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D E C I S I O N
of 23 August 2001

Case Number: T 0701/97 - 3.3.5

Application Number: 89103599.0

Publication Number: 0324513

IPC: C04B 35/10

Language of the proceedings: EN

Title of invention:
Ceramic shaped article and methods of making same

Patentee:
NORTON COMANY

Opponents:
Minnesota Mining & Manufacturing Company, 3M Center
Hermes Schleifmittel GmbH & Co.
CERASIV GmbH Innovatives Keramik-Engineering

Headword:
Ceramic article/NORTON

Relevant legal provisions:
EPC Art. 76(1), 100(c), 113(1), 123(2)

Keyword:
"Procedural status of a non-appealing opponent in the case of rejection of multiple oppositions (not decided)"
"Fresh ground of opposition (no)"
"New arguments on appeal (allowable)"
"Subject-matter claimed in a patent granted in response to a divisional application not clearly and unambiguously disclosed in parent application as filed"
"Experimental reproduction of an example unsuitable evidence for establishing implicit properties of a product in the absence of a clear and complete disclosure of the process steps necessary for obtaining that product"

Decisions cited:
G 0010/91, G 0009/92, G 0001/93, G 0001/95, G 0007/95, G 0002/98, T 0383/88, T 0086/94, T 0432/94, T 0688/99

Catchword:
Where Article 100(c) EPC has been raised as a ground for opposition and has been considered in the appealed decision, it is the board's duty to assess correctly whether or not the respondent's requests comply with said Article. Hence, the board has to consider all arguments which are relevant, independently of

- the point in time at which they were introduced into the proceedings, see e.g. Case Law of the Boards of Appeal of the EPO, 1998, VI-F, 6, decision T 86/94 of 8 July 1997, reasons 2.2.2, and decision T 432/94 of 19 June 1997, reasons 5.4.1,

- the procedural status of the party who actually introduced them, and

- whether or not a given party, relying on these arguments, had based it's initial opposition on this ground.

Once the board has become aware, during the prosecution of the case, of additional arguments not raised by one of the parties, and which are of decisive importance in the correct assessment of the case within the given framework of Article 100(c) EPC, it has the power and the duty to bring them into consideration in the course of the proceedings.

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Case Number: T 0701/97 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 23 August 2001

Appellant: (Opponent III)
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Decision under appeal:

Decision of the Opposition Division of the European Patent Office posted 22 April 1997 rejecting the oppositions filed against European patent No. 0 324 513 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: R. K. Spangenberg
Members: B. P. Czech
M. B. Günzel

Summary of Facts and Submissions

I. The appeal is from a decision of the opposition division to reject the three oppositions filed against European patent No. 0 324 513.

Claim 1 of the granted patent reads as follows:

"Shaped ceramic articles consisting of a high density polycrystalline phase of submicron, equiaxed non-faceted α-Al_2O_3 crystallites and optionally faceted lath-like coarse crystals of alumina, randomly dispersed among the submicron crystallites, optionally further containing additives of zirconia, magnesia present as spinel and chromiumoxide for suppressing crystal growth, and impurities said articles having a density of greater than 90% of theoretical density and a hardness of at least 18 GPa, aluminous abrasive grits being excluded."

II. In the decision of the opposition division it was inter alia held that the amendments carried out during substantive examination met the requirements of Article 123(2) EPC, see reasons 2. In particular, the opposition division held that the combination of "a density of greater than 90% of the theoretical density and a hardness of at least 18 GPa is covered by the original disclosures", and did not consider "the term shaped ceramic article to be broader defined than the term shaped parts disclosed in the parent application". In the context of the assessment of novelty, the opposition division interpreted the expression "consisting of" as used in claim 1 to mean that "the product is made of only two crystallite types, namely the non-faceted submicron equiaxed and optionally additionally faceted lath-like coarse crystallites", see reasons 4.6.

III. In its written statement setting out the grounds of appeal, the appellant CERASIV GmbH Innovatives Keramik-Engineering (opponent III) contested the findings of the opposition division and raised objections on the ground of Article 123(2) EPC, arguing that "shaped ceramic articles" as referred to in claim 1 of the patent were not disclosed in the parent application.

IV. In its reply, the respondent NORTON COMPANY (patent proprietor) stated that since the appellant had not based his opposition on Article 100(c) EPC in the first instance, he was "not entitled to raise this new ground of opposition in the appeal", and "these new grounds should be rejected".

