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of 16 January 2024**

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**Language of the proceedings:** EN

**Title of invention:**  
PROCESS FOR THE REALIZATION OF A WINDOW/DOOR FRAMEWORK FOR  
WALLS OF BUILDINGS

**Applicant:**  
Graf Synergy S.r.l.

**Headword:**

**Relevant legal provisions:**  
EPC Art. 56

**Keyword:**  
Inventive step - main request (yes) - ex post facto analysis -  
problem and solution approach - closest prior art

**Decisions cited:**

**Catchword:**



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Case Number: T 1452/21 - 3.2.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.03**  
**of 16 January 2024**

**Appellant:** Graf Synergy S.r.l.  
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**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 6 April 2021  
refusing European patent application No.  
17729920.3 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** C. Herberhold  
**Members:** R. Baltanás y Jorge  
D. Prietzel-Funk

## **Summary of Facts and Submissions**

I. European patent application No. 17 729 920.3 relates to a process for the realisation of a window/door framework for walls of buildings.

II. The appeal lies from the decision of the examining division to refuse the above-mentioned European patent application.

The examining division held that the subject-matter of claims 1 to 5 according to the main and only request - which included an amended page 4 of the description - filed on 16 February 2021 was not inventive over the combination of the document US 2003/0032214 A1 (D5) with the common general knowledge and the "Recycling Chemicals" brochure (D6) or the retrieved web page "Green Chemistry" (D7). The examining division also held that the application failed to comply with the requirement of unity of invention (Article 82 EPC) as dependent claims 2-5 and 6-8 aimed at solving distinct problems with distinct features.

III. The applicant (the appellant) filed an appeal against the above-mentioned decision of the examining division.

In a communication dated 28 November 2023 pursuant to Article 15(1) of the Rules of Procedure of the Boards of Appeal, the Board indicated its preliminary opinion of the case. Oral proceedings had been previously summoned for the 12 January 2014.

IV. With a letter dated 13 December 2023, the appellant filed amended description pages 5, 11, 12, 15, 16 and 17.

In this letter, the appellant agreed with the preliminary findings of the Board and considered the scheduled oral proceedings superfluous in view of the adapted description. The Board agreed, and the oral proceedings were cancelled.

V. Requests

The appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the claims of the main request dealt with in the contested decision and re-filed with the statement setting out the grounds of appeal and the adapted description.

VI. Claim 1 according to the main request, including feature numbering added by the Board, reads (amendments compared to claim 1 as filed in bold):

- A *Process for the realization of a window/door framework (1) for building walls,*
- B ~~**characterized by the fact that it comprises**~~ **comprising** *at least one molding step of a perimeter frame (2) by means of at least one three-dimensional molding device (5, 6, 7, 9),*
- C *said perimeter frame (2) comprising a plurality of perimeter sides made in a single monolithic body,*
- D **characterized in that said three-dimensional molding step comprises:**
  - **at least a supplying step of PVC and of at least one solvent in which said PVC is soluble;**
- E - **at least a mixing step of said PVC and of said solvent to obtain at least a mixture in the liquid phase;**

- F - at least a distribution step of said mixture on a deposition plane (4);
- G - at least an evaporation step of said solvent from said mixture to obtain at least a layer of PVC (12) of said perimeter frame (2), said evaporation step being subsequent to said distribution step; and
- H - repeating said distribution step and said evaporation step to obtain a plurality of said overlapped layers of PVC (12) conforming said perimeter frame (2);
- I wherein said three-dimensional molding device (5, 6, 7, 9) is housed inside a controlled atmosphere cabinet;
- J wherein said three-dimensional molding device (5, 6, 7, 9) comprises at least a distribution set (9) of said mixture provided with:
  - L - at least a distribution head of said mixture;
  - M - at least a removal and recovery system (10) of said evaporated solvent; and
  - N - at least a mixing unit (11) of said PVC and of said solvent;
- O wherein said evaporated solvent is recovered by means of said removal and recovery system (10), which suctions the air present in said cabinet and recovers said evaporated solvent, sending it again to said mixing unit (11).

Dependent claims 2 to 8 concern preferred embodiments of the process for the realisation of a window/door framework for building walls of claim 1.

