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Datasheet for the decision of 26 June 2025

Case Number: T 1186/23 - 3.2.03

Application Number: 16826954.6

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Language of the proceedings: EN

Title of invention:
PLASMA ATOMIZATION METAL POWDER MANUFACTURING PROCESSES AND SYSTEMS THEREFORE

Patent Proprietor:
AP&C Advanced Powders&Coatings Inc.

Opponent:
Tekna Plasma Systems Inc.

Headword:

Relevant legal provisions:
EPC Art. 100(c), 111(1)

Keyword:
Grounds for opposition - extension of subject-matter (no)
Appeal decision - remittal to the department of first instance (yes)

Decisions cited:

Catchword:

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Beschwerdekammern

Boards of Appeal

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Case Number: T 1186/23 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 26 June 2025

Appellant: (Patent Proprietor)	AP&C Advanced Powders&Coatings Inc. 3765 La Verendrye Boisbriand, Québec J7H 1R8 (CA)
Representative:	Hafner & Kohl PartmbB Schleiermacherstraße 25 90491 Nürnberg (DE)
Respondent: (Opponent)	Tekna Plasma Systems Inc. 2935 boul. lndustriel Sherbrooke, Quebec J1L 2T9 (CA)
Representative:	Lavoix Bayerstraße 83 80335 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 25 April 2023 revoking European patent No. 3325196 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairwoman	J. Hoppe
Members:	B. Miller
	M. Olapinski

Summary of Facts and Submissions

I. European patent No. 3 325 196 B1 ("the patent") relates to a plasma atomisation process for preparing metal powders.

II. An opposition against the patent was filed on the grounds of Article 100(a), (b) and (c) EPC.
The opposition division concluded that the ground for opposition under Article 100(c) EPC prejudiced the maintenance of the patent as granted and that the auxiliary requests on file did not meet the requirements of the EPC (Articles 123(3) and 84 EPC).

The decision was appealed by the patent proprietor ("the appellant").

III. The parties' requests at the end of the oral proceedings were as follows.

The appellant requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or, as an auxiliary measure, that the patent be maintained in amended form on the basis of auxiliary request 1.1, filed with the letter dated 17 June 2025 or one of auxiliary requests 1 to 72, la to 68a and 1b to 72b, filed with the grounds of appeal, in the order given.

The appellant further requested that the case be remitted to the opposition division for further prosecution if the Board concluded that the main request did not extend beyond the application as filed.

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

IV. Wording of claim 1 of the requests at issue in this decision

(a) Claim 1 as granted, including the feature numbering as proposed in point I.7.1 of the contested decision, reads:

M1 "A plasma atomization metal powder manufacturing process comprising:
M2 providing a heated metal source;
M3 aligning the heated metal source with a plasma of at least one plasma source,
M4 the aligning comprising positioning the heated metal source within at most 5 centimeters from an outlet nozzle of the at least one plasma source; and
M5 contacting said heated metal source with the plasma of the at least one plasma source under conditions effective for causing atomization of said heated metal source, wherein
M6.1 said atomization is carried out by using a total gas to metal mass ratio of less than about 20,
M6.2 wherein said ratio refers to the mass per unit of time (Kg/s) of gas injected for the mass rate (Kg/s) of metal source to the atomization zone,
M7.1 thereby at least 80% of the obtained powder has a particle size distribution of about 0-106 µm,
M7.2 measured according to ASTM B214."

(b) The wording of dependent claims 6, 7 and 9 is reflected below under point 2. The wording of the further auxiliary requests is not relevant for the decision.

V. Oral proceedings were held on 26 June 2025 in the form of a videoconference as requested by the parties.

VI. The appellant's arguments relevant for this decision can be summarised as follows.

The subject-matter of claim 1 was based on claim 27 as filed in combination with dependent claims 30 and 43 and paragraphs [0031] and [0032] of the application as originally filed. The addition of the term "total" in feature M6.1 did not extend beyond the teaching of the application as filed because feature M6.1 had to be interpreted in the context of feature M6.2, which provided a definition of what was meant by the expression "total gas to metal mass ratio". This definition had a literal basis in paragraph [0032] of the application. The technical meaning of this definition was not changed by the insertion of the term "total" in feature M6.1. The gas to be considered in the total gas to metal mass ratio according to claim 1 as granted was the same as the gas to be considered in the "gas to metal ratio" defined in the application as filed.

Paragraphs [0053] and [0054] of the application provided a direct and unambiguous basis for claims 6 and 7 as granted.