V. The parties were summoned for oral proceedings.

VI. With its letter dated 18 July 2001, in preparation of the oral proceedings, the non-appealing party Minnesota Mining & Manufacturing Company (opponent I) also raised objections against the claims of the contested patent, inter alia on the ground of Article 123 EPC. More particularly, it argued

- that "shaped ceramic article", let alone such articles having a density of more than 90% and a hardness of at least 18 GPa, were not disclosed at origin;

- that examples IV to IX did not indicate measured density and hardness values;

- that it could not be inferred from these examples that the products obtained are to be present as, let alone consist exclusively of, a "high density polycrystalline phase", having a density of more than 90% and a hardness of at least 18 GPa, the latter features having been combined in an

inadmissible manner with the features disclosed in these examples;

- that the disclaimer as used in claim 1 was not disclosed at origin, and that there was no justification for such a disclaimer;

- that the term "chromiumoxide" was broader than the term "Cr_2O_3" used in the parent application;

- and that, since claim 1 was not restricted to products obtained by sol-gel processes, let alone by seeded sol-gel processes, it would extend "beyond the subject-matter as originally filed".

VII. With its letter dated 23 July 2001, the respondent presented four sets of amended claims as main and first to third auxiliary requests. In the respective claims 1 of all requests, the term "chromiumoxide" as used in granted claim 1 was replaced by "Cr_2O_3". The respective claims 1 of the first to third auxiliary requests were further amended to respectively comprise additional features relating to the size of the crystallites, to the preparation method of the articles claimed, or to both. Concerning the objections raised by opponent I, the respondent, referring to decision G 9/92, reasons 10 and 11, argued that opponent I "did not have the necessary status to attack the patent", and that it was not allowable "to introduce a new ground under Article 123(2) EPC in this late stage of the proceedings, which has never been substantiated before". Moreover, it considered the arguments brought forward by the party as of right (opponent I) to be irrelevant.

VIII. With a communication date stamped 24 July 2001, the board noted

- that claim 1 as granted apparently differed from the claims of the parent application as originally filed, and

- that objections under Article 123(2) EPC had been raised during both the opposition and the appeal proceedings, and were dealt with in the decision of the opposition division;

and indicated inter alia

- that, since "claim 1 as granted covers different alternatives (products with or without coarse crystals, with or without additives for suppressing crystal growth) of a very specific combination of features (chemical, structural and physical properties)", it was "arguable whether the parent application as originally filed provides a sufficient basis for supporting all of the amendments carried out in the claims and the description";

- that the "respondent should therefore be prepared to indicate a supporting basis, in the parent application as originally filed, for every amendment to the description and/or claims (be it by addition, combination, generalisation or deletion of features) made during the examination, and for any further amendment envisaged";

- and that the parties should be prepared to comment on the meaning of the terms and expressions used in claim 1. The terms "consisting of", "submicron" and "impurities" were specifically addressed.

IX. Oral proceedings were held on 23 August 2001, in the presence of the appellant, the party as of right (opponent I) and the respondent.

In the course of the oral proceedings, the appellant and the party as of right inter alia questioned whether the combination of features comprised in the respective claims 1 had been disclosed in the parent application as filed. More particularly, it was discussed whether the application as filed disclosed products having a hardness of at least 18 GPa and consisting of submicron equiaxed non-faceted α-alumina. The board also questioned whether magnesia present in the products had to be considered as an impurity and where in the application as filed there could be found a disclosure for entirely magnesia-free products, having the required hardness and micro-structure.

X. The submissions as made by the parties, essentially during the oral proceedings, can be summarised as follows:

The appellant essentially argued that the parent application as originally filed would not disclose "shaped ceramic articles" - as opposed to abrasive grits - or methods for the preparation thereof.

Notwithstanding his request for the rejection of the appellant's objections for formal reasons, the respondent, to refute these objections, referred to the disclosure, in the parent application, of the expressions "shaped bodies", "coatings", "thin films", "fibres", "rods" or "small shaped parts".

The party as of right (opponent I) stated that objections under Article 100(c) EPC had already been raised during the opposition procedure and that he was entitled to present arguments concerning this ground of opposition. It submitted again that some features of claim 1 as granted had been taken from examples IV to IX, and combined with some more general and some more specific features not referred to in these examples, in

particular the features "consisting of", "high-density polycrystalline phase", "density greater than 90%" and "hardness of at least 18 GPa". These objections were fully supported by the appellant. Additionally, it submitted that according to his own experts ceramic products having a hardness of at least 18 GPa could not have been obtained with a firing time of only one minute as according to example IV.

