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**Datasheet for the decision  
of 29 April 2024**

**Case Number:** T 1184/22 - 3.3.05

**Application Number:** 14847363.0

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**IPC:** C22C38/00, C21C7/00, C21D8/06,  
C22B9/16, C22C38/26, C22C38/52

**Language of the proceedings:** EN

**Title of invention:**  
HIGH-SPEED-TOOL STEEL AND METHOD FOR PRODUCING SAME

**Patent Proprietor:**  
Hitachi Metals, Ltd.

**Opponent:**  
Uddeholms AB

**Headword:**  
High-speed-tool steel/HITACHI

**Relevant legal provisions:**  
EPC Art. 54(1), 54(2), 56  
RPBA 2020 Art. 11, 12(3), 13(2)

**Keyword:**

Novelty - main request (yes)

Inventive step - main request (no) - auxiliary request (no)

Reply to statement of grounds of appeal - party's complete  
appeal case

Amendment after summons - exceptional circumstances (no)

Remittal - (no)

**Decisions cited:**

T 1919/17, T 1913/19

**Catchword:**



**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

Boards of Appeal of the  
European Patent Office  
Richard-Reitzner-Allee 8  
85540 Haar  
GERMANY  
Tel. +49 (0)89 2399-0  
Fax +49 (0)89 2399-4465

Case Number: T 1184/22 - 3.3.05

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.05**  
**of 29 April 2024**

**Appellant:** Uddeholms AB  
(Opponent) Uvedsvägen 15  
683 85 Hagfors (SE)

**Representative:** Noréns Patentbyrå AB  
Box 10198  
100 55 Stockholm (SE)

**Respondent:** Hitachi Metals, Ltd.  
(Patent Proprietor) 2-70, Konan 1-chome,  
Minato-ku,  
Tokyo 1088224 (JP)

**Representative:** Adamson Jones  
Park View House  
58 The Ropewalk  
Nottingham NG1 5DW (GB)

**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 11 March 2022  
rejecting the opposition filed against European  
patent No. 3050986 pursuant to Article 101(2)  
EPC.**

**Composition of the Board:**

**Chairman** E. Bendl  
**Members:** T. Burkhardt  
R. Winkelhofer

## Summary of Facts and Submissions

I. The opponent's (appellant's) appeal is against the opposition division's decision to reject the opposition against European patent No. 3 050 986 B1.

II. Of the documents discussed at the opposition stage, the following are relevant to the present decision:

D7            EP 1 469 094 A1  
D8            EP 0 452 526 A1  
D9            JP 2004-169177 A  
D9t           machine translation of D9

III. With their reply to the appeal, the patent proprietor (respondent) submitted auxiliary requests 1, 2, 2.1, 3 and 3.1.

IV. In a communication under Article 15(1) RPBA 2020, the board took the preliminary view that the decision under appeal was likely to be set aside and the patent revoked.

V. In response, the patent proprietor submitted further arguments and auxiliary request 4.

VI. Independent claim 1 of the main request (patent as granted) and of auxiliary request 1 reads as follows:

"1. A high speed tool steel, comprising by mass-%: C at from 0.40 to 0.90%; Si at 1.00% or less; Mn at 1.00% or less; Cr at from 4.00 to 6.00%; one or both of W and Mo at a content determined by a relational expression

(Mo+0.5W) of from 1.50 to 6.00%; one or both of V and Nb at a content determined by the relational expression (V+Nb) of from 0.50 to 3.00%; optionally Ni at 1.00% or less by mass%; and optionally Co at 5.00% or less by mass%; wherein a content of N is 0.0200% or less by mass%, the balance comprises Fe and impurities, and a maximum value of an equivalent circle diameter of a carbide in a sectional structure is 1.00  $\mu\text{m}$  or less."

VII. Compared with claim 1 of the main request, the following feature has been inserted at the end of claim 1 of auxiliary requests 2 and 2.1:

"..., and a distribution density of a carbide in the high speed tool is  $80 \times 10^3 \text{ mm}^{-2}$  or higher."

