement of previous objections. The opponent's objections did not concern the subject-matter of claim 1. The Board also agrees that the amendment to claim 1 (and to claims 9 and 10) in auxiliary request 4new vis-à-vis auxiliary request 3 corresponds to the literal disclosure of original claims 2 and 3 and page 2, lines 21 to 27 and, hence, *prima facie* overcomes the Board's objection.

The mere allegation that there are other outstanding issues (such as an alleged lack of inventive step) yet to be discussed does not prejudice the admittance of the new request in view of *prima facie* allowability with respect to a newly raised objection under Article 123(2), which is clearly overcome by the new request. It must also be taken into account that the objections under inventive step against auxiliary requests 3 and 4 were not discussed in the Board's preliminary opinion in view of the above-mentioned issues under Article 123(2) EPC.

Applying the above criteria in an overall assessment, the Board considered that there were exceptional circumstances justifying the admittance of auxiliary request 4new under Article 13(2) RPBA.

4.2 Inventive step

The only substantive objection against auxiliary request 4new raised by the opponent was lack of inventive step of claim 1 in view of E1 in combination with the common general knowledge of the skilled person.

The opponent submitted that starting from E1, the additional features from original claims 2 and 3 would have been obvious for the skilled person. It was obvious that debris had to be carried away from areas yet to be scanned. The skilled person would thus have selected the scanning sequence such that this objective is achieved, i.e. with the features from original claim 2. The additional features from original claim 3 merely defined the logic of how to select the scanning sequence so that debris is carried away. This logic was also obvious and, hence, the skilled person would have implemented the scanning strategy with the steps of original claim 3 as well.

However, E1 does not refer to debris. The Board agrees that it is routinely observable and thus known to the skilled person that debris is produced by the laser beam in a selective laser solidification process. It is also apparent that this causes problems, for example, for beam quality and intensity at the current scan position. For these reasons, as acknowledged in the introductory section of the patent, it is known to introduce a gas flow through the build chamber to remove debris from the chamber.

However, the patent proprietor disputed that the problem of redepositioning debris onto the downwind parts of the powder layer was part of the common

general knowledge, this being why the patent proposes selecting the scanning sequence in dependence of the gas flow direction such that any debris produced during the scan is blown away from areas yet to be scanned (features from original claim 2). Indeed, there is no proof on file for this alleged common general knowledge.

Hence, it could not be established that it was part of the skilled person's common general knowledge and thus obvious to implement a selection of the scanning sequence with the claimed "such that" condition from original claim 2.

Accordingly, starting from E1 in combination with the common general knowledge, the subject-matter of independent claim 1 involves an inventive step.

4.3 Adaptation of the description

Neither the Board nor the opponent had any objections against the adapted description filed at the oral proceedings by the patent proprietor.

4.4 Summary

It follows from the above that auxiliary request 4new is allowable.

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 as amended in the following version:
 - claims 1 to 12 of auxiliary request 4new filed with the letter dated 14 December 2023
 - description as filed in the oral proceedings before the Board
 - drawings 1 to 5 of the patent specification

The Registrar:

The Chairman:



C. Spira

C. Herberhold

Decision electronically authenticated