The respondent

- referred to specific parts of the parent European patent application 85 100 506.6 as filed, which - in combination - would disclose ceramic articles not comprising any of the optional additives for suppressing crystal growth and consisting exclusively of submicron equiaxed non-faceted α-Al_2O_3 crystallites and impurities, and having a density of greater than 18 GPa, as according to one of the alternatives covered by claim 1;

- stated that the products free of lath-like crystallites, as covered by claim 1, were the commercially most interesting ones;

- argued that magnesia comprised in the final articles in amounts of e.g. 0.14% as in example X was to be considered as an impurity in the sense of claim 1;

- submitted that the product according to example IV was fully sintered and thus implicitly disclosed the hardness and density values required by claim 1, and that examples II and X implicitly disclosed the microstructure of claim 1;

- acknowledged that example IV was not clear as to whether a magnesium compound was added or not; and

- requested an opportunity to demonstrate, by carrying out experimental reproductions of examples IV and X, that the specific products obtained did indeed fulfil the criteria of particle size, absence of coarser particles, density and hardness.

XI. The appellant and the party as of right (opponent I) requested that the decision under appeal be set aside and that the patent be revoked.

As a main request, the respondent requested that the decision under appeal be set aside and that the patent be maintained with the claims of the main request filed with the letter dated 23 July 2001.

As auxiliary requests, he requested that the patent be maintained with the claims of any of the first to third auxiliary requests filed with the same letter, taken in their numerical order.

The other party as of right (opponent II) did not participate in the appeal proceedings and submitted no requests.

Reasons for the Decision

1. *New objections under Article 100(c) EPC*

1.1 In the first instance proceedings, Article 100(c) EPC had been invoked as a ground of opposition by opponent I and opponent II. This ground of opposition had been discussed during the first instance proceedings, both in writing and during the oral proceedings before the opposition division, see e.g. the annex to the summons for oral proceedings, item 4.2, and the minutes of the

oral proceedings, items 3, 4.5, 4.7 and 4.8. The opposition division has decided on this issue in its written decision, see reasons 2. Hence, objections on the ground of Article 100(c) EPC raised by the appellant, the party as of right (opponent I) or the board in the course of the appeal proceedings are not based on a "fresh ground" of opposition in the sense of opinion G 10/91 (OJ EPO 1993, 420) and decisions G 1/95 (OJ EPO 1996, 615) and G 7/95 (OJ EPO 1996, 626).

1.2 In the present case, some of the specific objections/arguments under Article 100(c) EPC discussed in the appeal proceedings (see items VI, VIII, IX and X here above), and on which the present decision is based, were not dealt with during the opposition proceedings. However, the board is not aware of any justification for excluding or disregarding relevant arguments concerning the ground of opposition under Article 100(c) EPC, for the sole reason that they differ from the lines of argument relied upon - under the same ground - before the first instance. In the examination of objections under Article 100(c) EPC, the contents of the application as filed and of the granted patent are to be considered as the relevant facts, and all attempts to demonstrate divergences between them are to be considered as arguments based on these facts. In such a case, the "legal and factual framework" as referred to in opinion G 10/91 (reasons 6) is not changed since no new facts or evidence and no new ground need to be relied upon. Where Article 100(c) EPC has been raised as a ground of opposition and has been considered in the appealed decision, it is the board's duty to assess correctly whether or not the respondent's requests comply with said Article. Hence, the board has to consider **all** arguments which are relevant, independently of

- the point in time at which they were introduced into the proceedings, see e.g. Case Law of the Boards of Appeal of the EPO, 1998, VI-F, 6, decision T 86/94 of 8 July 1997, reasons 2.2.2, and decision T 432/94 of 19 June 1997, reasons 5.4.1,

- the procedural status of the party who actually introduced them, and

- whether or not a given party, relying on these arguments, had based it's initial opposition on this ground.

For the same reason, once the board has become aware, during the prosecution of the case, of additional arguments not raised by one of the parties, and which are of decisive importance in the correct assessment of the case within the given framework of Article 100(c) EPC, it has the power and the duty to bring them into consideration in the course of the proceedings.

It need not, therefore, be pursued further in the present case, what the legal status and the rights of a non-appealing opponent are in appeal proceedings, when the oppositions were rejected by the opposition division. It need also not to be discussed whether the findings of decision G 9/92 (OJ EPO 1994, 875), relating to the situation where a patent was maintained in amended form by the opposition division, would be applicable to the present situation at all.

1.3 With its communication date stamped 24 July 2001, issued in preparation of the oral proceedings, the board has addressed the question of whether the parent application as originally filed provided a sufficient basis for supporting all of the amendments carried out in the claims. Independently thereof, the party as of

right (opponent I) has raised some objections in its written submission of 18 July 2001. The period of roughly one month in advance of the date of the oral proceedings was sufficient for the respondent to reconsider this aspect of the case and to familiarise itself again with the contents of its own parent application as filed, in particular since this text has a size of eleven pages only. Moreover, ample opportunity was given to the respondent during the oral proceedings to file requests comprising claims amended to overcome the deficiencies as discussed. Hence, the respondent has not been deprived of his right to be heard, in accordance with Article 113(1) EPC.

