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**Datasheet for the decision
of 16 September 2010**

Case Number: T 0814/08 - 3.3.05

Application Number: 02766076.0

Publication Number: 1425254

IPC: C04B 41/88

Language of the proceedings: EN

Title of invention:

Boron containing ceramic-aluminum metal composite and method
to form the composite

Patentee:

DOW GLOBAL TECHNOLOGIES INC.

Opponent:

ALCAN INTERNATIONAL LIMITED

Headword:

Ceramic-metal composite/ALCAN INT LTD

Relevant legal provisions:

EPC Art. 54, 56, 123(3)

Relevant legal provisions (EPC 1973):

-

Keyword:

"Novelty (main request): yes"

"Inventive step (main request) - evidence for the effect (yes)
- effect indicated in prior art - obvious solution"

"Auxiliary request (allowable) - method claims (not opposed) -
board bound by opponent's statement under Rule 55(c) EPC"

Decisions cited:

G 0009/91, T 0077/87, T 1437/07

Catchword:

-



Case Number: T 0814/08 - 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 16 September 2010

Appellant:
(Opponent)

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Decision under appeal:

Interlocutory decision of the Opposition
Division of the European Patent Office posted
5 March 2008 concerning maintenance of European
patent No. 1425254 in amended form.

Composition of the Board:

Chairman: G. Raths
Members: H. Engl
C. Vallet

Summary of Facts and Submissions

I. European patent EP-B-1 425 254 was granted with 21 claims. Independent claims 1, 11 and 18 read as follows:

"1. A method of forming a boron containing ceramic-aluminum metal composite comprising,
(a) mixing a boron containing ceramic with a metal powder comprised of aluminum or an aluminum alloy, where the boron containing ceramic is reactive with aluminum above the melting temperature of aluminum,
(b) shaping the mix of step (a) into a porous preform,
(c) contacting the porous preform with an infiltrating metal comprised of aluminum or aluminum alloy having a lower melting temperature than the metal powder, and
(d) heating the porous preform and infiltrating metal to an infiltrating temperature sufficient to melt the infiltrating metal but insufficient to melt the metal powder, such that the infiltrating metal infiltrates the porous preform and forms a substantially dense boron containing ceramic-aluminum metal composite."

"11. A boron containing ceramic-aluminum metal composite having a density of at least 95 percent of theoretical density and being comprised of at least 60 percent by volume aluminum metal or alloy thereof, with the boron containing ceramic and at least one reaction product of the boron containing ceramic and aluminum dispersed within the aluminum metal or alloy thereof."

"18. A vehicular part comprised of the composite of Claim 11."

- II. The opposition filed against the European patent was based on the grounds of opposition under Article 100(a) EPC and was specifically directed against granted claims 11 to 19 (i.e. the product claims) only.
- III. The opposition division maintained the European patent on the basis of amended claims 1 to 19 filed as a main request with letter dated 3 September 2007.
- IV. The documents cited in opposition proceedings included the following:
- D4: US-A-5 957 251
 - D5: J.P. Lucas *et al.*, J. Materials Sci. Eng. A131, 221 to 230, (1991)
 - D6: US-A-4 786 467
 - D9: Metals Handbook Vol. 15, pages 538 to 544 (1988)
 - D10: Affidavit and three exhibits by Dr X Grant Chen
 - D12: Further affidavit and exhibit XGC4 by Dr X Grant Chen
 - D13: ASM Handbook, Vol. 9, "*Metallography and Microstructures*", ASM International, Ohio, US, pages 404 to 410, 425 to 429
- V. The opposition division dismissed the opponent's novelty objection based on document D5. Claim 11 required that the amount of boron-containing ceramic in the composite was at least 50 vol.-% of the total amount of boron-containing ceramic and reaction product present in the composite. D5 did not clearly and unambiguously disclose that feature.

Claim 11 was also found to involve an inventive step over D1 or D4 because there was no suggestion to provide composites as defined in claim 11 having an Al content of at least 60 vol.-% in combination with high density and limited interface reaction.

