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**Datasheet for the decision  
of 24 January 2007**

**Case Number:** T 1068/04 - 3.2.02

**Application Number:** 99124943.4

**Publication Number:** 1036852

**IPC:** C22C 38/18

**Language of the proceedings:** EN

**Title of invention:**

High strength steel for dies with excellent machinability

**Applicant:**

HITACHI METALS, LTD.

**Opponent:**

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**Headword:**

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**Relevant legal provisions:**

EPC Art. 54

**Keyword:**

"Novelty of a selection - (no) "

**Decisions cited:**

-

**Catchword:**

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Case Number: T 1068/04 - 3.2.02

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.02  
of 24 January 2007

**Appellant:**

HITACHI METALS, LTD.  
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Tokyo (JP)

**Representative:**

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**Decision under appeal:**

**Decision of the Examining Division of the  
European Patent Office posted 27 April 2004  
refusing European application No. 99124943.4  
pursuant to Article 97(1) EPC.**

**Composition of the Board:**

**Chairman:** T. K. H. Kriner  
**Members:** R. Ries  
E. DufRASne

## Summary of Facts and Submissions

I. This appeal is against the decision of the examining division dated 1 April 2004 and posted 27 April 2004 to refuse European patent application No. 99 124 943.4.

The ground of refusal was that the subject matter of claim 1 of the main request then on file lacked novelty with respect to document

D2 WO-A-89/05869.

On 1 July 2004 the appellant (applicant) lodged an appeal against the decision and paid the prescribed appeal fee on the same day. On 18 August 2004 a statement of grounds of appeal was filed.

II. Oral proceedings were held on 24 January 2007. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the single request (main request: claims 1 to 8) submitted with letter of 22 December 2006.

III. Claim 1 reads as follows:

"1. A high strength steel which consists by weight of:

- 0.005 to 0.1% C,
- not more than 1.5% Si,
- not more than 2.0% Mn,
- from 3.0 to less than 8.0% Cr,
- 1 to 4.0% Ni,
- 0.1 to 2.0% Al,
- not more than 3.5% Cu,
- 0.1 to 1% Mo,

- optionally not more than 1% Co,
- optionally not more than 0.5% of V and/or Nb, namely  $0.5 \geq (V + Nb)$ ,
- optionally not more than 0,20% S,
- optionally one or two elements selected from not more than 0.5% Ti, not more than 0.5% Zr and not more than 0.3% Ta,
- optionally one or two elements selected from 0.0005 to 0.01% Ca, 0.03 to 0.2% Pb, 0.03 to 0.2% Se, 0.01 to 0.15% Te, 0.01 to 0.2% Bi, 0.005 to 0.5% In, and 0.01 to 0.1% Ce,
- optionally a total amount of 0.0005 to 0.3% Y, La, Nd, Sm and/or other REMs, and
- balance of Fe and unavoidable impurities including nitrogen and oxygen restricted to not more than 0.02% nitrogen and not more than 0.003% oxygen, and

which has a metal structure whose primary microstructure is martensite."

IV. The appellant argued as follows:

The claimed steel alloy constituted a novel and purposive selection from the steel composition disclosed in document D2. Although an overlap of the Cr-range of the known alloy (1 to 5% Cr) existed with that claimed in the application (3 to 8% Cr), it was only small. As set out in D2 on page 3, lines 17 to 22 and page 5, second paragraph, a low alloyed steel comprising chromium in the range of 1 to 5% was preferred thus teaching the skilled reader to keep the Cr content as low as possible. All the examples given in D2, page 12, Table 1 exhibited chromium contents in the range of 2.2 to 2.5% which were sufficiently far

removed from the claimed Cr-range of 3 to 8%. The skilled person putting into practice the teaching of document D2 would in the first place turn to these examples, and nothing in D2 would motivate him to provide more expensive "high"-Cr alloys comprising Cr contents of more than 3% or even close to the upper limit of 5%. As to the technical effect, D2 did not disclose or suggest any information about the machinability which, however, was significantly improved by combining Cr and carbon within the ranges specified in claim 1.