2. *Alternative products covered by claim 1 (main request)*

2.1 Leaving out all the features recited as optional, claim 1 according to the main request is directed, in one alternative, to "shaped ceramic articles consisting of a high density polycrystalline phase of submicron, equiaxed non-faceted α-Al_2O_3 crystallites, and impurities, said articles having a density of greater than 90% of theoretical density and a hardness of at least 18 GPa, aluminous abrasive grits being excluded". This embodiment is, in the following, labelled "alternative A" for the sake of conciseness of the decision.

2.2 Alternative A was introduced into claim 1 by an amendment submitted by the respondent during the examination proceedings, deviating from a proposal made by the examining division.

3. *Interpretation of claim 1 (main request), alternative A*

3.1 There is no dispute that it follows from the expression "consisting of" that, in the case of alternative A, no other components then "a polycrystalline phase of

submicron, equiaxed non-faceted alpha-Al_2O_3 crystallites" and "impurities" may be present in the claimed product. Crystallites having a size of more than 1 µm, being non-equiaxed and/or being faceted in the sense of the patent may thus not be present in the polycrystalline alumina phase. Moreover, the articles according to this alternative may not comprise the crystal growth-suppressing additives recited as optional in claim 1, and in particular they may not comprise the optional "magnesia present as spinel" component.

3.2 In claim 1 the term "impurities" is used to designate further components that may be present in the ceramic articles. Concerning the meaning of the term "impurities", which is not further defined in claim 1 itself, and which has only been introduced during substantive examination, one has to refer to the following passages of the parent application 85 100 506.6 as originally filed (in the following referred to as the "original application"):

- On page 3, lines 16 to 17, zinc and iron are mentioned as possible **impurities** introduced **from** the piping and associated **equipment**.

- On page 5, lines 6 to 7 and page 5, line 37 to page 6, line 2, reference is made to **impurities** contained **in** the alumina **milling media** used.

- On page 9, lines 14 to 26, SiO_2, Fe_2O_3, TiO_2 CaO and Na_2O are referred to as **impurities** introduced **during** the **milling** operation.

On the other hand, MgO, SiO_2, Cr_2O_3, and/or ZrO_2 are referred to as **additives** on - inter alia - page 2, lines 30 to 34, on page 4, lines 1 to 9, in example X

and on page 11, lines 9 to 26. According to the passages on pages 2 and 11, the addition of these compounds is optional, and they act as **crystal** or **"growth" inhibiting additives** where the high purity of the alpha-alumina is not a requirement. Moreover, it is noteworthy that on page 4, lines 1 to 4, the respondent himself qualified magnesia precursors as "the most useful **additives**", and that zirconia, magnesia and chromium oxide were labelled as "crystal growth suppressing **additives**" in claim 1 as granted.

3.2.1 The respondent argued during the oral proceedings that in view of the cited passages a skilled person would consider any components present in very small amounts to be impurities. Magnesia present in amounts as small as the 0.14% present in the product according to run 9498 of example X would therefore have to be considered as an impurity in the sense of claim 1.

3.2.2 The board cannot accept this interpretation, since it is not supported by the text of the original application.

The original description only refers to magnesia as an impurity of the alumina milling media. Nowhere, not even in the passage on page 9, is it clearly indicated that any magnesia comprised in the final products, irrespective of whether is has been deliberately added as magnesium compound or whether it originates from the alumina raw material or the milling media debris, has to be considered as an impurity. The board did not overlook that some of the components that might be comprised in the ceramic bodies produced, e.g. silica, are sometimes labelled as impurities and sometimes as additives (compare e.g. page 9, lines 23 to 26 and page 11, lines 9 to 10). The board also noted that although SiO_2 is mentioned as grain growth inhibitor on

page 11, lines 9 to 10, it has not been included in the list of optional components comprised in present claim 1.

However, since magnesia is qualified in the description as "the most useful **additive**", the board holds that it cannot be considered as an "impurity" at the same time. Whether a magnesium component present in the final ceramic article has been introduced by way of a separate addition of a magnesium compound or by means of the milling operation is of no relevance for the interpretation of the present product claim 1. In both cases, the magnesium component has to be considered as an additive with the inherent function indicated in the description, i.e. the suppression of crystal growth. Moreover, it does not clearly and unambiguously emanate from the original application that magnesia, which has not been **added** as magnesium compound, but is nevertheless present in the final product in very small amounts of e.g. the 0.14% mentioned in example X, run No. 9498, would **not** have a certain crystal growth inhibiting effect. Since neither the original application nor claim 1 indicate a clear borderline - in terms of a magnesia percentage - between a concentration range where magnesia is to be considered as an additive and a concentration range where magnesia is to be considered as an impurity in the sense of claim 1, the interpretation of the term impurity as adopted by the respondent is entirely arbitrary and cannot be accepted.

