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**Datasheet for the decision
of 11 May 2026**

Case Number: T 0190/25 - 3.3.05

Application Number: 19176016.4

Publication Number: 3572538

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C22B7/00, F27D21/00, F27B3/28,
F27D99/00

Language of the proceedings: EN

Title of invention:
SYSTEM AND METHOD OF OPERATING A BATCH MELTING FURNACE

Patent Proprietor:
AIR PRODUCTS AND CHEMICALS, INC.

Opponents:
C-TEC CONSTELLIUM TECHNOLOGY CENTER SAS
CONSTELLIUM NEUF-BRISACH SAS

Headword:
Operating a batch melting furnace/air products

Relevant legal provisions:
EPC Art. 100(b), 100(c)
RPBA 2020 Art. 11

Keyword:

Grounds for opposition - insufficiency of disclosure (no) -
added subject-matter (no)
Remittal - (yes)

Decisions cited:

G 0001/03

Catchword:



Beschwerdekammern
Boards of Appeal
Chambres de recours

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D E C I S I O N
of Technical Board of Appeal 3.3.05
of 11 May 2026

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted/electronically
transmitted on 2 December 2024 revoking European
patent No. 3572538 pursuant to Article 101(3) (b)
EPC.**

Composition of the Board:

Chair	R. Winkelhofer
Members:	G. Glod
	T. Burkhardt

Summary of Facts and Submissions

I. The appeal of the patent proprietor (appellant) concerns the opposition division's decision revoking European patent No. 3 572 538 B. Neither the main request (patent as granted) nor auxiliary requests 1 to 3 were found to meet the requirements of Article 83 EPC.

II. The following document cited in the impugned decision is of relevance here.

D13: P. Mullinger and B. Jenkins, "Industrial and Process Furnaces", 2014, excerpt of chapter 9, pages 337 - 341

III. Claims 1 and 7 of the patent as granted read as follows.

"1. A system (100) for controlling a metals melting process in a batch melting furnace comprising:

a melting furnace (110) comprising a chamber (120) configured and arranged to receive a charge (130) containing solid metal, a burner (140) configured and arranged to provide heat of combustion to the charge (130) in the chamber (120), and a passage to exhaust burner combustion products from the chamber (120), wherein the melting furnace (110) is characterized by at least one furnace parameter; at least one sensor (32, 42) to detect at least one charge parameter characterizing a charge added to the furnace (110); at least one sensor (12, 14, 16, 18, 20, 22, 26, 28, 40) to detect at least one process parameter

characterizing progress of a melting process in the furnace (110); and
a controller (50) having a processor (52) configured to:

calculate an overall furnace efficiency based on the at least one furnace parameter;
calculate a predicted process pour readiness time based on the at least one charge parameter, the at least one process parameter, and the overall furnace efficiency; and
control operation of the furnace based on the predicted process pour readiness time,

wherein the processor (52) uses a model (60), which is created by using theoretical calculations combined with real data,

wherein the passage to exhaust burner combustion products includes a flue; and

wherein the at least one process parameter includes one or more of: burner firing rate, reactant enthalpy rate, exhaust enthalpy rate, flue temperature, furnace wall temperature, fuel heating value, flue exit combustion intensity, baghouse temperature, flue gas composition, flue duct temperature, furnace door temperature, furnace door gap size, furnace shell temperature, furnace chamber temperature, charge melt rate, furnace heat loss, elapsed melt operation time, and charge visual appearance,

wherein when the furnace (110) is a rotary furnace, the at least one process parameter further includes one or more of: furnace rotation speed, rotation motor current, rotation motor torque, and furnace vibration;
and

wherein when the furnace (110) is a reverberatory furnace, the at least one process parameter further includes one or more of: gas pressure for bubbler gas stirring applications, roof temperature, wall

temperature, floor temperature, speed of circulation of the melt, energy expended in circulation of the melt, and melt temperature inside the furnace chamber."

