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**Datasheet for the decision
of 28 April 2026**

Case Number: T 1033/24 - 3.5.01

Application Number: 18839716.0

Publication Number: 3899677

IPC: G05B19/418

Language of the proceedings: EN

Title of invention:

METHOD AND ELECTRONIC DEVICE FOR CONTROLLING A MANUFACTURING
OF A GROUP OF FINAL METAL PRODUCT(S) FROM A GROUP OF
INTERMEDIATE METAL PRODUCT(S), RELATED COMPUTER PROGRAM,
MANUFACTURING METHOD AND INSTALLATION

Patent Proprietor:

ArcelorMittal

Opponent:

SMS group GmbH

Headword:

New manufacturing route for intermediate product/ARCELORMITTAL

Relevant legal provisions:

EPC Art. 54, 56, 100(a)

Keyword:

Novelty - main request (no) - auxiliary request 1 (no)

Inventive step - auxiliary request 2 (yes)



Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 1033/24 - 3.5.01

D E C I S I O N
of Technical Board of Appeal 3.5.01
of 28 April 2026

Appellant: ArcelorMittal
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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted/
electronically transmitted on 7 June 2024
concerning maintenance of the European Patent
No. 3899677 in amended form.

Composition of the Board:

Chairman N. Glaser
Members: A. Wahrenberg
E. Mille

Summary of Facts and Submissions

I. Appeals were filed by both the proprietor and the opponent against the opposition division's interlocutory decision maintaining European patent No. 3899677 in amended form on the basis of auxiliary request 2.

II. The decision under appeal referred to the following documents:

D5: EP1658533 B1; and

D6: US2018/0292811 A.

Claim 1 of the main request, corresponding to the patent as granted, was found to lack novelty over D5. The same conclusion was reached for claim 1 of auxiliary request 1. By contrast, the subject-matter of the claims of auxiliary request 2 was found to involve an inventive step in view of the combination of D5 and D6.

III. The proprietor requested that the decision of the opposition division be set aside and that the opposition be rejected (main request), or that the patent be maintained based on one of auxiliary requests 1 to 65 filed during the opposition proceedings on 9 May 2023 and again with the grounds of appeal.

IV. The opponent requested that the decision of the opposition division be set aside and that the patent be revoked.

V. The Board summoned the parties to oral proceedings to be held by videoconference. In the communication

accompanying the summons, the Board tended to agree with the opposition division that claim 1 of the main request and auxiliary request 1 lacked novelty. Furthermore, the Board had doubts as to whether claim 1 of the second auxiliary request involved an inventive step in view of D5, taking into account the teaching of D6.

VI. Claim 1 of the main request reads:

A method for controlling a manufacturing of a group of final metal product(s) (6) from a group of intermediate metal product(s) (8), the controlling method being implemented by an electronic controlling device (10) and comprising, for each intermediate metal product (8), the following steps:

- acquiring (110) a set of intermediate characteristic(s) (C_{IP}) for said intermediate metal product (8);
- determining (120) a current estimated set of final characteristic(s) (C_{est_cur}) with at least one corresponding prediction model and according to the set of intermediate characteristic(s) (C_{IP}) and to a respective current manufacturing route from said intermediate metal product (8);
- comparing (130) the current estimated set of final characteristic(s) (C_{est_cur}) with a current target set of final characteristic(s) (C_{target_cur}) for a respective current final metal product (6);

characterized in that if a deviation between the current estimated set of final characteristic(s) (C_{est_cur}) and the current target set of final characteristic(s) (C_{target_cur}) is above a predefined threshold, the method further comprises the following steps:

- obtaining (140) at least one new target set(s) of

final characteristic(s) ($C_{\text{target_new}}$) for respective new final metal product(s) (6); and

- calculating (150) a new manufacturing route from said intermediate metal product (8) according to the set of intermediate characteristic(s) (C_{IP}) and to the at least one new target set(s) of final characteristic(s) ($C_{\text{target_new}}$).

VII. The first auxiliary request adds the following features at the end of claim 1:

wherein each manufacturing route includes one or several transformation actions, each transformation action being chosen from among the group consisting of: a hot rolling; a cold rolling; a pickling; an annealing; a skin pass; an electro-galvanizing; and a coating; and

wherein a sequence of transformation action(s) of the calculated new manufacturing route differs from the one of the corresponding current manufacturing route through transformation action(s) of a different type and/or through transformation action(s) with different manufacturing parameter(s).

VIII. The second auxiliary request adds the following features to claim 1 of the main request:

wherein the calculating step (150) includes:

+ determining (160) new estimated sets of final characteristic(s) ($C_{\text{est_new}}$) with at least one corresponding prediction model and according to the set of intermediate characteristic(s) (C_{IP}) and to potential manufacturing routes from said intermediate metal product (8), and

+ selecting (170) one of the potential

manufacturing routes as the new manufacturing route according to a comparison of each new estimated set of final characteristic(s) (C_{est_new}) with a corresponding new target set of final characteristic(s) (C_{target_new}).

- IX. The parties' arguments, insofar as they are relevant to this decision, are set out in the Reasons below.

