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Datasheet for the decision of 27 March 2025

Case Number: T 1392/23 - 3.2.03

Application Number: 13705460.7

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Language of the proceedings: EN

Title of invention:
TURBO-MACHINE IMPELLER MANUFACTURING

Patent Proprietor:
Nuovo Pignone S.r.l.

Opponent:
KSB SE & Co. KGaA

Headword:

Relevant legal provisions:
EPC Art. 56
RPBA 2020 Art. 12(2)

Keyword:
Inventive step - (yes) - different starting points
Primary object of appeal proceedings to review decision - appeal case directed to objections on which decision was based (yes)

Decisions cited:
T 0694/15

Catchword:

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Beschwerdekammern

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Case Number: T 1392/23 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 27 March 2025

Appellant: (Opponent)	KSB SE & Co. KGaA Johann-Klein-Straße 9 67227 Frankenthal (DE)
Representative:	Laufhütte, Dieter Lorenz Seidler Gossel Rechtsanwälte Patentanwälte Partnerschaft mbB Widenmayerstraße 23 80538 München (DE)
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Representative:	Illingworth-Law, William Illingworth Baker Hughes 245 Hammersmith Chalk Hill Road London W6 8DW (GB)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 13 June 2023 concerning maintenance of the European Patent No. 2817117 in amended form.**

Composition of the Board:

Chairman	C. Herberhold
Members:	B. Goers
	N. Obrovski

Summary of Facts and Submissions

I. European patent No. 2 817 117 relates to a method of manufacturing a turbo-machine impeller comprising a hub and a plurality of blades and a shroud.

II. The opposition division decided to maintain the patent as amended according to auxiliary request 2.

III. This decision was appealed by the opponent ("appellant").

IV. At the oral proceedings before the Board, the final requests were as follows.

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

The patent proprietor ("respondent") requested that the appeal be dismissed.

V. Documents relevant to this decision:

D1: DE 10 2005 055 320 A1
D2: US 2010/0034647 A1
D3: WO 2010/128153 A1
D4: US 2003/0206820 A1
D5: EP 240 2112 A2
D6: DE 10 2009 048 665 A1
D7: WO 2011/063334 A1
D8: A. Engeda and M. Rautenberg, "On the Choice of Centrifugal Impellers Semi-Open or Closed", International Journal of Turbo and Jet Engines 6 (3-4), 1989, 327-332

VI. Claim 1 of the main request, i.e. the patent as maintained in the version of auxiliary request 2, reads (feature numbering added in "[]"):

"[1.1] *A method of manufacturing a turbo-machine impeller (120) comprising a hub (121) and a plurality of blades (125),*
[1.2] *using powder material in an additive manufacturing process;*
[1.3] *said method comprising: applying energy to said powder material by means of a high energy source; and solidifying said powder material,*
[1.4] *wherein at least one bulky portion of said hub (121) is irradiated such that the powder material solidifies in a lattice structure surrounded by a solid skin structure enclosing said lattice structure;*
[1.5] *wherein the method further comprises the step of forming an impeller shroud (123) and*
[1.6] *the step of forming a lattice structure in an inner volume of said impeller shroud (123);*
[1.7] *and wherein said high energy source is pulsed to generate said lattice structure.*"

VII. The appellant's arguments relevant to the present decision can be summarised as follows.

(a) Consideration of the objections starting from D5

The objections based on D5 were raised and maintained in the opposition proceedings as well as in the appeal proceedings and thus had to be considered.

(b) Main request - inventive step

The subject-matter of claim 1 did not involve an inventive step starting from D1 in combination with common general knowledge, D2 or D3, as well as starting from D5 in combination with the common general knowledge, D6 or D7.

Claim 1 was not restricted to a method in which a lattice structure in the shroud had to be formed by an additive manufacturing method. The claim only required "at least one bulky portion" to be irradiated by the pulsed high energy source, e.g. just the hub. Furthermore, the claimed "pulsed" operation of the energy source was not restricted to the formation such that the material was melted spot-wise as in the embodiment described in paragraphs [0009] and [0054], i.e. it did not have to result in a lattice structure as shown in Figures 5A to 5C of the patent. Instead, any discontinuation of the energy source fell within feature [F7].