VI. Claim 11 in the form maintained by the opposition division reads as follows:

"11. A boron containing ceramic-aluminum metal composite having a density of at least 95 percent of theoretical density and being comprised of at least 60 percent by volume aluminum metal or alloy thereof, with the boron containing ceramic and at least one reaction product of the boron containing ceramic and aluminum dispersed within the aluminum metal or alloy thereof, **wherein the amount of boron containing ceramic is at least 50 percent by volume of the total amount of boron containing ceramic and reaction product present in the composite.**"

(Amendments to claim 11 as granted in bold).

VII. The appeal was filed by the opponent by a letter dated 16 April 2008. The statement of grounds of appeal was filed under cover of letter dated 7 July 2008. It was accompanied by the new document

D14: US-A-5 700 962.

Further submissions were made in a letter dated 16 August 2010, including

D15: Affidavit of Mr Andris Bruno Innus, dated
13 August 2010,

and four references cited therein.

- VIII. The patentee's (respondent's) observations were received with letter dated 7 November 2008.
- IX. Oral proceedings were held on 16 September 2010. The respondent filed, as an auxiliary request, an amended set of claims consisting of claims 1 to 12 (based on claims 1 to 10, 20 and 21 as granted).
- X. The arguments of the appellant may be summarised as follows:

Novelty

The method described in D5 as "stir casting" and used for producing the composite samples analysed as proprietary had not necessarily been the same in 2001. Dr Chen asserted in his affidavit that the casting technique used in D5 was known as the "Duralcan process". Said process was described in D6, published in 1988. Therefore, in 2001 a person skilled in the art reading D5 and faced with a "stir casting" technique that was described in 1991 as proprietary would have had no difficulty in selecting the Duralcan process and thus would have had all the information needed to reproduce the teaching of D5. The appellant referred in this context to decision T 77/87.

Dr Chen declared in his first affidavit that densification by hot pressing, disclosed in D5, was known to reduce the porosity to between 1% and 2%.

The calculations made by Dr Chen in his second affidavit on the micrograph of Figure 2a of the Lucas paper (D5) resulted in a B₄C content of 56%. Dr Chen asserted that from his expertise he could not tell whether the illustrated composites (of D5) were made by stir casting or according to the opposed patent.

Therefore, the product of claim 11 lacked novelty over D5.

Inventive step

In view of paragraphs [0006] and [0010] of the patent, the problem underlying the opposed patent was that of improved bonding for the type of composite to which the opposed patent related.

This problem was clearly solved only by producing the composite using the patentee's claimed method, the improved bonding being ascribed to a limited interface reaction. However, as shown by example 3 (now outside the scope of the claims) and the other examples, the patentee could not assert that all composites falling within the scope of current claim 11 inherently possessed superior bonding and hence superior mechanical properties to composites falling outside said scope, or indeed composites prepared according to prior-art methods.

D1 admittedly discussed ceramic contents of at least 50%. However, D1 also taught use of higher metal contents to achieve higher theoretical densities, the reason for a high ceramic content being only to maximise the composite's hardness.

Similarly, D4 clearly taught the desirability of dense boron carbide-aluminium composites, made by the infiltration technique according to D2, in particular for vehicular parts. Said ceramic-metal composites also contained reaction products. It was noteworthy that the same Al alloy "6061" as in the opposed patent was used.

For these reasons, it would have been obvious to produce composites falling under the scope of claim 11 using known techniques other than the one disclosed in the opposed patent.

Document D14 described boron-containing metal matrix composites of the claimed type and their use as neutron shields. The composites were prepared by a combined high pressure pressing and sintering method achieving up to 99% of theoretical density. The intermetallic bonding between the boron carbide and the Al metal matrix described in D14 corresponded to the "interface reaction" of the opposed patent. By choosing the same Al alloy "6061" as the opposed patent, the boron containing ceramic Al composites exhibited improved bonding and mechanical properties. The exact amount of boron containing ceramic, compared with the total amount of boron-containing ceramic and reaction product in the composite was however presently not known.