Using a water-cooled crucible (skull melting) was not functionally or structurally linked to the provision of a melt stream. Hence, claim 9 did not create an

unallowable intermediate generalisation of the disclosure in paragraph [0038] of the application.

VII. The respondent's counter-arguments can be summarised as follows.

The application as filed did not disclose a total gas to metal mass ratio but only a gas to metal ratio.

The definition of feature M6.2 was unclear since the expression "to the atomization zone" could relate to "gas injected" or to "the mass rate (Kg/s) of metal source".

The insertion of the term "total" changed the technical meaning of the expression "gas to metal mass ratio" in feature M6.1 and its definition in feature M6.2.

Contrary to the teaching of the application as filed, amended feature M6.1 required that for the defined total gas to metal mass ratio, any gas involved in the atomisation process, for example, also the cooling gas, had to be considered.

The subject-matter of claims 6, 7 and 9 as granted extended beyond the teaching of the application because the combination of features defined was not directly and unambiguously derivable from the application as filed. Claim 9 constituted an intermediate generalisation of the disclosure in paragraph [0038] since claim 9 did not specify that the melt stream was derived from a raw material melted in a water-cooled crucible (skull melting). Skull melting allowed obtaining a metal stream without impurities. The use of a water-cooled crucible was thus linked to the goal of obtaining metal particles without impurities.

Reasons for the Decision

1. Main request - basis for the features of granted claim 1

1.1 As summarised in the following table, claim 1 as granted according to the main request is based on a combination of claim 27 as filed with dependent claims 30 and 43 and paragraphs [0031] and [0032] of the application as originally filed (in this regard, reference is made to the application as published: WO 2017/011900 A1, in the following, "the application"). In addition, the expression "gas to metal ratio" has been amended to "**total** gas to metal **mass** ratio".

feature No	wording of claim 1	Basis in the application
M1	A plasma atomization metal powder manufacturing process comprising:	claim 27
M2	providing a heated metal source;	claim 27
M3	aligning the heated metal source with a plasma of at least one plasma source,	claim 27
M4	the aligning comprising positioning the heated metal source within at most 5 centimeters from an outlet nozzle of the at least one plasma source; and	claim 30

M5	contacting said heated metal source with the plasma of the at least one plasma source under conditions effective for causing atomization of said heated metal source, wherein	claim 27
M6.1	said atomization is carried out by using a **total** gas to metal **mass** ratio of less than about 20,	claim 43
M6.2	wherein said ratio refers to the mass per unit of time (Kg/s) of gas injected for the mass rate (Kg/s) of metal source to the atomization zone,	paragraph [0032]
M7.1	thereby at least 80% of the obtained powder has a particle size distribution of about 0-106 µm,	claim 43
M7.2	measured according to ASTM B214.	paragraph [0031]

1.2 The opposition division considered, in line with the arguments of the respondent, that the addition of the term "total" in feature M6.1 of claim 1 as granted extended the claimed subject-matter beyond the content of the application as filed.

The Board disagrees for the following reasons.

1.3 It is correct that the application (WO 2017/011900 A1) does not provide a literal basis for the expression "**total** gas to metal mass ratio" in feature M6.1 of claim 1 as granted.

However, the Board agrees with the appellant's view that adding the term "**total**" to the expression "gas to metal ratio" from claim 43 as filed in the context of the remaining features of claim 1 does not generate

subject-matter which extends beyond the content of the application.

1.4 Feature M6.2 directly refers to "said ratio" in feature M6.1. Feature M6.2 therefore provides a definition for what is to be understood by the amended expression "**total** gas to metal mass ratio" in feature M6.1 of claim 1.

This definition according to feature M6.2 has been taken literally from paragraph [0032] of the application and defines that the ratio according to feature M6.1 refers to a mass ratio, more specifically to the "mass per unit of time (Kg/s) of gas injected for the mass rate (Kg/s) of metal source to the atomization zone". Hence, the meaning of the newly inserted expression within the context of claim 1 corresponds to the original disclosure.

1.5 As regards the gas to be taken into account in the ratio, feature M6.2, like the ratio defined in paragraph [0032] of the application, refers to the mass per unit of time (Kg/s) of gas injected. Irrespective of whether the expression "to the atomization zone" applies to "gas injected" or could also be understood to relate to "the mass rate (Kg/s) of metal source", the gas to metal ratio includes all the gas injected defined in this manner. Hence, in the words of amended claim 1, it refers to the total gas defined in feature M6.2. Accordingly, the definition of the gas in paragraph [0032] of the application as filed alone refers to the total gas defined despite the fact that the word "total" is not used. Interpreting claim 1 in a technically sensible manner, the addition of the term "total" in feature M6.1 therefore does not change the definition according to feature M6.2 in the context of

claim 1 and does not add subject-matter extending beyond the content of the application as filed.