D1 disclosed the additive manufacturing of a turbo-machine impeller with a lattice structure at a bulky portion of it. The use of a pulsed energy source in additive manufacture was known from the common general knowledge. Providing a turbo-machine impeller with a shroud was also known. As explained above, the claim did not require the shroud to include a lattice structure, the subject-matter thus being obvious from the common general knowledge alone. Moreover, the subject-matter was at least made obvious by D2, which disclosed a lattice structure, in a shroud formed by additive manufacturing or in view of D3, which disclosed lattice fibre structures e.g. in Figure 7H, these fibre structures not necessarily being embedded

in a polymer matrix and therefore anticipating feature [1.6].

D5 was an equally valid starting point for inventive step and disclosed the manufacture of a turbo-machine impeller with a shroud. Providing such bulky machine parts with a lightweight but still stable lattice structure was obvious in view of the common general knowledge. At least from D6, the skilled person derived the general teaching to provide bulky parts with a lattice structure. Providing such a lattice structure was also made obvious from D7.

VIII. The respondent's arguments relevant to the present decision can be summarised as follows.

(a) Consideration of the objections starting from D5

The objections based on D5 should not be admitted. The objections were not considered in the decision under appeal, and it was unfair to consider them in the appeal proceedings.

(b) Main request - inventive step

The subject-matter of claim 1 involved an inventive step.

Claim 1 was restricted to a method in which the lattice structure in the shroud had to be formed by an additive manufacturing method. The "pulsed" operation of the energy source was restricted to a method in which material was melted spot-wise, resulting in a structure as exemplified in Figures 5A to 5C of the patent and not as disclosed in D1.

Starting from D1, even if the skilled person considered adding a shroud and applying a pulsed energy source, no common general knowledge was available for applying the same lattice structure as in the impeller body also to such a shroud. D2 did not disclose lattice structures in an inner volume of the shroud. D3 disclosed polymer-fibre composite structures not in accordance with claim 1.

Starting from D5, no common general knowledge was available for applying a lattice structure produced by additive manufacturing to such a turbo-machine impeller with a shroud, in particular not to the hub and the shroud portion. Also, D6 had no generic teaching to provide bulky parts with a lattice structure. D7 did not even concern an additive manufacturing method for producing a lattice structure.

Reasons for the Decision

1. Main request - inventive-step objections based on D1

The appellant raised objections of lack of inventive step based on D1 as the starting point in combination with any of:

- common general knowledge (as for example allegedly represented by D2, D3, D4 and D8)
- D2
- D3

1.1 Common and distinguishing features

1.1.1 D1 discloses a method of manufacturing a turbo-machine impeller 28 (see claim 5; "Leistungssystemkomponente für eine Arbeitsmaschine") comprising a hub 46 ("Nabenglied") and a plurality of blades 40 ("Schaufeln"). The hub and the blades are integrally formed by an additive manufacturing method. This method includes the step of selectively melting a powder ("freiformgeschweißt") such that the hub comprises a solid skin which encloses in the bulky part a void with a lattice structure- e.g. in the form of ribs. The lattice structure is not further defined in the patent and thus encompasses also a void with a reinforcing structure as disclosed in D1 (see paragraph [0026]: "Gitter- oder Waben- bzw. Honeycomb-Struktur" and Figure 7).

The lattice structure in D1 is enclosed by an integrally formed base 58 ("Stützplatte"). As in the patent (see paragraph [0055]), small apertures for

removing the unmelted powder from the lattice structure can be provided (see D1, paragraphs [0027] and [0028]). Therefore, D1 also discloses a skin structure enclosing the lattice structure according to feature [1.4]. D1 further discloses an electron beam as the high energy source (see D1, paragraph [0018]) as also preferably used in the patent.

1.1.2 However, D1 is silent about any details of the operation of the energy source and thus the feature "**pulsed** energy source to generate the lattice structure" (emphasis added) as defined by feature [1.7] is not directly and unambiguously disclosed in D1.

Contrary to the appealed decision, feature [1.7] is not understood to be restricted to a lattice structure as defined by paragraphs [0009] and [0054], i.e. inherently resulting in a structure according to Figures [5A] to [5C] in which "each spot of melted material [is] contacting the adjacent spots of melted material".

According to the more generic teaching in paragraph [0054] of the patent, the term "pulsed" has the meaning of "choppered, and moved such that the powder material is melted spot-wise", i.e. the laser or electron beam has somehow to be discontinued while forming the lattice structure.