XI. The arguments of the respondent may be summarised as follows:

D14 should not be admitted: It was not sufficiently relevant because it did not disclose essential features of claim 11. It was unclear how much Al reacted with the B₄C and how much Al remained in the composite. There was also no suggestion as to how to obtain a composite having a density of at least 95% of theoretical density by a dry-blending and pressing process.

Novelty

Regarding D5, the respondent argued that this document was not enabling with respect to the composites disclosed therein. Moreover, D5 said nothing about the amount of boron-containing ceramic in the composite. The affidavits submitted by the appellant in order to show that someone reproducing D5 would inevitably arrive at a product falling within claim 11 were tainted with methodological errors and unwarranted assumptions.

Inventive step

The problem that the invention set out to solve was the provision of ceramic composites having high metal concentrations (*i.e.* greater than 60% by volume) in which deleterious reaction phases were not formed to a significant extent, and the avoidance of slumping problems.

This problem was solved by the composite of claim 11 which could be prepared in accordance with the methods

of claims 1 to 10 (which the appellant acknowledged to be novel and inventive). Said product was distinguished from the prior art in that it had a density of at least 95% theoretical, an Al content of at least 60%, and a specified low level of the reaction product of boron carbide and Al. None of the cited references was able to produce such a composite, which therefore could not be obvious in the light of the references cited.

In particular, D1 indicated that merely increasing the metal content was not sufficient to densify the composite.

XII. Requests

The appellant requests that the decision under appeal be set aside and that the European patent be revoked, as far as pending claims 11 to 17 are concerned.

The respondent requests that the appeal be dismissed, or, in the alternative, that the patent be maintained according to auxiliary request 1 filed during oral proceedings.

Reasons for the Decision

1. Late-filed documents

Document D14 was filed by the appellant with the statement of grounds of appeal (letter dated 7 July 2008).

During oral proceedings, the respondent did not object to admitting this document into the proceedings, but criticised the fact that the appellant had not made a (complete) case regarding this document, as it should have done according to Article 12(2) RPBA. More specifically, the respondent argued that the appellant was not able to say whether the composites described in that document did or did not contain an amount of boron-containing ceramic which was at least 50% by volume of the total amount of boron-containing ceramics and reaction product.

However, the board considers that D14 which discloses a boron-containing ceramic-aluminium composite having at least 60% by volume of Al metal is *prima facie* highly relevant. The appellant had submitted arguments that the critical feature in question could be implicitly disclosed in D14 and had announced further evidence addressing this issue, evidence which was indeed filed with letter dated 16 August 2010 in the form of the affidavit of Mr Innus (D15). The respondent had been aware of the document since 2008 and had sufficient time to study it.

Therefore, document D14 is admitted into the procedure.

2. Novelty (main request)
 - 2.1 The appellant cited document D5 ("the Lucas paper") as novelty-destroying for the subject-matter of product claim 11.
 - 2.1.1 D5 concerns the matrix microstructure and interfacial precipitation of Al-7Si metal matrix composites (MMCs)

containing B₄C and SiC particulates processed by a stir-cast technique (page 222, right-hand column, second paragraph). One of the MMCs under investigation comprised 25 vol.-% of B₄C as a particulate material and an Al matrix alloy A 356 containing 7 wt-% Si and minor amounts of Mg, Ti and Fe (page 222, right hand column, last paragraph and Table 1). This composite material was supplied by Dural Aluminium Composites Corporation, La Jolla, Ca., USA, in bar form. D5, page 223, left-hand column, first paragraph, states: "*Details of the casting technique are considered proprietary by the manufacturer, but the basic processing steps include surface preparation of the reinforcement and then combining the reinforcement with the matrix by stir casting which facilitates suspension of the reinforcement in the molten metal. In all cases, the cast composites were hot isostatically pressed to reduce casting porosity.*"

The microstructure of the Al-B₄C-MMCs is shown in the micrographs of Figure 2 on page 224 and reveals extensive reaction of the Al alloy matrix on and near the B₄C interface, extending approximately 5 µm inward from the particulate surface. The typical reaction products of B₄C reinforcement and aluminium are reported to be AlB and Al₄C₃ (page 227, right-hand column).