Reasons for the Decision

1. Main request, claim 1

- 1.1 The invention of claim 1 concerns a method for controlling the manufacture of metal products from intermediate metal products. For each intermediate product, a set of intermediate characteristics is acquired, a corresponding set of final characteristics is estimated, and the estimated final characteristics are compared with target characteristics for an intended final product. If the deviation exceeds a predefined threshold, one or more new target sets of final characteristics for alternative final products are obtained and a new manufacturing route is calculated, enabling the intermediate product to be processed into a different final product instead of being rejected.

In the oral proceedings, it was common ground that the "new manufacturing route" in claim 1 may consist either of a different sequence of processing steps or of the same processing steps performed with different processing parameters (see paragraph [0076] of the patent and also claim 1 of the first auxiliary

request).

- 1.2 D5 discloses, in particular in paragraph [0044], a method in which production data are monitored and assessed to determine whether the required material properties can be achieved for the intended final product. If this is not the case, the target processing parameters ("Sollwerte") are modified and the assessment is repeated. Where the required material properties still cannot be achieved, the intermediate product (slab) is reassigned to a different order:

"Falls die Festigkeit nicht erreichbar ist, wird eine Umbindungsanforderung ausgegeben, um die Bramme an einen anderen Auftrag anzubinden"

- 1.3 The opposition division identified features a) to j) of claim 1 (see point 10.1 of the decision under appeal). It is common ground that document D5 discloses features a) to i). The only disputed issue is whether D5 discloses feature j):

calculating a new manufacturing route from said intermediate metal product according to the set of intermediate characteristics and to the at least one new target set of final characteristics.

- 1.4 The proprietor argued that, in D5, the reassignment of a slab to a new order constituted merely an administrative measure rather than a technical step involving the determination of a new manufacturing route. In particular, it was emphasised that paragraph [0044] of D5 stated that the reassignment was carried out without further processing steps ("*... ohne dass weitere Herstellungsschritte durchgeführt werden*"), which, in the proprietor's view, excluded any further

manufacturing activity. Reliance was also placed on paragraph [0019], according to which the slab could simply be placed into storage.

- 1.5 The Board is not persuaded by the proprietor's arguments.

D5 discloses that, when the desired material properties cannot be achieved for the current order, the slab is assigned to a different order. Such reassignment necessarily implies that the slab will no longer be processed according to the manufacturing route associated with the original order, but instead in accordance with the requirements of the new order. The new order has different target product characteristics and therefore requires a corresponding manufacturing route leading from the intermediate product to that alternative final product, see [0044] of D5.

The Board further considers that the statement in paragraph [0044] that the reassignment occurs without further processing steps must be read in its context. This passage merely indicates that no further processing steps are carried out within the framework of the current order before the reassignment takes place (*"Diejenigen Brammen oder Coils, die für den vorliegenden Auftrag nicht geeignet sind, werden sofort umgebunden, ohne dass weitere Herstellungsschritte durchgeführt werden"*). It does not mean that the slab will undergo no further processing. On the contrary, assignment to a new order presupposes that the slab will subsequently be processed in accordance with the requirements of that order, possibly after storage in an interim storage (*"Zwischenlager"* in paragraph [0019]).

Consequently, D5 discloses that, once the slab is reassigned to a different order having different target characteristics, a corresponding manufacturing route for that order is determined. The Board therefore considers that feature j) is disclosed in D5.

- 1.6 Since D5 also disclosed features a) to i), the Board concludes that D5 discloses the whole subject-matter of claim 1. Consequently, the subject-matter of claim 1 is not novel within the meaning of Article 54 EPC, and the ground for opposition under Article 100(a) EPC prejudices the maintenance of the patent.

2. *First auxiliary request, claim 1*

- 2.1 It is common ground that the first additional feature of claim 1 of the first auxiliary request is disclosed in D5.

During the oral proceedings, the proprietor explained that the second additional feature clarified how the new manufacturing route differed from the current route; the proprietor did not argue that this feature further distinguished the claim from D5.

- 2.2 As the Boards reasoning given for the main request already takes into account the definition of a new manufacturing route as defined in the first auxiliary request, the same reasons apply. Consequently, claim 1 of the first auxiliary request lacks novelty (Articles 54 EPC).

3. *Second auxiliary request, claim 1*

- 3.1 Claim 1 of the second auxiliary request defines how a new manufacturing route is calculated. For each

potential manufacturing route, a prediction model uses the intermediate characteristics to estimate a corresponding set of final characteristics. These estimated final characteristics are then compared with target characteristics, and a new manufacturing route is selected on that basis.

During the oral proceedings, the meaning of the term "prediction model" was discussed. The proprietor explained that the prediction model was the same as that used in the main request to estimate the final characteristics of the current manufacturing route. According to paragraph [0058], this model was a metallurgical model. However, the proprietor emphasised that the model itself did not constitute the inventive concept. Rather, the inventive concept lied in the manner in which the model was used to determine a new manufacturing route.