While this is not a feature disclosed implicitly in D1 since proper movement of the electron beam might allow for continuous application of the energy source, it is likewise not excluded from a technical point of view to form the structure in the embodiment of Figure 7 of D1 by a pulsed, i.e. discontinued, electron beam.

1.1.3 Claim 1 further requires that also the lattice structure in an inner volume of the shroud be formed by an additive manufacturing process.

The appellant argued that claim 1 according to feature [1.4] only defined that at least one of the lattice structures, possibly just that in the (bulky) hub, had to be produced by an additive manufacturing process including energy application by means of a high energy source being pulsed to generate the lattice structure. The shroud did not have to comprise a lattice structure generated by a pulsed high energy source.

However, this is not convincing.

It is true that claim 1 does not require forming both the hub with the blades and the shroud integrally in a single step by the additive manufacturing process. The claim also encompasses their separate production, each by an additive manufacturing method. It is also true that feature [1.7] only refers to "said lattice structure" in the singular, although two different lattice structures are defined in claim 1. However, even if this back-reference might be ambiguous, this ambiguity was already present in granted claim 7.

In any event, in the further features of the claim, the skilled person interpreting the claim as a whole understands that the method step according to feature [1.7] refers back to both lattice structures in manufacturing step [1.4] and [1.6] (including also features [1.2] and [1.3]).

Feature [1.6] requires forming a lattice structure in an inner volume of the impeller shroud and feature [1.7] defines that **said** lattice structure is generated

by pulsing **said** high energy source. As far as feature [1.4] defines that (emphasis added) **"at least one** bulky portion [...] solidifies in a lattice structure" this only refers to possible lattice structures in the hub and even if "at least one" is read to mean only one, the feature does not refer to the lattice structure in the shroud according to feature [1.6].

Moreover, feature [1.6] defines that "the lattice structure **is formed in** an inner volume" (emphasis added) of the shroud. In other words, the outside forming the inner volume of the shroud must already be present when the lattice structure is formed or this structure must at least be formed at the same time. It is not apparent how this can be done without using an additive manufacturing method.

This understanding is supported by the patent specification as a whole.

1.1.4 The distinguishing features of claim 1 over D1 are thus:

- a step of forming an impeller shroud (feature [1.5])
- the shroud comprising an inner volume and a lattice structure formed in the inner volume in accordance with method features [1.7], [1.2] and [1.3] (feature [1.6])
- the energy source being pulsed (feature [1.7])

1.2 Objective technical problems

The Board agrees with the appellant's approach that distinguishing feature [1.7] (pulsed energy source) is related to a partial problem. This feature is not

inextricably linked to the shroud manufacturing step features [1.5] and [1.6] as the pulsed operation of the energy source is not essential for forming the claimed lattice structure. As explained in point 1.1.2 above, and contrary to the respondent's understanding, the feature of "pulsed" operation is not restricted such that a structure as shown in Figure 5 of the patent is inherently formed. For example, the structure in Figure 7 of D1 also falls within a lattice structure produced in accordance with claim 1 and can be formed either continuously or pulsed (by discontinuing the electron beam), depending on the beam's guiding direction during the manufacturing process.

1.2.1 Partial problem related to feature [1.7] and obviousness

The partial technical problem suggested by the appellant ("to provide a certain [suitable] type of high energy source") is convincing since D1 does not disclose details of the operation mode of the high energy source and the skilled person has inevitably to select one.

The Board also concurs with the appellant's assessment that the choice of a pulsed energy source is an obvious selection from two commonly known alternatives (see also D2, paragraph [0036]: "The lasers [i.e. the high energy source] can be operated in either a pulsed mode or a continuous mode").

1.2.2 Partial problem related to features [1.5] and [1.6]

The appellant argued that the partial objective technical problem related to the shroud features was to improve the fluidic performance of open impellers while

providing a lightweight design. This problem can be agreed with.

However, not all the distinguishing features are obvious from common general knowledge or the prior art cited (D2 and D3) for the following reasons.

1.3 Obviousness of features [1.5] and [1.6]

1.3.1 Combination with common general knowledge

The Board agrees with the appellant that the provision of a shroud is obvious from common general knowledge. Respective selection criteria are summarised in document D8 (chapter 3), which is a representation of this common general knowledge. It is further convincing that, in view of the teaching of D1, the skilled person would consider also manufacturing this shroud by the same additive manufacturing method.