VIII. Compared with claim 1 of the main request, the Nb content in claim 1 of auxiliary requests 3 and 3.1 has been further specified by the following feature:

"[Nb at a content determined by the relational expression (V+Nb) of from 0.50 to 3.00%], the Nb content being higher than 0%"

IX. Independent claim 1 of auxiliary request 4 reads as follows (emphasis added by the board):

"1. A high speed tool steel, comprising by mass-%: C at from 0.40 to 0.90%; Si at 1.00% or less; Mn at 1.00% or less; Cr at from 4.00 to 6.00%; one or both of W and Mo at a content determined by a relational expression (Mo+0.5W) of from 1.50 to 6.00%; one or both of V and Nb at a content determined by the relational expression (V+Nb) of from 0.50 to 3.00%; optionally Ni at 1.00% or less by mass%; and optionally Co at 5.00% or less by mass%, wherein a content of N is 0.0200% or less by

mass%, the balance comprises Fe and impurities; having a martensite structure after tempering and cooling, and wherein a maximum value of an equivalent circle diameter of a carbide in a sectional structure is 1.00 µm or less, and a distribution density of a carbide in the high speed tool steel is  $80 \times 10^3 \text{ mm}^{-2}$  or higher."

- X. The arguments made by the appellant during the appeal, where relevant to the present decision, can be summarised as follows.

The subject-matter of claim 1 of the main request and of auxiliary request 1 was neither novel nor inventive in view of D7, possibly in combination with either D8 or D9/D9t.

The subject-matter of auxiliary requests 2, 2.1, 3 and 3.1 did not meet the requirements of Articles 54 and 56 EPC either.

The respondent had failed to substantiate in time their claims that auxiliary requests 2, 2.1, 3 and 3.1 did involve an inventive step. The arguments submitted later should not be considered.

Auxiliary request 4 was late-filed and should not be considered.

- XI. The arguments made by the respondent during the appeal, where relevant to the present decision, can be summarised as follows.

All the claim requests met the requirements of the EPC.

The case should be remitted to the department of first instance if the auxiliary requests were to be discussed.

- XII. The appellant requests that the decision under appeal be set aside and amended such that the patent be revoked.

The respondent requests that the appeal be dismissed (main request). Alternatively, they request that the patent be maintained on the basis of auxiliary requests 1, 2, 2.1, 3 and 3.1 (re-)submitted with the reply to the appeal, or of auxiliary request 4 submitted on 15 April 2024.

## **Reasons for the Decision**

### *Main request*

The main request is identical to the granted version of the patent.

1. Novelty

The appellant raises, *inter alia*, a novelty objection against the subject-matter of product claim 1 over D7.

The appellant considers the embodiment of paragraphs [0060] to [0068] of D7 with the composition of Table 1 and an ingot diameter of 580 mm (paragraph [0060]) as novelty-destroying for the subject-matter of claim 1.

Besides nitrogen (N), the composition of Table 1 falls within the ranges of claim 1 of the main request. This has not been contested.

Figure 6 of D7 shows that there are no carbides with a diameter of more than 1  $\mu\text{m}$  when this steel is cooled at a cooling rate of 300°C/hour in surface temperature of the tool steel (see paragraph [0066]).

The respondent argues that Figure 6 of D7 did not relate to a "high speed tool steel" as required by claim 1 but to a "specimen" of an intermediate product before the mandatory quenching and tempering steps. The respondent pointed to paragraph [0071] in this regard.

This argument is not convincing. Claim 1 of the patent in suit is a product claim and does not mention quenching and tempering. The first line of paragraph [0066] of D7 clarifies that the "specimens" of the embodiment relating to Figure 6 are already considered as "tool steel".

Moreover, there is no reason to assume that D7 distinguishes between a "tool steel" and a "high speed tool steel" and that quenching and tempering are necessary to convert a tool steel into a high speed tool steel. The appellant has not argued along these lines either, let alone provided supporting evidence for such an allegation.

The respondent further argues that D7 only discusses average carbide size, not maximum carbide diameter.

This view is likewise not shared since Figure 6 of D7 subdivides the carbide diameter range between 0 and 1  $\mu\text{m}$  into at least seven sub-ranges and indicates the



respective number of particles. Hence Figure 6 discloses the distribution of the particle diameter, which in turn allows the average particle diameter to be determined.