VII. State of the art

The following documents were cited in the international search report:

- D1: US 2010/0251643 A1
- D2: US 5,216,616 A
- D3: US 2009/0271323 A1
- D4: WO 2016/064489 A1

The following document was introduced by the examining division with its communication dated 18 December 2019:

- D5: US 2003/0032214 A1

The following documents were introduced by the examining division during the oral proceedings:

- D6: "Recycling Chemicals - The ecological and economic advantages of solvent recovery" brochure, Verband Chemiehandel e.V.
- D7: "Green Chemistry" page dated 5 January 2017 from the website [www.organic-chemistry.org](http://www.organic-chemistry.org) retrieved via the website <http://web.archive.org> on 18 February 2021

VIII. The appellant's arguments can be summarised as follows.

Document D5 disclosed the 3D printing of a type of polarisable polymers for the production of functionally responsive devices which were completely different from window/door frameworks. Document D5 specified that the material employed is a "capacitor-grade" polymer (see paragraphs [0012] and [0023]), i.e. a high crystallin resin with ultra-high purity. Thus, the subject-matter of claim 1 differed from D5 by feature A.

The following features of claim 1 were also not disclosed in D5.

- The "three-dimensional molding device is housed inside a controlled atmosphere cabinet" (feature I).
- The distribution set is provided with "at least a removal and recovery system of said evaporated solvent" (feature M).
- The "evaporated solvent is recovered by means of said removal and recovery system, which suctions the air present in said cabinet and recovers said evaporated solvent, sending it again to said mixing unit" (feature O).

The technical effect of the distinguishing features was that the window/door framework can be obtained by a 3D moulding step of a mixture of PVC for windows and a solvent by a process that permits a big reduction in the manufacturing costs related to the use of the solvent; a reduction of the environmental impact caused by the disposal and/or release of the solvent into the environment; and, not least, the possibility of reusing the solvent by sending it again to the mixing unit to form new mixture, using a single distribution set.

Therefore, the objective technical problem solved by the invention consisted in providing a new process for the realisation of a window/door framework that allowed avoiding particularly difficult and complex extrusion processes for obtaining profiled elements in PVC for windows.

Document D5 did not show or suggest the possibility of performing a 3D moulding step of a solution of PVC



suitable for windows to obtain a window/door framework. D5 dealt with a completely different technical problem, namely to develop an alternative method for micro-electromechanical systems (MEMS) production by printing polarisable polymeric materials. These functionally responsive devices required the use of materials with very high purity. Moreover, MEMS were devices that had dimensions ranging from 1 micrometre to 1 millimetre, whereas window/door profiles might reach dimensions in the order of metres.

The person skilled in the art, therefore, faced with the technical problem described above, would not have considered document D5 to arrive at the invention because of the enormous differences between the products and the mechanical/functional characteristics of the materials used.

### **Reasons for the Decision**

1. Added subject-matter, Article 123(2) EPC

The examining division considered that amended claim 1 had a basis in originally filed claims 1, 10, 15 and 16, together with the passage of the originally filed description from page 14, line 28 to page 15, line 4 (i.e. the translation published as the PCT application).

The Board agrees with this finding.

2. Novelty, Article 54 EPC

The examining division did not raise any novelty objection against claim 1 of the main request.

The Board agrees that none of the documents cited by the examining division casts doubt on the novelty of the subject-matter of claim 1.

3. Inventive step, Article 56 EPC

3.1 D5 as the closest prior art

The examining division considered D5 the closest prior art since it showed "*the technically closest three-dimensional molding process to claim 1*".

However, this is not persuasive since claim 1 actually concerns a "[p]rocess **for the realization of a window/door framework for building walls**", whereas D5 relates to the manufacture of **miniaturised electromechanical components** ("micro-electro-mechanical system (MEMS)") using **particular materials** for this purpose ("*featuring a polymeric material element with piezoelectric and pyroelectric properties*"; see paragraph [0001]). Even if some claims of D5 define a manufacturing process for producing a multilayered undefined object - e.g. claim 8 - this is to be read in the general context of the document, which is the production of micro-electromechanical systems (MEMS), as confirmed by the definition of "poling" steps in these claims (see e.g. step 3 of claim 8). Consequently, D5 does not show a manufacturing method for any general purpose or for producing any undefined item.

Thus, the manufacturing process and the equipment disclosed in D5 are for producing tiny components which differ by several orders of magnitude in size from the "window/door framework for building walls" to be produced by the process defined in current claim 1. In consequence, D5 cannot be considered a realistic starting point for a process of manufacturing "window/door framework for building walls".

Anyway, even if the person skilled in the art started from the teaching of D5, the claimed invention is non-obvious, as is set out below.