The Board is, however, not convinced that the provision of a lattice structure in the shroud is obvious from common general knowledge.

The appellant argues that if the skilled person decided to add a shroud to the impeller of D1, they would necessarily transfer the considerations that drove the design of the impeller parts of D1 (as according to paragraph [0032]: "to reduce the mass of the component") also to the added shroud and form this also with a lattice structure. However, this is not persuasive.

First, there are various ways to provide a solution to the problem other than in accordance with the invention, e.g.:

- to form the shroud without bulky parts (whether the shroud is a bulky part being debatable)
- to form the shroud of lightweight material
- to include a lattice structure in other parts of the impeller (such as in the blades as suggested in D6 or D7) or on the outside of the shroud

In contrast to the patent, D1 does not provide a generic teaching that (any) "bulky" part should preferably be formed with a lattice structure. Moreover, even if that were the case, it is questionable whether the skilled person would identify a shroud comprising such "bulky structures" as being suitable for a lattice structure. Also, according to D1, a simple void ("Freiraum") is considered sufficient, while in the void volume a reinforcing structure and in particular a lattice structure as shown in Figure 7 is only disclosed as an optional feature of the void (see paragraph [0009]: "zusätzlich kann das Rad mindestens eine Verstärkungsstruktur aufweisen").

1.3.2 Combination with the teaching of D2

D2 is directed to shroud components for gas turbines having operating temperatures of 1000 to 1700°C (paragraph [0002]). It is not convincing that the skilled person would consider the teaching of D2 in view of the objective technical problem of improving an impeller of a turbo-charger as disclosed in D1 (see paragraph [0002]).

Furthermore, even though D2 discloses forming features of the shroud by additive manufacturing (reference was made to Figure 7), these features are structures on the

shroud's outer surface and not in an inner volume. Also the reason for providing these positive features is unrelated to the objective technical problem defined above. These features are aimed at improving the heat transfer characteristics of the gas turbine shroud (see D2, paragraphs [0059] and [0001]).

1.3.3 Combination with the teaching of D3

The appellant refers to the embodiments of Figures 3 and 4, in which a shroud is either an integral part of the impeller or attached to the blades. It argues that D3 taught to produce the shroud from a composite material including a lattice structure part as shown in Figure 7H. This reduced the weight of the impeller (as was, for example, explained on page 17, first paragraph). Thus, either the skilled person added a shroud in accordance with Figures 3A and 3B to the impeller of D1 or modified the additive manufacturing process of D1 such that a shroud including a lattice structure was produced.

However, this is not persuasive. As explained above, the step of forming the lattice structure in an inner volume of the shroud according to feature [1.6] of claim 1 is restricted to additive manufacturing methods (see point 1.1.3). D3 teaches something different. In D3, a fibre material is embedded in a homogeneous matrix, preferably a polymer (page 16, fourth paragraph) to form a composite material. Even if D3 also mentions a lattice fibre structure "with empty spaces" (see patent, paragraph [0009]) according to Figure 7H without an embedding polymer as argued by the appellant with reference to page 16, second paragraph, such an embodiment would still not be produced by the required additive manufacturing step.

It is also not apparent from the disclosure of D3 how such a lattice structure with "empty spaces" is to be enclosed in an inner volume of the shroud.

It is true that D3 mentions the matrix to be at least in part composed of a metal such as aluminium, titanium, magnesium and their alloys or others (page 18, first full paragraph). This, however, is just in passing and with explicit reference to "another exemplary embodiment". There is no indication to combine these materials with the fibre structure of Figure 7H, let alone with the claimed additive manufacturing process. There is no indication that the additive manufacturing process of D1 can be applied to manufacture the much finer lattice structure shown in Figure 7H of D3 in combination with the metallic material disclosed for a different embodiment 2 two pages later. The appellant's objection in this context is hindsight driven.

2. Main request - inventive-step objections based on D5

The appellant raised objections of lack of inventive step based on D5 as the starting point in combination with common general knowledge, D6 or D7. The respondent requested that these objections not be considered in the appeal proceedings and, in the alternative, argued that they were not convincing.

For the reasons set out in the following paragraphs, the objections are to be considered in the appeal proceedings. They cannot, however, successfully invalidate the presence of an inventive step.

2.1 Consideration of the objections starting from D5

In the decision under appeal, only objections of lack of inventive step starting from document D1 were dealt with in detail for auxiliary request 2 (i.e. the current main request).

