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D E C I S I O N
of 10 June 2003

Case Number: T 1044/02 - 3.2.3

Application Number: 99201696.4

Publication Number: 0960673

IPC: B22F 1/00, B22D 17/00, C22B 9/16

Language of the proceedings: EN

Title of invention:
Particulate feedstock for metal injection molding

Applicant:
Thixomat, Inc.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - (yes) after amendment"

Decisions cited:
-

Catchword:
-



Case Number: T 1044/02 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 10 June 2003

Appellant: Thixomat, Inc.
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Ann Arbor
Michigan 48104 (US)

Representative: James, Anthony Christopher W.P.
Carpmaels & Ransford
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office dated 22 May 2002 refusing
European patent application No. 99 201 696.4
pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: C. T. Wilson
Members: F. Brösamle
J. P. Seitz

Summary of Facts and Submissions

I. With decision of 22 May 2002 the examining division refused European patent application No. 99 201 696.4 in the light of

(D1) DE-A-1 758 656 corresponding essentially to

(D1a) US-A-3 407 062 being in English and relied on in the following.

II. Against the above decision of the examining division the applicant - appellant in the following - lodged an appeal on 22 July 2002 paying the fee on the same day and filing the statement of grounds of appeal on 27 September 2002.

III. Following the board's Communication pursuant to Article 110(2) EPC the appellant filed a **new main request** being based on claims 1 to 8 amended to meet the requirements of the EPC.

IV. The independent claim 1 reads as follows:

"1. Particulate material suitable for use as a feed material in the injection moulding or casting of thixotropic alloys, said particulate material comprising particles of a metal alloy or composite, wherein a portion of said particles is shaped such that each of said particles in said portion has a ratio of the length of its largest dimension to its effective diameter in the range of 1.2 to 4.0 and has a largest dimension in the range of 0.5 to 5 mm, wherein said

portion of said particles comprise at least 40% by weight of said particulate material, and wherein said particulate material has a tap density of at least 50% of the theoretical density."

V. The appellant essentially argued as follows:

- as clearly set out in remark 2 of the statement of grounds of appeal jet/wheel atomising according to (D1a) leads to a range of particle sizes (0.07 mm to 0.84 mm) and a mixture of particles within this range;
- the weight fraction of these particles having a dimension greater than 0.5 mm is, however, not indicated in (D1a);
- claim 1 is now restricted to a tap density of at least 50% of the theoretical density to overcome any possible opposition as in the earlier patent application on which the present divisional application is based;
- summarizing it could not be asserted that at any stage in the processing of the particulate material the claimed weight fraction had a largest dimension and an aspect ratio as claimed;
- (D1a), see its column 2, lines 40/41 teaches a ratio of "L" to "D" greater than 4, i.e. outside the claimed 40% weight fraction;
- starting from (D2) US-A-4 694 881 as a document dealing with the injection molding of thixotropic alloys and reflecting the nearest prior art

document there cannot be seen a direct way from the prior art to be considered to the subject-matter of claim 1.

- VI. The appellant requested to set aside the decision under appeal and to grant a patent on the basis of the new **main request** or on the **auxiliary request** both filed with letter of 31 March 2003, received on 1 April 2003, together with an amended description.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Amendments*

2.1 Claim 1 is a combination of features of originally filed claims 1 and 5; from this dependent claim 5 the tap density of at least 50% of the theoretical density is derived so that new claim 1 meets the requirements of Article 123(2) EPC.

2.2 Claims 2 to 8 correspond to originally filed claims 2 to 4 and 6 to 9 so that they are also not open to an objection under Article 123(2) EPC.

3. *Novelty*

3.1 In the decision under appeal the examining division came to the result that the subject-matter of originally filed claim 1 was not novel in the light of (D1). In the following (D1a) is dealt with since this

memeber of the (D1) - family is **in English**.

3.2 It is believable that jet atomising or wheel atomising used in (D1a) leads to a product having a **range/distribution** of particles so that column 2, lines 8 to 11, of (D1a) has to be interpreted in the light of a range/distribution of particles with respect to the range disclosed in (D1a), namely 0.07 mm to 0.84 mm (No. 20 to No. 200 U.S. Sieve Series) and not as an information about distinct particle sizes; no information is given about what weight fraction of the known particles has a dimension greater/smaller than 0.5 mm in (D1a). What is loaded into the ball mill for subsequent processing under these circumstances is a **mixture** containing a **distribution** of particle sizes in the known range of 0.07 mm to 0.84 mm without knowing how the particles are distributed within this range.