"7. A method of controlling a metal melting process in a melting furnace (110), comprising:

determining at least one furnace parameter

characterizing a melting furnace (110);

adding a charge (130) containing solid metal into the melting furnace (110);

detecting at least one charge parameter characterizing the charge (130);

firing a burner (140) into the melting furnace (110) to provide heat to melt the charge (130), and exhausting combustion products from the furnace (110) through a passage;

detecting at least one process parameter characterizing progress of melting the charge (130);

calculating an overall furnace efficiency based on the at least one furnace parameter, calculating a predicted process pour readiness time based on the at least one charge parameter, the at least one process parameter, and the overall furnace efficiency and controlling the metal melting process based on the predicted process pour readiness time by a controller (50) having a processor (52), wherein the processor uses a model (60), which is created by using theoretical calculations combined with real data, wherein the passage to exhaust burner combustion products includes a flue; and

wherein the at least one process parameter includes one or more of: burner firing rate, reactant enthalpy rate, exhaust enthalpy rate, flue temperature, furnace wall temperature, fuel heating value, flue exit combustion intensity, baghouse temperature, flue gas composition,

flue duct temperature, furnace door temperature, furnace door gap size, furnace shell temperature, furnace chamber temperature, charge melt rate, furnace heat loss, elapsed melt operation time, and charge visual appearance,
wherein when the furnace (110) is a rotary furnace, the at least one process parameter further includes one or more of: furnace rotation speed, rotation motor current, rotation motor torque, and furnace vibration; and
wherein the furnace (110) is a reverberatory furnace, the at least one process parameter further includes one or more of: gas pressure for bubbler gas stirring applications, roof temperature, wall temperature, floor temperature, speed of circulation of the melt, energy expended in circulation of the melt, and melt temperature inside the furnace chamber."

Claims 2 to 6 refer directly or indirectly to claim 1, while claims 8 to 12 refer directly or indirectly to claim 7.

- IV. The appellant argued that neither Article 100(b) EPC nor Article 100(c) EPC prejudiced the maintenance of the patent as granted.

The respondents (joint opponents) agreed with the impugned decision and argued that the requirements of Article 83 and Article 123(2) EPC were not fulfilled.

- V. In response to the board's communication pursuant to Article 15(1) RPBA, both parties announced that they would withdraw their requests for oral proceedings in the event that the board maintained their preliminary opinion as expressed in the communication.

Consequently, the oral proceedings were cancelled and the decision (essentially reiterating this preliminary opinion) can be given in writing pursuant to Article 12(8) RPBA.

- VI. The appellant requests that the impugned decision be set aside and amended such that the opposition be rejected (main request), or that the case be remitted to the opposition division for further prosecution on the basis of the patent as granted or alternatively on the basis of one of auxiliary requests 1 to 3 as underlying the impugned decision.

The respondents request that the appeal be dismissed. As an auxiliary measure, they request that the case be remitted to the opposition division for further prosecution.

Reasons for the Decision

Main request (patent as granted)

1. Article 100(b) EPC

The opposition division was of the opinion that the sufficiency of disclosure requirement was not met. In particular, it argued that the calculation of the OFE (overall furnace efficiency) and the PRT (pour readiness time) was not sufficiently disclosed.

This is not convincing, however.

Claim 1 relates to a system for controlling a metals melting process comprising, among other things, a controller (50) having a processor (52) configured to: calculate an overall furnace efficiency based on the at

least one furnace parameter; calculate a predicted process pour readiness time based on the at least one charge parameter, the at least one process parameter, and the overall furnace efficiency; and control the operation of the furnace based on the predicted process pour readiness time, wherein the processor (52) uses a model (60), which is created by using theoretical calculations combined with real data.

Claim 7 relates to a method of controlling a metal melting process comprising, among other things, calculating an overall furnace efficiency based on the at least one furnace parameter, calculating a predicted process pour readiness time based on the at least one charge parameter, the at least one process parameter, and the overall furnace efficiency, and controlling the metal melting process based on the predicted process pour readiness time by a controller (50) having a processor (52), wherein the processor uses a model (60), which is created by using theoretical calculations combined with real data based on an energy balance (see paragraphs [0043] and [0044] of the patent).

The main debate between the parties is about the overall furnace efficiency (OFE) and the predicted process pour readiness time (PRT).