In his second affidavit Dr Chen subjected three of the micrographs of the Lucas paper to image analysing by high resolution digitising, handtracing of the various phases identified and software calculating the surface areas. He finds a value of 56% of the total B₄C content of the composite of Figure 2a (Exhibit XGC4). In his first affidavit, Dr Chen estimated the porosity of the

composite after densification by hot pressing to be between 1% and 2%, or, in other words, the density of the hot pressed material of Lucas as 98% to 99% of theoretical density.

Dr Chen finally states: *"While I appreciate that on the one hand the Patentee describes in European Patent No. 1425254 only the production of composite form metal powder using an infiltration technique whilst on the other hand Lucas describes in his paper only the production of composites by stir-casting, it is my opinion that both of these production techniques could result in composite material which is very similar, if not identical. Indeed, just looking at the micrographs of the Lucas paper, I could not say by which method the illustrated composites were formed."*

Dr Chen concludes that at least some of the composite material of the Lucas paper would fall within what the patentee defined in the opposed patent as novel material.

- 2.1.2 In the board's view, these arguments are neither convincing as such nor sufficient to deny novelty of the subject-matter of claim 11.

Firstly, D5 does not reveal the claim feature according to which *"the amount of boron containing ceramic is at least 50 percent by volume of the total amount of boron containing ceramic and reaction product present in the composite."*

Secondly, Dr Chen's assumption of a theoretical density of 98 to 99% is a mere estimation which is not

supported by a corresponding disclosure in D5, but apparently based on data obtained from hot pressing of Al castings (D9 = exhibit XGC3, page 539, Figure 2). The board doubts whether results obtained from HIP experiments of a cast Al alloy IN738 can be readily transferred to composites containing a substantial amount of ceramic, such as boron carbide.

Lastly, and most importantly, the board is of the opinion that D5 in itself is not an enabling disclosure of a preparation method for the Al-B₄C MMCs under investigation, because the paper clearly states that the process of manufacture is proprietary (i.e. kept secret by the supplier of the MMCs) and involves undisclosed process steps such as surface preparation of the reinforcement, the processing temperatures, and the details of the stir casting which were not part of the skilled person's common knowledge at the relevant time of the opposed patent. It is mere speculation when Dr Chen in his first affidavit (point 4) tries to fill the disclosure gaps of D5 as regards the method of producing the MMCs by referring to the so-called Duralcan process (D6, published in 1988). Although D6 does disclose a stir casting process for making Al MMCs, nothing in D5 indicates with the required certainty that the process described in D6 had indeed been used by Dural Aluminium Composites Corporation in the production of the composite material supplied to Lucas and co-workers.

- 2.1.3 The appellant cited T 77/87 (OJ EPO 1990, 280) *"as making clear that where in a single document relied on there is an inconsistency or lack of teaching, then it [was] legitimate to look behind the document to another*

document or relevant teaching in order to understand properly the disclosure of that document." The appellant argued that a person skilled in the art in 2001 reading D5 and faced with a "stir casting" technique that was described in 1991 as proprietary would have no difficulty in selecting the Duralcan process and thus be equipped readily to reproduce the teaching of D5.

The board cannot accept this argument, for the following reasons.

Decision T 77/87 states: *"Summarising, the inconsistency between abstract document (7) and its basic original document (7') would lead the man skilled in the art to ignore the abstract as erroneous and to consider as relevant teaching only the description according to the basic document"* (Reasons, point 4.1.6). Thus T 77/87 refers to an inconsistency (an obvious error, a technical impossibility) in a document and how it is resolved by the skilled person. It does not deal with a situation where essential information is missing or deliberately withheld, as in the present case. In the case of D5 there is no error or technical impossibility which could or should be resolved by referring to some related basic document.