The respondent requested that the appellant's objections of lack of inventive step starting from D5 submitted with the statement setting out the grounds of appeal not be considered. It argued that it was "clearly [...] unfair for the appellant / opponent to introduce a whole new line of argument with D5 as the starting point at this stage when such arguments have not been decided upon by the opposition division".

2.1.1 However, objections of lack of inventive step based on combinations of D5 with D6, D7 or the common general knowledge had been raised by the appellant already in its notice of opposition. These objections were maintained during oral proceedings before the opposition division. According to the minutes of these oral proceedings (see point 6.4), the appellant had in regard to auxiliary request 2 at that time (i.e. the current main request) further referred "to the same combination of documents as for the main request" In other words, the objections based on D5 were maintained also for the current main request.

2.1.2 In the decision under appeal, the opposition division argued with respect to the current main request that D1 was the closest prior art since "D1 solves the same problem as the contested patent and has more common features with the patent in suit than D5". In view of this conclusion, the opposition division apparently

decided that the objection starting from D5 did not have to be dealt with in detail.

The Board does not agree with this approach.

2.1.3 Where the skilled person has a choice of several workable routes, i.e. routes starting from different documents, which might lead to the invention, it is established case law that the rationale of the problem-solution approach requires that the invention be assessed relative to all these possible routes before an inventive step can be acknowledged (Case Law of the Boards of Appeal, 10th edn., 2022, I.D.3.1., sixth paragraph; see also T 694/15, Reasons 13 to 15).

A situation in which a single "closest" prior art can be selected as the only one among several starting point might apply in certain exceptional situations (see Case Law of the Boards of Appeal, 10th edn., 2022, I.D.3.4.2). However, such a situation does not present itself in the case in hand.

D5 is also, like D2, a document concerning the same technical field as the claimed invention. D5 discloses an impeller with a hub and blades and - unlike D1 - a shroud all of which were formed by an additive manufacturing method, either integrally or as several parts (a disclosed example is selective laser sintering, see paragraph [0006], claims 1 and 2 and Figure 2). Thus, D5 does not have fewer common features than D1 but rather **different** distinguishing features when compared with the subject-matter of claim 1.

- D1 does not disclose a shroud, let alone a shroud having an inner lattice structure produced by additive manufacturing, i.e. the skilled person

would first have to consider adding a shroud at all.

- D5 discloses an impeller with a hub, blades and a shroud, all produced by additive manufacturing, but it does not disclose any lattice structure in an inner volume.

2.1.4 Hence, for the two different starting points, different objective technical problems apply. This requires different assessments, partly in combination with different teachings. It cannot be argued that either of these starting points - both from the technical field of impellers obtained by an additive manufacturing method - would be unreasonable in view of the invention in question.

Therefore, in the case in hand the objections from both starting points D1 and D5 have to be considered.

2.1.5 The respondent's argument that it was not "fair" to discuss the objections starting from document D5 only now in appeal in depth is not persuasive.

In the appealed decision, the opposition division had not decided not to admit these objections. The opposition division instead decided to exclude D5 as a starting point in the assessment of the requirements of Article 56 EPC for substantive reasons (impunged decision, II.3.2.6 to 3.2.7 in the context of the main request and minutes, this assessment being transferred to the maintained auxiliary request, see minutes 6.4). Hence, Article 12(6), first sentence RPBA is not applicable. For completeness, the Board further notes that these objections had been raised in the notice of opposition and therefore in due time within the meaning of Article 114(2) EPC. Hence, the opposition division

would not even have had any discretion not to admit them.

The objection having been considered in substance in the decision under appeal, the latter is based on it within the meaning of Article 12(2) RPBA, and the Board has no discretion under Article 12(4) RPBA not to admit it. Even if it had not been considered in substance, it would still have been admissibly raised and maintained in the proceedings leading to the decision under appeal, and the Board would likewise have no discretion under Article 12(4) RPBA not to admit it.

Having dismissed D5 as a suitable starting point, the opposition division did not provide a full assessment of the objections starting from this document under the problem-solution approach. However, under established case law, parties do not have a right to have their case (here: the inventive-step objections starting from D5) examined at two levels of jurisdiction (see Case Law of the Boards of Appeal, 10th edn., 2022, V.A. 9.2.1).