3.3 The cited passages of the description also make it clear that the term "impurities" is exclusively used to refer to the chemical nature of such components and not the shape of the alumina particles. Alumina particles of blocky, lath-like or any other shape which is not submicron, equiaxed and non-faceted are not to be

regarded as impurities in this sense and may thus not be contained in the products according to claim 1, alternative A. This was not disputed by the respondent.

3.4 Hence, the board holds that claim 1, alternative A has to be construed as being directed to products comprising no other α-Al_2O_3 components besides the "submicron, equiaxed non-faceted alpha-Al_2O_3 crystallites" and no magnesia (or other crystal growth suppressing components) in more than trace amounts being clearly ineffective to suppress crystal growth.

4. *Basis for amended claim 1 (main request), alternative A, in the original application*

4.1 According to Article 100(c) EPC, a patent granted in response to a divisional application, as in the present case, may be opposed on the ground that it's subject-matter "extends beyond the content of the earlier" (i.e. parent) "application as filed". A similar wording is used in Articles 76(1) and 123(2) EPC, which exclude the addition of new matter during examination.

4.1.1 The idea underlying these provisions is that an applicant should not be allowed to improve his position by adding subject-matter not disclosed in the original application, giving him an unwarranted advantage by obtaining patent protection for something he had not properly disclosed and maybe not even invented at filing date of the application, and possibly being damaging to the legal security of third parties relying on the contents of the original application (see G 1/93, OJ EPO 1994, 541, reasons 9 and 16).

4.1.2 An amendment must be regarded as introducing subject-matter extending beyond the content of the original application, if the overall change in the content of the application results in the skilled person being

presented with information which is not clearly and unambiguously presented in the original application, even when account is taken of matter which is implicit to a person skilled in the art (see e.g. T 688/99 of 11 July 2001, reasons 2.2 and T 383/88 of 1 December 1992, reasons 2.2.2). The criteria to be used when comparing a claimed invention to the subject-matter disclosed in an earlier document allegedly disclosing the same invention have recently been defined once more in the conclusion of opinion G 2/98 (OJ EPO 2001, 413), relating to the comparison between a claimed invention and a priority document: The skilled person must have been able to derive the subject-matter of the claim directly and unambiguously, using common general knowledge, from the previous application as a whole.

4.1.3 Where, as in the present case, an independent claim present in the parent application as originally filed (here claim 1) has been amended by addition of features (here "consisting of..." and "hardness of at least 18 GPa") restricting the scope of the claim and being taken from a number of not clearly related parts of the original application, it is not sufficient that all the added features are mentioned somewhere in that document. Rather, the **combination** of features in question must be clearly and unambiguously derivable from the document by a skilled person using common general knowledge. Therefore, multiple limitations generating specific subject-matter not derivable from the original application cannot be allowed.

4.2 The respondent did not dispute that the original application contains no **literal** disclosure of ceramic articles or grits having - in combination - all the properties recited in claim 1, alternative A, and more particularly

(i) a structure **consisting of** a polycrystalline phase of submicron, equiaxed and non-faceted α-alumina crystallites and impurities in the sense of claim 1 (for the proper construction of "consisting of" and "impurities" see item 3. here above),

(ii) a density of greater than 90% of the theoretical density, and

(iii) a **hardness of at least 18 GPa**.

Concerning the original disclosure of such products, the respondent relied on the original application taken as a whole, but more particularly on claim 1, examples IV and X, page 1, lines 2 to 5, page 2, lines 30 to 34, page 4, lines 15 to 19, page 7, lines 14 to 26, page 7, line 27 to page 8, line 2, and the passage on page 11, lines 2 to 6. It argued that the skilled person would read the information given in examples IV and X in combination with the general indications concerning structure, hardness and density of the ceramic bodies or grits as given in original claim 1 and on the original description pages 7,8 and 11, this combination disclosing the claimed articles.

4.3 The board is, however, convinced that neither these parts nor any other parts of the original disclosure can constitute a basis for the amended claim 1. As will appear from the following reasons, a ceramic product with the combined features (i), (ii) and (iii) has not been originally disclosed. Therefore, the further objections under Article 100(c) EPC which were raised against claim 1 by the appellant and the party as of right (opponent I), in particular against the disclaimer type limitation and the feature "shaped article", need not be considered.