- 2.1.4 According to T 1437/07 (of 26 October 2009; Reasons, point 25), a *"disclosure in a prior art document is novelty-destroying only if the teaching it contains is reproducible. This need for an enabling disclosure is in conformity with the principle expressed in Article 83 EPC. Thus, the requirements of sufficiency*

of disclosure are identical for a prior art document and a patent."

As pointed out above, the Lucas paper does not enable a person of ordinary skill in the art to produce the MMCs under investigation. It is also not clear and proven beyond reasonable doubt that the composite material supplied by Dural Aluminium Composites Corporation, La Jolla, Ca., USA, was made by the Duralcan process disclosed in D6.

2.1.5 The board therefore concludes that D5 does not anticipate the subject-matter of claim 11.

2.2 No further documents have been cited against novelty.

Document D14 does not clearly and unambiguously disclose ceramic-aluminium composites having densities exceeding 95% of theoretical density as called for in claim 11 of the opposed patent.

Document D8 was published on 2 October 2001, after the priority date of the patent in suit. As the board finds the priority of the patent in suit of 29 August 2001 to be valid, D8 does not belong to the state of the art under Article 54(1) and (2) EPC.

The board, having examined the remaining prior-art documents, concludes that claim 11 satisfies the requirements of Article 54(1) and (2) EPC.

The same applies to dependent product claims 12 to 17 which refer directly or indirectly back to claim 11.

3. Inventive step

Main request

3.1 As far as the subject-matter of claims 11 to 17 is concerned, the opposed patent relates to boron containing ceramic-aluminium composites of high density and high aluminium content.

3.2 The board had first to decide which one of the documents D4, D5 and D14 would qualify as the most suitable starting point for assessing inventive step. It considers that the most relevant prior art is to be found in documents disclosing similar boron-containing ceramic metal composites having a high density and containing a substantial proportion of Al metal or alloy, as for instance in documents D4 and D14.

The board disregards D5 for the assessment of inventive step because it does not enable the skilled person to actually reproduce the aluminium-ceramic composites described therein.

3.2.1 Of the first mentioned documents, D4 discloses ceramic-metal composites wherein the metal is Al and the ceramic phase consists of at least two boron-containing phases and is present in an amount of at least about 20% by volume of the composite (claims 1, 2 and 6; column 4, lines 11 to 23; column 7, line 17 to column 8, line 4). D4 does not disclose a concrete example of an Al-B₄C composite and also fails to disclose composites having an Al content of at least 60%.

The appellant argued that D4 taught the desirability of high aluminium-boron carbide composites, particularly for vehicular parts, and that it described by reference to D2 (column 8, lines 2 to 4) the infiltration methods that could be used for preparing them.

The board cannot agree. D4 clearly advocates against high aluminium contents in the composite (column 4, lines 16 to 19). The preferred embodiments contain at least about 50%, the most preferred embodiments at least about 85% by volume of the ceramic phase, and consequently less than 50%, preferably even less than 15% of Al metal. The infiltration method described in D2 likewise yields composites of 1 to 40% by volume of Al (see claim 4 and examples 1 and 2), which is substantially below the aluminium percentages claimed in claim 11 of the opposed patent. For these reasons, D4 neither directly nor by way of reference to D2 suggests the claimed high Al composites.

3.2.2 The board regards D14 as representing the closest prior art, because it disclosed a boron-containing ceramic - aluminium composite having at least 60% by volume of Al metal densified to a high degree. See column 4, line 44 to column 5, line 34; claim 8; Figure 1; column 2, lines 24 to 30.

3.3 The next step in assessing inventive step is to define the problem underlying the patent in suit in the light of D14.