1.6 The conclusion set out above is also confirmed when considering which gases fall within the definition of the expression "gas to metal ratio" in the application as filed and the amended expression "total gas to metal ratio" in granted claim 1.

The parties agreed during the oral proceedings before the Board that the skilled person would take into account the overall disclosure of the application as filed, including the examples, to interpret the metal to gas ratio according to claim 43 and paragraph [0032] as filed.

1.6.1 Plasma gas

The application aims to provide a process of plasma atomisation metal powder manufacturing in which the amount of gas used in the atomisation process within the atomisation zone is reduced (see paragraph [0006]: "atomizing gas", [0035]: amount of gas "that is used in the atomization process", [0041]: "injected gas", "injected within the atomization zone", [0043]: "gas injected during atomization"). The application further discloses that the injected gas under consideration "will often be an inert gas" and "reducing the amount of injected gas" can thus significantly reduce production costs, especially the "recycling gas costs" (see paragraph [0043]).

In this context, it is immediately clear to the skilled person that the term "injected gas", as used in the application, includes plasma gas - regardless of whether it is in a gaseous or plasma state ("plasma gas

flow", see paragraph [0042]) since the application does not distinguish between the gas fed to the plasma sources and the fact that it enters the atomisation zone as plasma and not as gas.

It was undisputed that the addition of "total" in the feature M6.1 of claim 1 as granted does not change the interpretation of the definition of feature M6.2 concerning the plasma gas.

1.6.2 Sheath gas

Moreover, the application confirms that the term "injected gas" also includes other (inert) gases involved in the atomisation process within the atomisation zone (see paragraphs [0035] and [0041]).

In the Board's view, the injected gas thus includes all the gas directed towards the atomisation zone in the reaction chamber as it is this gas that comes into contact with the liquid metal and thus falls into the category of gases that "will often be an inert gas" or otherwise involve significant costs.

This interpretation of the expression "injected gas" as confirmed by the disclosure in the description as filed is also defined in the wording of feature M6.2. Regardless of whether the phrase "to the atomization zone" applies to the "gas injected" or to the "mass rate of metal source", it is clear that the expression refers to the gas involved in the process of atomisation of the metal source in the atomisation zone.

Therefore, the gas injected addressed in feature M6.2 also includes the sheath gas, which has the function of

transporting the droplets formed in the atomisation zone (see paragraph [0125] of the application). Due to this function, the sheath gas has to be directed towards the atomisation zone and guide the droplets away from it. It is also undisputed that the sheath gas also has to protect the liquid droplets from reactive gases. In view of these functions (transport, guidance and protection), the sheath gas falls into the category of expensive gases, the amount of which is to be reduced according to the goal underlying the application.

It is thus apparent to the skilled person that the sheath gas forms part of the gas to metal ratio in the application and the total gas to metal mass ratio of amended claim 1. During the oral proceedings, this conclusion was not disputed by the respondent.

1.6.3 Cooling gas

The application also mentions that a "cooling gas" can be used as an example of a cooling medium for cooling the guide through which the metal source is displaced. This gas is not injected into the atomisation zone and is not used within the atomisation zone but flows through the guide (see Figure 3, gas inlet 196 and outlet 220; paragraph [0102] of the application).

Moreover, the application also discloses that the cooling gas does not need to be an expensive inert gas and that its recycling from the closed circuit is not an issue (paragraph [0041] of the application).

Furthermore, a cooling liquid could be used in place of a cooling gas (paragraph [0102] of the application).

Hence, it is clear to a skilled person that the optional cooling gas mentioned in paragraph [0102] of the application is not part of the underlying problem of reducing the amount of injected gas and consequently is not included in the gas to metal ratio of original claim 43 or the corresponding definition in paragraph [0032] as filed.

The above interpretation of the expression "gas to metal ratio" in claim 43 in combination with paragraph [0032] as filed is confirmed by the examples of the application.

The examples demonstrate that the gas required to generate the plasma (called plasma gas in the application) and the sheath gas are considered in the gas to metal ratio.