4.3.1 In the original application, a polycrystalline phase **consisting** exclusively of submicron, equiaxed and non-faceted crystallites was not generally presented as being a key feature of the invention, even less in combination with the remaining features of (i), (ii) and (iii). In most of those parts of the original application wherein the alumina crystallite size in the finished products is addressed, language such as "containing" (claims 1 and 8, page 3, line 4), "consisting essentially" (claims 4 and 6), "mainly" page 6, line 21) or "having" (page 11, line 4) is used. Original claim 6 refers to products having a structure consisting of an alumina matrix and a secondary particulate material, see also page 4, lines 9 to 11, which is thus different from the structure of the products according to claim 1. Moreover, in view of the expression "consisting essentially of", the matrix needs not necessarily to consist exclusively of submicron equiaxed and non-faceted alumina crystallites. Example I mentions the presence of "rare blocky shapes about 5 micron in diameter", example III mentions a "cellular appearance", and according to examples V to IX "lath-like coarse crystals" occur in the final products at firing times of more than one minute. Nevertheless, products fired for up to five minutes, and hence comprising substantial amounts of coarser particles (see the table on page 7, right column) were originally labelled as "preferred", although the presence of coarse particles was "believed to be less desirable" (see page 7, lines 10 to 13). Examples II and X are silent about the shape and size of the alumina crystallites.

4.3.2 In fact, the only explicit mention of products with an alumina phase **consisting** of equiaxed, non-faceted and submicron α-alumina crystallites is to be found in example IV (see table on page 7, first row of data) and

in original claim 7. The grits defined in original claim 7 do, however, comprise an additional component forming a matrix of spinel (MgO being the only spinel former mentioned in the application) and cannot, therefore, form a basis for claim 1, alternative A. On the other hand, the grits obtained according to example IV do not comprise coarse alumina particles, but their specific density and hardness values are not indicated. These values cannot be regarded as being implicitly disclosed as the inevitable result of performing the experimental procedure described, as will become apparent from the following discussion of the disclosure provided by example IV.

4.3.3 Example IV

Concerning the experimental procedure relied upon, the description of examples IV to IX refers back to "the general procedure of example I", but neither the separate addition of a magnesium compound nor the nature of the milling media are explicitly addressed. As acknowledged by the respondent during the oral proceedings, the description of the experimental procedure used in example IV is, therefore, ambiguous as to whether a magnesium compound is added to the starting material or not. Moreover, the exact firing regime, and in particular the heat-up times used to reach the firing temperature, are not indicated such as e.g. in example X.

Assuming that a magnesium compound has been separately added in accordance with the general procedure of example I, the product obtained would contain about 5% MgO and could not support a claim directed to alternative A. Assuming, on the other hand, that the magnesia containing milling media of example I (see page 5, line 37 to page 6, line 3) were used, the skilled person would also expect the presence of

crystal growth inhibiting magnesium components in more than trace amounts in the final product, as indicated in example X (page 9, lines 23 to 26). Again, example IV could not support a claim directed to alternative A. Assuming further in the respondent's favour that magnesia had not been added, either separately or by means of the milling media debris, the fact remains that the hardness and density values of the product are not indicated. The board holds that the description passages cited by the respondent are too general and may not, therefore, be used for completing the specific information given in example IV for the following reasons:

- The passage on page 2, lines 30 to 34 does not refer to the total absence of crystal growth inhibitors such as magnesia, but merely states that strong (abrasive) bodies may be obtained without the (deliberate) **addition** of magnesia (e.g. as a compound). Moreover the passage is silent about the hardness and density values that may be obtained in that case, and does not exclude the presence of coarser, non-equiaxed and/or faceted alumina crystals.

- The board concurs with the appellant and opponent I in that the term "having" cannot be understood to be as narrow as the expression "consisting of". Hence, the passage on page 11, lines 2 to 6 does not - as suggested by the respondent during the oral proceedings - refer to the total absence of crystal growth inhibitors such as magnesia and does not exclude the presence of at least some coarser, non-equiaxed and/or faceted alumina crystals. The expression "high-purity α-alumina bodies" as used in this passage, does not - according to the respondent's own definition of

the term "impurities" - exclude the presence of non-negligible amounts of magnesia.

- The passage on original page 7, line 27 to page 8, line 2 merely states some ranges concerning the hardness values to be obtained for some specific products (abrasive grits). Preferably the hardness should be at least 18 GPa, but the value of 16 GPa is mentioned as a lower limit in the case of alumina (grits) "without additions". This passage does not disclose a discrete hardness value, let alone a value of 18 GPa or more, for the products of example IV. Neither does this particular passage generally exclude the presence of at least some coarser, non-equiaxed and/or faceted alumina crystals.