2.2 Common and distinguishing features and objective technical problems

As mentioned above, D5 is silent about any internal open volume, let alone a volume comprising a lattice-form structure in the impeller (features [1.4] and [1.6]). Consequently, D5 does not disclose a high energy source pulsed to generate such a structure either (feature [1.7]).

2.2.1 With respect to the pulsed energy source, the same partial problem applies as discussed in point 1.2.1

above, and also the conclusion that this choice is obvious applies here *mutatis mutandis*.

2.2.2 With respect to the lattice structure in the hub and the shroud the other partial technical problem can be formulated in accordance with paragraphs [0007] and [0023] of the patent: the provision of an impeller which reduced the overall impeller weight while maintaining the resistance against mechanical and thermal stresses, similar to what was argued by the appellant.

2.3 Obviousness of features [1.4] and [1.6]

The provision of a lattice structure produced by an additive manufacturing method in the hub and shroud is not made obvious for the following reasons.

2.3.1 Combination with common general knowledge

It is not convincing that the provision of lattice structures formed by the additive manufacturing process are obvious from common general knowledge alone (as argued by the appellant with reference to D2, D3, D4, D7 and D8). Only D1 and D6 disclose the formation of lattice structures in an inner volume by added manufacturing technology. However, these are patent documents and do not represent common general knowledge. D8 - the only document considered to represent common general knowledge (with respect to the provision of a shroud), is silent about lightweight design or inner lattice structures of the shroud.

Moreover, there are various alternative solutions to address the technical problem, examples being:

- the provision of voids without a lattice structure (see, for example, D1, paragraph [0009] "Freiraum", optionally with any kind of "Verstärkungsstruktur [reinforcement structure]")
- the use of composite materials (see, for example, D3)
- the choice of a lighter bulk material
- a different design of bulky parts (thinner)

Even if, for the sake of the argument, it were accepted that the production of lattice structures for a selective laser sintering method as in D5 was common practice, there is still no common general knowledge which teaches which parts of the impeller (comprising a shroud) should be provided with a lattice structure in an inner volume.

Among other factors, such a selection must ensure that the impeller (including its shroud) is not weakened as it is subjected to dynamic stresses when rotating. The choice of the hub and the shroud part can - in the absence of common general knowledge pointing the skilled person to such a selection - only be based on hindsight.

2.3.2 Combination with the teaching of D6

D6 discloses turbine vanes with an internal lattice structure ("Gitterstruktur"). D6 encompasses embodiments of the lattice structure (see paragraph [0015]: "offenzelluläre 3D-Raumstrukturen [open-cell 3D spatial structures]"). The purpose of the provision of lattice structures in D6 is to reduce the weight of the vanes but at the same time maintain their stability (see paragraphs [0006], [0009] and [0024]), i.e.

similar to the objective of the patent (see patent, paragraph [0007]).

The appellant's argument that the skilled person understands from D6 that in general "bulky" parts can be designed accordingly and would apply this teaching in an obvious manner to the hub and shroud parts of the impeller in D5 is not convincing.

D6 is exclusively focused on the production of turbine vanes. There is no generic teaching, including in paragraph [0015] cited by the appellant, pointing beyond design considerations specific to such vanes. In particular, there is no general teaching that any "bulky part" in the geometry of an impeller (including the inner volume of its shroud - the shroud not being in any way bulky in the above sense) can be produced accordingly. At most, the skilled person would consider the blades of the impeller in D5 - being possibly structurally and functionally similar to the vanes in D6, also with respect to dynamic loads - to be a possible candidate for a lattice structure.

The application of the teaching of D6 to the hub and the shroud parts of the impeller in D5, i.e. to implement a lattice structure as disclosed for the vanes in D6, is thus based on hindsight.

2.3.3 Combination with the teaching of D7

D7 is a moulding technique for an impeller in which only lattice-shaped inserts of the vanes are produced by additive manufacturing (page 17, second paragraph). Here, it is the choice of the moulding material and not the lattices which provide for low weight (page 8, third paragraph). Unlike in feature [1.6] the lattice

structure is not formed in an inner volume of the part; it is preformed and then used in the moulding process. Furthermore, it is not apparent why the skilled person would be motivated to apply this teaching to the hub and shroud portions of an impeller as disclosed in D5.

3. As the appellant's objections against the main request are not convincing, the appeal is not successful.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

D. Grundner C. Herberhold

Decision electronically authenticated