3.3.1 It can be derived from the description of the opposed patent, paragraphs [0006] and [0010], that one object of the claimed invention is the provision of a

substantially dense boron carbide aluminium metal matrix composite having a high Al content and having improved bonding between the boron carbide and the aluminium. The patent in suit attributes this improved bonding *"to the production of reaction phases between the boron carbide and aluminum in a controlled manner due to the low infiltration temperatures"* (paragraph [0010], second sentence). According to paragraph [0033], *"the boron containing ceramic-aluminum composite of the present invention has improved bonding resulting in a composite that is both light weight and stiffer than aluminum, while retaining much, if not all, of the toughness of aluminum. Because of this, the composite is particularly useful for vehicular parts."*

3.3.2 However, no direct comparison is available between the composites of D14 and those of the opposed patent as regards the bonding strength between the boron carbide and the aluminium matrix. Therefore, an improvement over D14 cannot be acknowledged.

3.3.3 The board also considered the claim feature according to which *"the amount of boron containing ceramic of the total amount of boron containing ceramic and reaction product present in the composite is at least 50% by volume"*. It is not apparent what the contribution of this feature is with respect to the bonding between the ceramic and the matrix. Example 3 of the opposed patent exhibits an amount of boron containing ceramic of the total amount of boron-containing ceramic and reaction product present in the composite of less than 50% by volume and is therefore not in accordance with the invention as now claimed in claim 11. In view of the high amount of reaction phases, one would expect

comparably poor ceramic-matrix bonding. Nevertheless one observes that the mechanical properties of the composite of example 3 are far better in terms of strength, hardness and elastic modulus than those of the composites of examples 1 and 2.

TABLE

Example No.	1	2	3 (comp.)
Strength MPA	220	200	450
Hardness kg/mm ²	350	500	550
Elastic modulus GPa	65	70	150

Therefore, the claim feature at issue is not related to the technical problem and to its solution as set out in the description of the opposed patent and cannot be taken into account when formulating the objective technical problem underlying the opposed patent.

However, the respondent offered the following explanation for the superior mechanical properties of example 3. The improvement of the properties of example 3 over those of examples 1 and 2 was due to an additional heat treatment step at 1025°C for 5 minutes. Said heat treatment also increased the proportion of reaction product.

3.3.4 The technical problem underlying the patent in suit in the light of D14 is therefore seen as providing a substantially dense boron containing aluminium metal matrix composite having a high Al content and a high

bonding between the boron carbide and the aluminium matrix.

3.4 As a solution to this problem, the patent in suit proposes a composite according to claim 11, characterised in that the amount of boron-containing ceramic is at least 50 percent by volume of the total amount of boron-containing ceramic and reaction product present in the composite and in that the density is at least 95% of theoretical density.

3.5 The next step is to verify whether the problem has actually been solved.

Examples 1 and 2 of the opposed patent illustrate boron-containing aluminium composites having a high density exceeding 95% of theoretical density, an Al content of respectively 73% and 65%, and mechanical properties (in terms of strength, hardness and elastic modulus; see table under point 3.3.3) which are indicative of a substantial bonding between ceramic and matrix.

In view of this experimental evidence, the board is satisfied that the technical problem is successfully solved.

3.6 It remains to be decided whether the proposed technical solution is obvious in view of the prior art.

3.6.1 The boron carbide - aluminium metal matrix composites (MMCs) disclosed in D14 have a composition of about 10 to 30 weight-% boron carbide, about 70 to 90 weight-% of a metal matrix material and less than about

3 weight-% of metal additives (see claim 8). These additives are added to improve the chelating properties of the metal matrix material by forming intermetallic bonds (column 4, lines 5 to 8; claims 9 and 13). A typical formulation is an MMC of Al alloy 6601 and 20 weight-% boron carbide (column 5, lines 13 to 18).

As the opposition was directed against the product claims, not the method claims, a distinction between these types of claims is indispensable.