Neither claim 1 nor claim 7 includes any details as to the model to be used, nor any objectives of the method apart from controlling. A feedback loop is not part of the process. The desired effect of optimising metals melting processes (paragraph [0005]) is not part of the claims. Consequently, the effect is not to be taken into consideration for the question of sufficiency of disclosure (G 1/03, Reasons 2.5.2). Moreover, the

question of sufficiency must be assessed on the basis of the patent as a whole, including the description and the claims (Case Law of the Boards of Appeal of the EPO, 11th edition, 2025, II.C.3.1).

Figure 2 shows the input parameters for the controller, which calculates, based on an undefined model, the predicted pour readiness time.

According to the opposition division, the OFE "cannot be based on a single (or even a few arbitrary) furnace parameters as allowed by the expression 'at least one furnace parameter'" as present in claims 1 and 7 (see point 2.2 of the decision).

The skilled person can apparently execute the process steps defined in claims 1 and 7 with only one input parameter, but it is doubtful that the output would be very reliable. However, this is not a question of sufficiency, but rather a question of inventive step when establishing whether the claimed method allows some optimisation over the whole scope of the claims or only under specific, well-defined input conditions. In any case, it is evident from the teaching of the patent as a whole that several parameters can be used. The skilled person knows that any prediction is improved if more data are available.

The skilled person also understands from the patent as a whole and in particular from Equation 5, Figure 5, and paragraphs [0043] and [0044], in agreement with D13, that in the context of the patent OFE is a *thermal* efficiency defined by $Q_{\text{tap}}/Q_{\text{in}}$. The skilled person knows how to calculate an energy balance.

The overall efficiency of the furnace is indeed not

directly linked to the quality of the product, as argued by the respondents. The goal of the patent is to control the metals melting process and not the quality of the product.

Paragraph [0038] teaches how Q_{flue} can be estimated. The fact that there is a discrepancy between claim 5 and paragraph [0038] is not a question of sufficiency but of clarity (Article 84 EPC).

The respondents were also of the view that Q_{other} could not be determined.

However, paragraph [0039] discloses that historical data may be used to get an estimation. For such "historical" cases Q_{in} is known, and Q_{tap} and Q_{flue} can be estimated, meaning that Q_{other} can also be estimated. This information can be used to estimate an OFE. The reliability of such an OFE is not part of the claims.

Based on this information and the Q_{tap} , the PRT can be calculated. Figure 5 shows a simulation of the heat input from charging until post melting and postulates that the melting time could have been reduced by 14% (see also paragraph [0056]). There is no data showing a correlation with the product quality, but this is also not part of the claims.

Therefore, the skilled person is able to provide sufficient control of the metals melting process. Article 100(b) EPC does not prejudice the maintenance of the patent as granted. Whether the desired optimisation of the metals melting processes is obtained, though, is a question to be decided under Article 56 EPC.

2. Article 100(c) EPC

The respondents argued that the expression "overall furnace efficiency" as present in claims 1 and 7 was not directly and unambiguously derivable from the application as filed.

Although this matter was not part of the impugned decision, it is appropriate to deal with it at this stage. The objection is limited in scope and somewhat linked to the discussion pursuant to Article 100(b) EPC.

The board is not convinced by the respondents' arguments in this context. The application as filed does not give a different meaning to "overall furnace efficiency" than to "furnace efficiency". In particular, the symmetry between claims 1 and 9 as filed and aspects 1 and 11, respectively (paragraphs [0005] and [0015] as filed) shows the skilled person that there is no difference between "overall furnace efficiency" and "furnace efficiency".

Article 100(c) EPC therefore does not prejudice the maintenance of the patent as granted.

3. Article 11 RPBA

Both parties requested that the case be remitted to the opposition division for further prosecution.

Article 100(a) EPC did not form part of the impugned decision and would require an extensive discussion at the appeal stage. However, the primary object of the

appeal proceedings is to review the decision under appeal (Article 12(2) RPBA).

Therefore, there are special reasons within the meaning of Article 11 RPBA to remit the case to the opposition division to deal with Article 100(a) EPC.

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 Chair:



A. Chavinier-Tomsic

R. Winkelhofer

Decision electronically authenticated