Moreover, from the table on page 5, relating to examples IV to IX, it emanates that products not comprising lath-like coarser particles could only be obtained with a firing time of 1 minute at 1400°C, the heat-up time used to reach the firing temperature not being indicated. Example IV merely illustrates explicitly that an increased firing time leads to crystal growth, as generally mentioned on page 4, lines 23 to 24. The one minute firing time of example IV is very short in comparison to the firing times used in the other examples, see e.g. 30 minutes in example I, 60 minutes in example II, up to 60 minutes in examples V to IX, and 15 minutes in example X. As pointed out by opponent I during the oral proceedings, an expert would rather assume that a product obtained with a firing time of one minute only would not be fully sintered, or at least not sintered to a high density and hardness. Information concerning the time used to reach the firing temperature of 1400°C (in example X, 15 minutes are used to raise the temperature from 450°C to 1400°C) is missing, although the importance thereof in the

sintering of the material cannot be neglected in view of the very short firing time at 1400°C. Hence, even when assuming in the respondent's favour that example IV does not disclose the addition of any magnesia, the information disclosed therein, even when read in conjunction with the more general description passages referred to above, is not sufficient to clearly establish that **both** a high hardness and an exclusively submicron polycrystalline alumina phase were obtained in the total absence (but for insignificant traces) of crystal growth inhibitors, and in particular of magnesia.

Summarising, no preference was given originally to products consisting exclusively of submicron crystallites and/or being entirely free - but for insignificant traces - of magnesia and other crystal growth inhibiting additives. On the other hand, a hardness value of more than 18 GPa was only mentioned as a preferred lower limit of a range in a broader context concerning various types of products. The disclosure of example IV is incomplete in terms of the experimental conditions used (addition/absence of magnesia, nature of milling media and firing regime). Examples II and X, which do lead to products with hardness values above 18 GPa, rely on relatively long firing times, which, on the other hand, are shown to go along with increased crystal growth. Hence, the board holds that a skilled person could not clearly and unambiguously take from the specific but incomplete example IV, even in view of the mentioned passages of the description, and even assuming that no magnesia was present, that the grits obtained according to this example would implicitly have a hardness of at least 18 GPa and a density of at least 90%. In this respect it is also to be observed that claim 7 of the original application explicitly refers to a product comprising

exclusively submicron equiaxed and non-faceted α-Al_2O_3 crystallites, and having a hardness of at least 18 GPa, but only in the presence of a spinel matrix.

A two-fold reproduction of example IV, with and without separate addition of magnesium, respectively, with measurements of the corresponding hardness and density values obtained, as offered by the respondent, cannot establish the implicit original disclosure of the products having the composition and properties according to alternative A, since it would necessarily be based on experimental conditions (addition/absence of magnesium, nature of milling media and firing regime) which were not clearly and unambiguously mentioned in the original application. Therefore, the offer of experimental reproduction had to be refused.

4.3.4 Examples II and X

Examples II and X are the only ones which do clearly **not** rely on the **separate** addition of a magnesium compound. Both examples II and X also specify a hardness of at least 19 GPa for the products obtained. However, they do not comprise any indication concerning the microstructure thereof, i.e. the absence of coarse alumina particles as required by alternative A of claim 1. According to the experimental procedures used in both examples II and X, the raw material is subjected to a pre-firing/calcination at 450°C for 16 hours, followed by firing at 1400°C for 60 minutes and 15 minutes, respectively.

During the oral proceedings, the appellant alleged that in the absence of specific statements pointing to the contrary, as in examples I and V-IX, the skilled person would infer from the description that the grits of examples II and X would not comprise coarser or non-

equiaxed crystals. The board does not accept this argument in view of the fact that - irrespective of the differences in the pre-firing times and temperatures used - the actual firing times at 1400°C are much longer in the latter examples than the one used in example IV, the only example explicitly disclosing the absence of coarse particles. The board therefore holds that in view of crystal growth induced by extended heating, see page 4, lines 23 to 24 and page 6, lines 30 to 34, the skilled reader would rather expect the final products of both examples to contain substantial amounts of crystallites being larger than 1 µm and/or non-equiaxed with such extended firing times.

According to example X (Run No. 9498), the milling was carried out as according to example I with alumina media and the final products are explicitly stated to contain 0.14% MgO, assumed to originate from the milling media, see page 9, lines 14 to 26. Since the products obtained in example X, run No. 9498 contain magnesia in an amount that cannot be qualified as being on an impurity level (see item 3. here above) and do not, therefore, exemplify alternative A, a completion of the information comprised in this example by reproducing the latter and analysing the microstructure of the products obtained, as offered by the respondent, could not have affected the conclusion of the board, and was therefore refused.