The examples also mention cooling gas for cooling the guide in paragraph [00127]. However, the flow rate of the cooling gas is not disclosed in the examples. It is also not described as being relevant for the gas to metal ratio and consequently is not considered in the calculation of the gas to metal ratio in the examples. This is consistent with the above interpretation that the skilled person would not consider the cooling gas for the gas to metal ratio disclosed in claim 43 as filed.

The technical teaching provided by the application on the role of the cooling gas and its irrelevance for the calculation of the gas to metal ratio according to the application as filed is not changed by the addition of the term "total" in feature M6.1 of granted claim 1.

1.6.4 Secondary gas

The application also discloses the injection of a high-pressure cold "secondary gas" that produces a secondary atomisation (see paragraphs [0085] and [0088]). The examples do not disclose that a secondary gas is used in the atomisation process.

The respondent argued that the specification of the application disclosed the secondary gas as an obligatory feature but did not mention it in the examples. From this it had to be concluded that the secondary gas had not to be considered in the gas to metal ratio according to the application as filed. The insertion of "total" in claim 1 changed this understanding and thus added matter.

This argument is not convincing.

Contrary to the view of the respondent, the application does not disclose that the secondary gas flow is mandatory for the plasma atomisation metal powder manufacturing process according to claim 1.

Neither claim 1 nor the remaining claims define that a secondary gas flow is to be used in the claimed process.

The secondary gas flow is only disclosed for the atomising system 2 of the apparatus shown in Figure 1 (see paragraphs [0085] and [0088] of the application). However, a feature that is only disclosed as mandatory in an embodiment illustrated by a figure of the application does not limit the process defined by the claims.

Neither paragraphs [0085] and [0088], nor the examples of the application, disclose that the process according to the examples requires the use of an apparatus such as that depicted in Figure 1 or that a secondary gas flow is used but not explicitly mentioned.

Therefore, there is no reason to conclude that a secondary gas flow is present in the examples of the application but not considered in the gas to metal ratio.

Instead, it is apparent for the skilled person that the secondary gas can be used optionally. If present, it needs to be considered in the gas to metal ratio because it is injected into the atomisation zone where it is involved in the atomisation process and comes into contact with the liquid metal.

The respondent further argued that the application disclosed that only hot gas had to be considered in the gas to metal ratio. Since the secondary gas was a cold gas, the application disclosed that it did not have to be considered in the gas to metal ratio.

This argument is also not convincing.

It is correct that the secondary gas flow can be a cold gas (see paragraph [0088] of the application). However, the temperature of the gas injected into the atomisation zone is not decisive for whether the gas is considered in the gas to metal ratio. Neither paragraph [0032] nor claim 43 of the application discloses that the gas to be considered in the gas to metal ratio has to be a hot gas.

While it is true that paragraphs [0041] to [0043] refer by way of example to the "amount of very hot gas flow injected within the atomization zone", this only concerns the plasma gas. It addresses the question of the increased power consumption of the plasma source when using a reduced amount of plasma gas compared to the savings made by reducing the gas amount.

It follows that the application does not provide a teaching to disregard the secondary gas flow, if present, in the gas to metal ratio because of its low temperature.

The technical teaching provided by the application on the role of the secondary gas and, if present, its relevance for the calculation of the gas to metal ratio according to the application as filed, is not affected by the addition of the term "total" in feature M6.1 of granted claim 1.

1.6.5 Any other possible gases

The appellant argued that other gases might be used in the atomisation process. For example, a gas could be used to shield the liquid metal melt prior to atomisation. This was not dealt with in the application.

In the Board's view, whether possible additional gases should be taken into account in the gas to metal ratio is not affected by the addition of "total" in feature M6.1. If the skilled person assumes that other gases fall under the definition of feature M6.2 (or equally in paragraph [0032] of the application), they must be taken into account in their entirety to determine the gas to metal ratio. However, if the skilled person

understands that other gases do not fall within the definition of feature M6.2, they do not have to be taken into account in the gas to metal ratio solely because of the addition of the word "total" in feature M6.1.

1.7 In view of the above, the Board concludes that the same interpretation for the gas to metal ratio in claim 43 in view of paragraph [0032] of the application applies for the *total* gas to metal mass ratio according to the amended wording of claim 1 as granted.

The skilled person still interprets the ratio of feature M6.1 in combination with the definition of feature M6.2 in the same way as in the application as filed.

Accordingly, the addition of the term "total" does not add subject-matter extending beyond the content of the application as filed. Thus, the ground for opposition under Article 100 (c) EPC does not prejudice the maintenance of the patent because of the amendments in claim 1 as granted.