The possible presence of some larger carbides in Figures 9a and 10a of D7 is of no relevance, since these figures relate to a different embodiment, namely that described in paragraphs [0069] to [0078]. The ingot of the latter embodiment is much thicker, i.e. 1000 mm or even 1500 mm (paragraph [0069]). Moreover, the cooling rate is lower, namely 180°C/h, corresponding to 3°C/min (paragraph [0073]). These differences between the embodiments have not been disputed. However, a slower cooling process, especially at the high temperatures at the beginning of the cooling step, increases the risk of forming larger carbides as explained in the patent in suit (paragraphs [0041] to [0048]).

On the other hand, it has also not been disputed that the presence of N is not mentioned in Table 1 of D7. In fact, D7 does not mention N at all. The N content range of claim 1, i.e. 0.0200% or less, is narrow in comparison and renders the subject-matter of claim 1 novel within the meaning of Article 54(1) and (2) EPC over D7 (see also Case Law of the Boards of Appeal, 10th edition, 2022, I.C.6.3.1).

The appellant has not disputed that special alloys with an N content much higher than 0.0200% do exist.

Thus there is no direct and unambiguous disclosure anticipating the claimed high speed tool steel. Consequently, the subject-matter of claim 1 is novel.

2. Inventive step

Moreover, the appellant raises, *inter alia*, an inventive-step objection against the subject-matter of claim 1 starting from D7.

For the reasons set out below, the subject-matter of claim 1 is not inventive in view of this document.

2.1 The invention relates to a high speed tool steel (see paragraphs [0001] and [0006] of the patent in suit).

2.2 **D7** also relates to high speed tool steels with high toughness (paragraph [0001]). It is a family member of document JP 2004-307963 acknowledged in paragraphs [0002], [0003] and [0119] of the patent in suit.

D7 relates to the same technical field and seeks to solve the same problem. Moreover, as shown above (see point 1.), the embodiment of paragraphs [0060] to [0068] with the composition of Table 1 and an ingot diameter of 580 mm has numerous features in common with claim 1.

It is hence a suitable starting point for assessing inventive step.

2.3 According to the patent in suit, the problem to be solved is to provide a steel with further improved toughness (e.g. paragraph [0006]).

2.4 It is proposed that this problem be solved by the steel of claim 1 being characterised by an N content of 0.0200 mass-% or less.

2.5 However, the problem has not been solved successfully since the high cooling rate in the embodiment relating to Figure 6 of D7 (300°C/h, i.e. 5°C/min (paragraph [0066])) *already* prevents the formation of larger carbides as shown in Figure 6 of D7. Paragraph [0028] of the patent in suit explains that these carbides cause reduced toughness.

Hence the problem to be solved has to be reformulated as the provision of a mere alternative.

2.6 However, while D7 itself is silent on N, it is well known that reduction in the N content in high speed tool steels is advantageous (e.g. **D8**: page 5, lines 7 to 16; **D9t**: last paragraph on page 7).

2.7 The respondent argued that **D8** was from a different technical field as it related to low-cost backing materials. Moreover, it advocated controlling/limiting the content not only of N, but also of P, S and O. However, this was contrary to the teaching of the patent in suit, since inventive steel ingot A comprised a non-negligible amount of P (Table 1 of the patent in suit).

These arguments are not convincing. D8 explicitly relates to high speed steels for a specific tool, i.e. a metal band saw (page 1, lines 3 to 4). Even if P, S, N and O are all limited, the resulting steel will fall within the scope of claim 1 (which comprises no restrictions regarding P, S and O). The disclosure of steel ingot A of the patent in suit is irrelevant as the scope of protection is defined by the claims.

2.8 In the respondent's view, **D9t** should not be relied upon in this context, as it was merely a machine translation.

However, D9/D9t has been on file since the notice of opposition. There is no evidence of any incorrect translations. Moreover, the respondent has not provided any human translation, despite considering the translation in D9t inaccurate.

2.9 The respondent also argued that the prior art was entirely silent on the role that N plays in the formation of large carbide particles and toughness.