According to example II, the milling media comprise 1,74% MgO and 1,74% SiO_2 (see page 5, line 35 to page 8, line 2). Although the presence of magnesia in the final products is not addressed in example II, the skilled person would assume that the grits prepared, due to the desired media abrasion in the milling step (see e.g. page 3, lines 13 to 15, and example X, page 9, lines 23 to 25) would also contain magnesia in more than negligible trace amounts, MgO being qualified in the

description as most useful additive, having a well known "grain" or crystal growth suppressing or inhibiting effect, see page 4, lines 1 to 4 and page 11, lines 9 to 26. Moreover, whereas example X specifies the heat-up time from the calcination temperature of 450°C to the firing temperature of 1400°C, example II does not. In the board's view, this heat-up time cannot be neglected in view of the very short firing time to be observed for obtaining grits free of coarse particles (see example IV). Hence, assuming in the appellant's favour - although highly unlikely - that magnesia is not introduced in a crystal growth suppressing amount into the final grits of example II during the milling step, the board holds that the experimental conditions (firing regime, i.e. heat-up time) are not disclosed in a sufficiently clear and unambiguous manner that would justify the assumption that the products obtained implicitly do not contain coarse crystals. A re-working of this example, with an analysis of the crystallite sizes obtained, could not change this finding since it would also have to be based on experimental conditions (firing regime, i.e. heat-up time) which were not clearly and unambiguously mentioned in the original application.

Summarising, examples II and X do not, implicitly and/or explicitly, clearly disclose products not comprising non-negligible amounts of magnesia that could be considered as impurities, and/or not containing alumina crystallites being larger than 1 µm and/or being non-equiaxed or faceted. Even in the context of the total information comprised in the whole application as filed, these two examples do not constitute a clear and unambiguous disclosure of all the combined features of claim 1, alternative A.

4.3.5 The board also takes the view that some of the other more general passages of the description cannot

contribute to or constitute the disclosure of products according to claim 1, alternative A. Concerning the preparation method using milled water addressed on page 9, line 27 to page 10, line 20, the board holds that a skilled person would expect magnesia from the milling media debris to be present in the milled water in the same way as in a milled gel, the method thus leading to products containing magnesia, see in particular page 10, lines 18 to 20. According to the further methods referred to on page 10, lines 21 to 30, which rely on the use - as seed particles - of a settled suspension of high purity alumina mixed with water, of commercial fine α-alumina powders, or of fine alumina generated by milling very high purity alumina, using such alumina itself as a milling medium, the presence of blocky and/or lath-like alumina crystals in the finished products is not explicitly excluded either. These methods are only addressed in a general way, without clear indications concerning the process conditions, and in particular the firing regime applied. The properties of the products that may be obtained by using such seed particles are not specifically mentioned. All the passage says is that such seed particles were "effective" in producing "the dense finely crystallised product of the invention". Considering that according to the application as filed, the meaning of "the invention" encompassed products (grits) having a hardness as low as 16 GPa "without additions" (page 7, line 27 to 30) and "consisting essentially", but not exclusively, of submicron alumina crystallites, the skilled reader does not get from these passages any detailed information concerning the preparation of ceramic articles according to claim 1, alternative A.

4.4 For these reasons, the board is convinced that a skilled person reading the entire original application would not, without having to make assumptions requiring

the knowledge of the invention as now claimed, gather from it that the preparation of ceramic articles according to the claimed alternative A was initially envisaged. In the description of the experimental procedures, the skilled person would not perceive any clear and unambiguous teaching directed to the preparation of such products. Hence, the board holds that products with the combination of features defining alternative A of claim 1 according to the main request could not be clearly and unambiguously derived from the original application. Such ceramic articles thus constitute subject-matter extending beyond the content of the earlier application as filed in the sense of Articles 100(c) and 76(1) EPC. Hence, the main request cannot be allowed.

5. *Auxiliary requests*

In comparison to claim 1 of the main request, the respective claims 1 of the first to third auxiliary requests are further limited by the incorporation of additional features relating to the size of the Al_2O_3 crystallites obtained and/or to the method used for the preparation of the ceramic articles. Nevertheless, irrespective of these additional features, each of the respective claims 1 is still directed, in one alternative, to products fulfilling the combined criteria of absence of coarser particles, absence of specific crystal growth suppressing additives, including magnesia in spinel form, and hardness of at least 18 GPa, as in alternative A of claim 1 according to the main request. For the same reasons as stated above concerning the main request, the board holds that products with these combined properties could not be clearly and unambiguously derived from the original application. This finding is not affected by a reference to the size of the submicron crystallites obtained or to the process of preparation originally

disclosed. Such ceramic articles constituting subject-matter extending beyond the content of the earlier application as filed in the sense of Articles 100(c) and 76(1) EPC, the first to third auxiliary requests cannot be allowed either.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar

pp.

U. Bultmann

The Chairman

R. Spangenberg