- 3.2 The opponent did not dispute that the additional features of claim 1 of the second auxiliary request were not disclosed in D5 and that claim 1 was therefore novel over D5. However, the opponent submitted that the subject-matter of claim 1 of the second auxiliary request was rendered obvious by the combination of D5 and D6.

According to the opponent, D5 disclosed, in paragraph [0035], a microstructure optimisation ("Gefügeoptimierung"), in which mathematical models were used to simulate material behaviour and to determine, for each production step, changes in the steel's microstructure. Following the optimisation calculations, the microstructure optimiser of D5 outputted modified target values as in claim 1. The skilled person would, according to the opponent, have

turned to D6 for further details regarding the optimisation or prediction techniques employed.

The opponent contended that D6, like D5, concerned product quality (see, for example, paragraph [0007]), in particular in the manufacture of steel products, and aimed to improve quality during the manufacturing process by means of self-learning software that modified and selected process variables. Since changes to process variables resulted in different manufacturing routes, D6 effectively concerned the selection of manufacturing routes. In particular, paragraphs [0031] and [0048] disclosed the determination of new estimated sets of characteristics and the use of a prediction model in the manufacturing process.

In the opponent's view, paragraph [0031] further disclosed the selection and input of product genealogy data into a machine-learning algorithm to train the prediction model, enabling the model to calculate coefficients for the relevant variables. D6 therefore suggested determining intermediate characteristics of an intermediate metal product and, on that basis, identifying different potential manufacturing routes and selecting one of them.

- 3.3 The Board does not share the opponent's view that the subject-matter of claim 1 of the second auxiliary request is rendered obvious by the combination of D5 and D6.

Although the microstructure optimisation ("Gefügeoptimierung") disclosed in D5 employs a prediction model, that model is not used to select a new manufacturing route in the sense of a new order for

a slab that cannot be processed so as to achieve the target final characteristics of the current order. Rather, it is used to analyse whether modifying the target processing parameters ("Sollwerte") would enable the steel product to be processed within the required tolerances (paragraph [0038]: "Falls nach der Durchführung einer Berechnung des Gefügemonitors feststeht, dass eine mechanische Eigenschaft nicht eingehalten werden kann, wird mittels des Gefügeoptimierers 1 analysiert, ob das jeweilige Stahlprodukt durch eine Änderung der Sollwerte noch so behandelt werden kann, dass es innerhalb der Toleranzen liegt.").

Moreover, D5 does not disclose determining a plurality of potential manufacturing routes, estimating the final characteristics associated with those routes, and selecting a route on the basis that its estimated final characteristics meet the target final characteristics. Instead, the optimisation is limited to adjusting processing parameters within a given manufacturing route.

- 3.4 Furthermore, the Board is not persuaded that the opponent has sufficiently explained which specific teaching of D6 the skilled person would have incorporated into the method of D5, why the skilled person would have done so, and how such a combination would have led to the subject-matter of claim 1 of the second auxiliary request.

D6 discloses a machine-learning algorithm for deriving processing control rules from historical product genealogy data and processing conditions. These control rules may be ranked and filtered according to their effectiveness, for example by applying them during the

manufacturing process and evaluating the quality of the resulting product.

However, like the opposition division, the Board does not see how this disclosure corresponds to determining a plurality of potential new manufacturing routes for an intermediate product that cannot be processed to meet the target final characteristics, estimating the final characteristics for those routes, and selecting a route on the basis that its estimated final characteristics satisfy the target final characteristics.

- 3.5 In the Board's view, the distinguishing features of claim 1 of the second auxiliary request solve the problem of how to determine a new manufacturing route (order) for an intermediate product that cannot be processed so as to achieve the target final characteristics of the current order.

Since the combination of D5 and D6 does not teach a solution to this problem, the Board is satisfied that the subject-matter of claim 1 involves an inventive step within the meaning of Article 56 EPC.

- 4. *Second auxiliary request, claim 14 to 17*

- 4.1 The same reasons apply to claim 14 to 17, which are therefore allowable.

- 5. *Second auxiliary request, claims 18 to 22*

- 5.1 Claim 18 is based on granted claims 1, 3, and 4. During the opposition proceedings, the opponent did not dispute that the subject-matter resulting from this combination of claims was allowable (see the decision

under appeal, point 15.2.8, and the minutes of the oral proceedings before the Opposition Division, point 35). In its statement of grounds of appeal, the opponent merely asserted that the same objections raised against claim 1 applied equally to claims 14 to 18. However, this assertion is clearly not applicable to claim 18. No specific objections against claim 18 were substantiated, neither in writing nor during the oral proceedings before the Board. Accordingly, claim 18 was not effectively challenged in the appeal proceedings. The Board therefore sees no reason to depart from the opposition division's conclusion that claim 18 is allowable. The same reasoning applies to claims 19 to 22.

Order

For these reasons it is decided that:

1. The patent is maintained on the basis of the set of claims of auxiliary request 2.
2. The appeals of the opponent and the patent proprietor are dismissed.

The Registrar:

The Chairman:



S. Sánchez Chiquero

N. Glaser

Decision electronically authenticated