However, the fact that the respondent allegedly discovered the importance of the effect of the N concentration on carbide particle diameter is of no relevance under the current circumstances, since the embodiment of Figure 6 of D7 already shows the absence of large carbide particles. There is thus no technical problem that has been solved in a surprising and unexpected manner.

2.10 Even if it was acknowledged that a non-quenched and non-tempered tool steel was not (yet) a high speed tool steel, *arguendo*, it would be obvious to carry out the quenching and tempering steps for the specimens of the embodiment relating to Figure 6 of D7, since the purpose of this document is precisely a high speed tool steel (paragraph [0001]). Moreover, quenching and tempering are explicitly disclosed (paragraph [0016]). By carrying out these steps, the skilled person would arrive at a high speed tool steel in accordance with claim 1.

The respondent does not share this view, arguing that quenching and tempering of the steel used in Figure 6 of D7 would result in the formation of a certain number of carbide particles having a diameter above 1  $\mu\text{m}$  as shown by Figures 9a and 10a.

This reasoning is not correct, though. Paragraphs [0041] to [0048] of D7 confirm, to the contrary, the appellant's view according to which the size of the carbides is (already) reduced during the soaking and cooling steps that precede the quenching and tempering steps. This is corroborated by paragraphs [0073] to [0080] of the patent in suit.

As explained above under point 1., Figures 9a and 10a of D7 are of no relevance as they relate to a different embodiment with a thicker steel, which was cooled more slowly.

2.11 Hence the subject-matter of claim 1 of the main request is rendered obvious when starting from the embodiment of Figure 6 of D7.

2.12 In the respondent's view, the skilled person would not start from the embodiment of Figure 6 of D7 but of that of Figures 9a and 10a.

However, according to established case law, the choice of starting point needed no specific justification if an inventive step was to be denied (Case Law of the Boards of Appeal, 10th edition, 2022, I.D.3.1).

2.13 Hence the subject-matter of claim 1 does not involve an inventive step (Article 56 EPC).

For this reason the main request fails.

*Remittal*

3. The respondent requested that the case be remitted to the department of first instance for consideration of the auxiliary requests.

In accordance with Article 11 RPBA 2020, though, the board shall remit a case only for special reasons.

The respondent has failed to provide any such special reasons. The board cannot see any such reasons either; in particular, the board can deal with the auxiliary request, which is also in the interest of procedural economy.

For this reason alone, the case will not be remitted to the department of first instance.

*Auxiliary requests*

4. Auxiliary request 1

Claim 1 of auxiliary request 1 is identical to that of the main request.

Hence auxiliary request 1 fails for the same reasons as the main request (Article 56 EPC).

5. Auxiliary requests 2, 2.1, 3 and 3.1

According to the appellant, the newly added features in claim 1 of these requests were either known from D7 or obvious, and could not confer inventive step.

In their reply, the respondent has not responded to these objections and has thus failed to explain why the amendments in these auxiliary requests overcome the inventive-step objections.

These aspects are not self-explanatory either.

Thus these requests were not initially substantiated, contrary to the requirements of Article 12(3) RPBA 2020.

Responding to the board's communication under Article 15(1) RPBA 2020, the respondent submitted some reasoning as to why the auxiliary requests overcame the objections on file, but did not indicate any exceptional circumstances why they did so only at that stage, while confirming that the board's communication contained no new elements.

Such a late substantiation is contrary to the provisions of Article 13 RPBA 2020 (T 1913/19, reasons 10 to 16; T 1919/17, reasons 25) and therefore cannot be admitted (Article 13(2) RPBA 2020).

Therefore the reasoning above for the main request applies *mutatis mutandis*, and consequently auxiliary requests 2, 2.1, 3 and 3.1 do not meet the requirements of Article 56 EPC either.

6. Auxiliary request 4

The respondent submitted this request in response to the board's communication under Article 15(1) RPBA 2020 that contained no new elements, as also acknowledged by

the respondent. The respondent did not explain why they had not submitted this request earlier, and also failed to invoke exceptional circumstances.

Consequently, auxiliary request 4 cannot be admitted under Article 13(2) RPBA 2020 either.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chair:



C. Vodz

E. Bendl

Decision electronically authenticated