The examining division correctly identified a distinguishing feature, namely "the object is a window/door framework". This corresponds to feature A since claim 1 differs from D5 in that (among other aspects) it relates to a process **for the realisation of a window/door framework for building walls.**

From this distinguishing feature, the examining division defined the "technical effect and problem" of "realising a specific object" (see point II.12.2 of the decision) and considered that "[t]he feature (F2 [feature F2 in examination corresponds to feature A of the feature assignment in point VI above]) *is merely one of several straightforward possibilities which the skilled person would select, depending on the circumstances, without exercising inventive skill, in order to solve the problem posed*" (point II.12.4.1 of the decision).

This is not convincing.

The reasoning of the examining division as to why it would be obvious to apply the process of D5 for the

production of window/door frameworks consists of a mere unsubstantiated statement which cannot explain why the skilled person, starting from a process for manufacturing **miniaturised electromechanical** components using materials with very **specific properties**, would consider using this same process for manufacturing much larger construction elements requiring completely different properties (e.g. stress resistance, thermic insulation, etc.).

The Board cannot see any motivation in D5 for the skilled person to use the process (and materials) disclosed in it for the manufacture of such construction elements in view of the considerably larger size of the intended products (several orders of magnitude) and the required mechanical properties.

The process of D5 is based on the deposition of thin film layers within a vacuum oven (18) comprising a high voltage DC source (22) which makes possible poling the material as it is applied on a target surface (44) to produce a miniaturised component (see Figure 1 and paragraph [0014] on the device and paragraphs [0015] to [0017] on the dispensing devices, the material and the product to be manufactured). By using this technique, a miniaturised component can be produced within two to three hours (see the portion of paragraph [0023] on page 4).

The skilled person would not contemplate using such a process or equipment for manufacturing objects in the range of size of a window/door frame since manufacturing such objects by the process of D5 would require several days and involve major substantial modifications of the vacuum oven (e.g. in terms of size) and the working conditions of the high voltage DC

source. These modifications far exceed a routine modification.

Furthermore, to arrive at the claimed subject-matter, the skilled person starting from D5 must first select PVC from the several materials listed in this document and then decide to use the process of D5 on the selected material for the production of large construction elements. This amounts to reasoning tainted by an unallowable *ex-post facto* analysis since there is no pointer to such a selection when starting from D5. PVC is used in D5 because it is polarisable, a property which is useful for MEMS but has no benefit for the requirements of a window/door frame construction material.

In view of the above, it is not necessary to discuss the inventiveness of further distinguishing features, and it can be concluded already at this stage that the subject-matter of claim 1 of the main request involves an inventive step when starting from D5.

### 3.2 D1 as the closest prior art

D1 concerns the manufacturing of construction members for the fenestration of a facade. The construction members (10) include a frame (12) which is "*molded or otherwise fabricated to be unitary and monolithic*" (see paragraph [0024]).

Therefore, D1 concerns a process for the realisation of a window/door framework for building walls (feature A), i.e. **the object of claim 1**. As D1 has the same purpose as the invention, the Board considers it a suitable starting point for analysing inventive step.

D1 shows at least one moulding step of a perimeter frame (see the third sentence of paragraph [0024]) by at least one three-dimensional moulding device (i.e. the three-dimensional mould implicitly used when producing a three-dimensional object by moulding) (feature B). The perimeter frame (12) of D1 comprises a plurality of perimeter sides made in a single monolithic body (see e.g. Figure 1 and 2) (feature C).

The material used in D1 is a composite fabric sheet material bonded by a resin (see paragraph [0024], third sentence).

The subject-matter of claim 1 differs from D1 in all the features of the material employed and its handling, namely:

- D** the said three-dimensional molding step comprises:
  - at least a supplying step of PVC and of at least one solvent in which said PVC is soluble;
- E** - at least a mixing step of said PVC and of said solvent to obtain at least a mixture in the liquid phase;
- F** - at least a distribution step of said mixture on a deposition plane;
- G** - at least an evaporation step of said solvent from said mixture to obtain at least a layer of PVC of said perimeter frame, said evaporation step being subsequent to said distribution step; and
- H** - repeating said distribution step and said evaporation step to obtain a plurality of said overlapped layers of PVC conforming said perimeter frame;
- I** wherein the three-dimensional molding device is housed inside a controlled atmosphere cabinet;

- J** wherein said three-dimensional molding device comprises at least a distribution set of said mixture provided with:
- L** - at least a distribution head of said mixture;
- M** - at least a removal and recovery system of said evaporated solvent; and
- N** - at least a mixing unit of said PVC and of said solvent;
- O** wherein said evaporated solvent is recovered by means of said removal and recovery system, which suctions the air present in said cabinet and recovers said evaporated solvent, sending it again to said mixing unit.

The technical effect of the distinguishing features is manufacturing a window/door frame by the application of successive layers of material.