2. Main request - amendments in claims 6, 7 and 9

2.1 Claims 6 and 7 as granted read:

Claim 6:
"The manufacturing process of any one of claims 1 to 4, wherein the raw metal powder has a 0-75 µm particle size distribution yield of at least 85%, measured according to ASTM B214."

Claim 7:
"The manufacturing process of any one of claims 1 to 4, wherein the raw metal powder has a 0-45 µm particle size distribution yield of at least 50%, measured according to ASTM B214."

2.2 The features defined in claims 6 and 7 are disclosed literally in paragraphs [0053] and [0054] of the application as optional features. These features are presented in general and without a link to an embodiment. Hence, the subject-matter of claims 6 and 7 does not generate a new technical teaching in combination with amended claim 1, which is essentially based on claim 27 as originally filed (see point 1.1 above).

2.3 Claim 9 as granted specifies that the heated metal source is chosen from a wire, a rod and a melt stream and reads:

"The manufacturing process of any one of claims 1 to 8, wherein the heated metal source is chosen from a wire, a rod and a melt stream."

The Board considers that the disclosure in paragraphs [0038] and [0039] of the application provides a basis for the subject-matter defined by claim 9 as granted. Therefore, it needs not to be decided whether the appellant's further arguments referring to paragraph [0066] of the application should not be admitted for being late filed.

Paragraph [0039] of the application provides literal support for the option that the metal source is a metal wire or metal rod.

Concerning the alternative that the metal source is a melt stream, paragraph [0038] of the application reads:

"*For example, the raw material can be melted in a water-cooled crucible (skull melting). The metal source is then a melt stream that can be further heated and fed to the atomization zone to be contacted by the plasma from the at least one plasma source to be atomized.*"

The respondent argued that this paragraph of the application disclosed a metal source in the form of a melt stream only in combination with a specific melting method (skull melting).

The respondent submitted that a plasma atomisation metal powder manufacturing process designed to provide high purity metal powders required a high purity metal source. Hence, skull melting, which avoided contact of the melt with the crucible and provided a high purity melt stream, was inextricably linked with the atomisation process of claim 1 and could not be omitted without adding information extending beyond the content of the application as filed.

However, it is immediately apparent for the skilled reader that the process of claim 27 as filed can be equally used for any kind of metal which can be melted by any other available and conventional method. The claim is limited neither to a specific metal nor a particular purity.

Furthermore, whether a feature can be isolated from other features disclosed in combination depends on whether there is a functional or structural link between these features, not between the other features

and the subject-matter or purpose of the claim in which the isolated feature is to be taken up. In the case at hand, there is no functional or structural link between the melting method (in a water-cooled crucible (skull melting)) and the mere fact that the metal source is a melt stream. The function of the melt stream feature is to provide heated metal in a particularly hot form. The function of skull melting is to provide a high purity melt. These features are thus not functionally linked. There is also no structural link between the presence of a melt stream and the type of melting.

The omission of skull melting in the subject-matter of claim 9 does therefore not constitute an unallowable intermediate generalisation of the disclosure in paragraph [0038] of the application.

This finding is supported by the further general references to a melt stream in the application in various contexts and without a reference to a specific melting method (see, for example, paragraphs [0066] and [00116] to [00120] and claims 16, 20 to 25, 57 to 62, 95 and 99 to 104 as filed).

2.4 The amendments in claim 6, 7 and 9 as granted according to the main request therefore do not generate subject-matter which extends beyond the application as originally filed. The ground for opposition under Article 100 (c) EPC does not prejudice the maintenance of the patent because of the amendments in claims 6, 7 and 9 as granted.

3. Remittal to the opposition division

3.1 Under Article 11 RPBA, the Board has discretion to remit the case to the department whose decision was

appealed in accordance with Article 111(1) EPC if there are special reasons for doing so.

3.2 The Board decided to remit the case in accordance with Article 111(1) EPC to the opposition division for further prosecution for the following reasons.

3.3 The primary object of the appeal proceedings is to review the decision under appeal in a judicial manner (Article 12(2) RPBA). The contested decision is limited to the ground for opposition pursuant to Article 100(c) EPC with respect to the main request, and the conclusion on the auxiliary requests is only based on Articles 84 and 123(3) EPC. Accordingly, no assessment of novelty, inventive step and sufficiency of disclosure has been provided in the impugned decision that could be reviewed.

In view of these special reasons, the Board acceded to the appellant's request that the case be remitted to the opposition division for further prosecution.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division for further prosecution.

The Registrar: The Chairwoman:

C. Spira J. Hoppe

Decision electronically authenticated