The MMCs according to D14 are formed by a powder metallurgical consolidation process involving the steps of dry blending, high pressure pressing and heating process (45 minutes at 625°C) (step S16 in Figure 2; column 3, lines 1 to 8; column 4, lines 44 to 54). Evidently, such a process differs from the preform infiltration process according to claim 1 of the opposed patent.

However, D14 is nevertheless relevant for the composites claimed in claim 11 of the opposed patent, because these are not, or not necessarily, prepared by the process according to claim 1.

- 3.6.2 The claim feature according to which *"the amount of boron containing ceramic is at least 50 percent by volume of the total amount of boron containing ceramic and reaction product present in the composite"* is not explicitly disclosed in D14. Moreover, it results from the affidavit of Mr Innus (points 14 to 16) that under the reaction conditions of D14 (45 minutes at 625°C), a typical starting composition of 60 weight-% B₄C, 6% Si as an additive, and remainder Al would lead to a

composition of the MMC of 57.5% B₄C, 6.6% Si, 28.5% Al, 2.6% Al₄C₃ and 4.9% AlB₂, yielding a ratio of boron carbide to the total amount of reaction products and boron carbide of 88.5%, i.e. well within the claimed range. These calculations of Mr Innus and the underlying assumptions have not been contested. The board therefore concludes that the MMCs prepared in accordance with D14 implicitly satisfy the above-mentioned claim feature.

It follows that the MMCs of D14 also exhibit a high ceramic-matrix bonding and, consequently, high strength and fracture resistance. This is in fact what is explicitly disclosed in D14 (column 3, lines 8 to 20; column 5, lines 14 to 34).

3.6.3 According to claim 8 of D14, the densities of the composites range from 2.5 to 2.8 g/cm³. This roughly converts to about 93% to 98% of theoretical density, calculated for a composition of 90% Al and 10% B₄C, and disregarding any reaction product formed (density B₄C = 2.52 g/cm³, density Al = 2.7 g/cm³). Although it may be derived from column 2, lines 24 to 30, that recent powder metallurgical consolidation techniques, as employed in D14, yield composites of 99% theoretical density, there is no unambiguous and explicit disclosure in D14 of densities exceeding 95% of theoretical density as stipulated in claim 11 of the opposed patent.

3.6.4 The board is of the opinion that the skilled person would have no difficulty in bridging the minor gap between the B₄C/Al MMCs already having high densities of 2.5 to 2.8 g/cm³ disclosed in D14 and the subject-matter

of claim 11 of the opposed patent, if necessary by increasing the pressure in the HIP (hot isostatic pressing) process and/or the sintering time, so as to arrive at a composite having a density of at least 95% of theoretical density. D14 teaches in the general statement in column 2, lines 24 to 30, that recent powder metallurgical consolidation techniques yield composites of 99% theoretical density. This is a confirmation that such high densities could be achieved by the HIP/sintering process disclosed in D14.

- 3.7 For these reasons, the subject-matter of claim 11 does not involve an inventive step (Article 56 EPC). The main request is therefore not allowable.

First auxiliary request

- 3.8 The board in its examination of the appeal is bound by the statement of the opponent under Rule 55(c) EPC of the extent to which the patent is opposed (G 9/91, Reasons, point 5, first sentence). Decision G 9/91 (OJ EPO 1993, 408; Order, first sentence), states that "*[t]he power of an Opposition Division or a Board of Appeal to examine and decide on the maintenance of a European patent under Articles 101 and 102 EPC depends upon the extent to which the patent is opposed in the notice of opposition pursuant to Rule 55(c) EPC.*"

- 3.9 Granted claims 1 to 10, 20 and 21 are not comprised in the opposition procedure. Therefore, corresponding claims 1 to 12 of the auxiliary request are not under scrutiny by the board.

Consequently, the case is to be remitted to the department of first instance with the order to maintain the patent on the basis of this auxiliary request.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to maintain the patent on the basis of claims 1 to 12 according to auxiliary request 1 filed at the oral proceedings and a description to be adapted.

The Registrar

The Chairman

C. Vodz

G. Rath