The objective technical problem addressed by the invention can thus be defined as providing an alternative manufacturing method for a window/door frame.

The skilled person would not have any motivation to consider document D5 when looking for a solution to this technical problem since D5 relates to the manufacturing of **MEMS** and uses a very **particular kind of materials** (polymeric material with piezoelectric and pyroelectric properties) which are not relevant for the manufacture of window/door frames (see paragraph [0001]). Furthermore, even if D5 incidentally mentions PVC in the **context of manufacturing MEMS**, this would not motivate the skilled person to replace the materials used in D1 to produce construction members for the **fenestration of a facade** since these are completely unrelated technical applications.

Nor is there any reason for the skilled person to take into consideration document D2 since it is on the manufacturing of "models, molds, patterns, or short production runs" (see column 1, lines 32 to 36) within hours or days (see column 1, lines 36 to 39). The skilled person would not consider such a process suitable for manufacturing window/door frames, which are substantially larger than the proposed objects and must be produced within a reasonable time frame. Furthermore, D2 proposes resins (see column 4, lines 48 to 53), plaster, ceramics or metals (see column 5, lines 28 and 29) as production materials instead of PVC and a solvent. Thus, even if the skilled person considered D2, it would not lead them towards the invention.

Document D3 is on a "transactional method for building three-dimensional objects" (see title) which focuses primarily on the business model behind the production of items "such as prototypes, tooling, and production-quality parts" (see paragraph [0001]). Moreover, the materials proposed in D3 (see paragraphs [0025], [0028] and [0029]; wax materials, thermoplastic materials and photochemical build materials that harden upon activation by a laser beam) are different from the PVC and solvent defined in claim 1. Consequently, the skilled person would not take D3 into consideration and, even if they did, this would not result in a process as defined in claim 1.

Document D4 relates to additive manufacturing of an **energetic material** which must fit the shape of a **rocket motor** (see paragraphs [0002], [0003] and [0026]). This alone renders the document irrelevant for the skilled person starting from D1 in view of the completely



unrelated technical fields. Even if D4 shows the use of PVC in the manufacturing material, this is only for mixing PVC as a "plastisol" with the **solid energetic material** to produce a slurry which can be applied during additive manufacturing (see paragraphs [0011] to [0022] and [0028] and claims 9 and 10). The skilled person recognises that this material is inherently unsuitable for producing a window/door frame.

Documents D6 - on which no date can be identified - and D7 merely relate to the recovery of solvents in the chemical industry and do not mention additive manufacturing. Thus, they would not be taken into consideration by the skilled person and, in any case, could not guide them towards the invention in view of their technical content.

### 3.3 Conclusion

The subject-matter of claim 1 involves an inventive step (Article 56 EPC).

### 4. Unity of invention, Article 82 EPC

In view of the conclusions on novelty and inventive step above, no lack of unity can be seen since the patent application relates to a single general inventive concept corresponding to the subject-matter of claim 1, the only independent claim of the patent application (Article 82 EPC).

### 5. Adapted description, Rule 42(1) (b) EPC, Article 84 EPC

The main request dealt with by the examining division comprised amended page 4 of the description. The

amendments in this page consisted of the citation of documents D1, D2, D3 and D4 under Rule 42(1)(b) EPC.

Amended pages 5, 11, 12, 15, 16 and 17 of the description were filed by the appellant to adapt the description to amended claim 1 of the main request (Article 84 EPC).

- The first two lines of page 5 were amended to specify that Figure 1 does not show an embodiment of the invention.
- Line 21 of page 11 was amended to specify that the use of PVC and solvent is a feature of the invention.
- Line 1 of page 12 was amended to specify that the use of a distribution set is a feature of the invention.
- The passage bridging pages 15 and 16 was amended to exclude embodiments where the making of a mould was carried out by three-dimensional moulding methods not belonging to the invention.
- Line 10 of page 17 was amended to specify that providing the PVC and solvent mixture is a feature of the invention.

The Board thus finds that the description satisfies the requirements of the EPC.

6. To conclude, the appeal is allowable.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the examining division with the order to grant a patent on the basis of the following documents:
  - claims 1 to 8 of the main request filed with the statement setting out the grounds of appeal
  - description:
    - pages 1 to 3, 6 to 10, 13 and 14 as published (PCT application)
    - page 4 filed with the letter dated 11 July 2019
    - pages 5, 11, 12, 15, 16 and 17 filed with the letter dated 13 December 2023
  - figure sheets 1/6 to 6/6 as published (PCT application)

The Registrar:

The Chairman:



C. Spira

C. Herberhold

Decision electronically authenticated