3.3 Summarizing, it cannot be clearly derived from (D1a) that **at least 40% by weight** of the material has **both**

- (a) a largest dimension in the claimed range of 0.5 to 5 mm **and**
- (b) an aspect ratio (i.e. "L" to "D" ratio) in the range of 1.2 to 4.0

as prescribed in claim 1 of the **new main request**.

Calculating the aspect ratio of the example given at column 2, lines 40/41, of (D1a) leads to a ratio of 6.25 being **clearly outside** of the range of 1.2 to 4 according to claim 1.

3.4 As a result of the above considerations the subject-

matter of claim 1 is novel with respect to (D1a),

Article 54 EPC, so that the crucial issue to be decided is inventive step.

4. *Inventive step*

4.1 The nearest prior art is **(D2)** from which document the injection molding of thixotropic alloys is known. This document was already discussed in the originally filed documents corresponding to EP-A1-0 960 673, see page 2, lines 27 to 30, namely the problem of blocking of the hopper, seizing of the screw extruder and unsatisfactory control over the temperature of the melt. Further, the particles did not exhibit good packing characteristics which can cause difficulty in achieving sufficient heat transfer rates to cause the partial melting of the metal particles and also render control over the temperature more difficult.

4.2 The objectively remaining technical problem to be solved is to overcome the above deficiencies of the nearest prior art. This problem is solved by the feature of claim 1 which defines the particulate material comprising particles of a metal alloy or composite with respect to its aspect ratio ("L" to "D" ratio), its range of largest dimension "L", its amount of these particles within the particulate material and the tap density compared with the theoretical density.

4.3 By controlling the size and shape of a percentage of the feedstock particles within the ranges according to claim 1 the above problems with regard to high-pitch

squealing during retract, screw-stalling and uneven heating could be eliminated thus improving the technology for instance of injection molding or casting of thixotropic alloys.

- 4.4 In above remark 3.2 it is set out that (D1a) is not relevant with respect to the claimed particle sizes and about the weight fraction of particles in the range of 0.5 to 5 mm so that a skilled person confronted with the solution of the problem set out in above remarks 4.1 and 4.2 is not led to the particulate material according to claim 1 in an obvious way.
- 4.5 (D2), see its column 3, lines 5/6, **teaches away** from the teaching of claim 1 since it is disclosed: "The size of the particles used **is not critical** to the invention." (stress added).
- 4.6 Under these circumstances a skilled person would not consider a combination of (D1a) and (D2) so that the prior art taken as a whole is not relevant with respect to the objectively remaining technical problem and its solution according to claim 1. This claim does therefore meet the requirements of Articles 54 and 56 EPC and is allowable.
- 4.7 Claims 2 to 8 are dependant claims which relate to embodiments of the subject-matter of claim 1 and are likewise allowable.
- 4.8 The description filed with letter of 31 March 2003, received on 1 April 2003, meets the essential requirements of the EPC and is suitable for grant.

Auxiliary request

5. The new **main request** being allowable there is no need to discuss the merits of the **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 first instance with the order to grant a patent with the following documents:

Claims: 1 to 8, filed with letter of 31 March 2003, received on 1 April 2003;

Description: pages 1, 2, 2A, 3 to 6, 8, 9, 16 and 18; pages 7, 10 to 15 and 17 as originally filed;

Drawings: Figures 1 to 17 as originally filed.

The Registrar:

The Chairman:

A. Counillon

C. T. Wilson



Case Number: T 1044/02 - 3.2.3

Decision of 5 April 2005
correcting
D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 10 June 2003

Appellant: Thixomat, Inc.
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Ann Arbor
Michigan 48104 (US)

Representative: James, Anthony Christopher W.P.
Carpmaels & Ransford
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Composition of the Board:

Chairman: U. Krause
Members: G. Ashley
J.-P. Seitz

The decision given on 10 June 2003 contains an obvious mistake and in application of Rule 89 EPC the order on page 7 of the decision is to be corrected as follows:

"Description: pages 1, 2, 2A, 3 to 6, 8, 9, 16 and 18
received on 1 April 2003
pages 7, 10 to 15, 17 and 19 as originally
filed;"

The Registrar:

The Chairman:

A. Vottner

U. Krause