Moreover, D2 was silent about the oxygen content which was restricted to not more than 0.003%.

Novelty over the disclosure of D2 was therefore given.

## **Reasons for the Decision**

1. The appeal is admissible.
2. *Novelty*
  - 2.1 With respect to the appellant's position summarized above, it has to be examined whether each of the following criteria, which are indispensable for a "novel selection" from the prior art, is satisfied:
    - (a) the selected sub-range should be narrow;
    - (b) the selected sub-range should be sufficiently far removed from the preferred part of the known range (as illustrated for instance in the examples given in the prior art);

(c) the selected sub-range should not be an arbitrarily chosen specimen from the prior art, i.e. not merely one way of carrying out the prior teaching, but must provide a new invention (purposive selection); (cf. Case Law of the Boards of Appeal of the EPO, 4th edition 2001, I.C.4.2.1, 4.2.2).

It has also to be checked whether a skilled person would, in the light of the technical facts at his disposal, seriously contemplate applying the technical teaching of the document D2 in the range of overlap.

2.2 Like the application, document D2 is concerned with a precipitation hardening steel for producing moulding tools for die casting plastics or metals (cf. D2, page 1, lines 5 to 12). After cooling from the hot working temperature, the known steel exhibits a good polishability, tempering resistance and a comparatively soft and tough microstructure which consists essentially or almost fully of lath martensite. The known steel therefore exhibits the same microstructure that is aimed at for the claimed steel (cf. D2, page 4; the A1 publication of the application, [0016], and [0024]). A comparison between the claimed steel alloy and that known from D2 is given in the following Table:

	Claim 1 application	D2	D2, Table 1 steel Nr. 2
C	0.005-0.1	0.01-0.1	0.05
Si	≤1.5	≤2	0.36
Mn	≤2.0	0.3-3.0	1.6
Cr	3.0-<8.0	1-5	2.5
Mn+Cr		≥ 3	4.1
Ni	1- 4.0	1-7	2.6
Al	0.1-2.0	1.0-3.0	1.0
Cu	≤3.5	1.0-4.0	0.01
Mo	0.1 - 1	0.1-1	0.3
N	≤0.02	≤0.015	-
O	≤0.003	-	-
Fe	balance + opt. elem. +residuals	balance	balance
micro- structure:	lath martensite.	lath martensite	almost fully lath martensite

As can be seen, the elemental ranges of the claimed steel composition and the steel known from D2 are almost identical (C, Mo, N) or overlap (Si, Mn, Cu, Ni, Al). With particular respect to the chromium content, the overlap range of 3 to 5% Cr represents 50% of the extent of the range of 1 to 5% given in document D2. Although the ranges for the further compulsory elements Ni, Al specified in the application are somewhat more restricted, the degree of overlap cannot be rated as "narrow" as required by criterion (a).

Turning to criterion (b), all components of steel No. 2 of D2 fall within the claimed ranges, except for the chromium content of 2.5% which nevertheless comes close to the lower limit of 3.0% Cr. The claimed restriction for the oxygen content of  $\leq 0.003\%$  is assumed to be also met since the known steel comprises 1.0% of the deoxidising element Al.

The appellant argued in this context with reference to the comparative example C3 (2.49% Cr; 0.29% Mn) in Table 1 of the application that the machinability is significantly impaired due to the formation of ferrite unless the Cr content is 3% or higher (cf. paragraphs [0028] and [0066] of application).

At the oral proceeding, the appellant could, however, not provide convincing evidence or arguments that a difference in Cr of 0.5% actually results in a fundamental difference in the alloy's properties, in particular in comparison with steel No. 2 of D2. The passage on page 7, lines 1 to 29 of D2 reflects the metallurgical knowledge that either or both of chromium and manganese promote the formation of the preferred soft and tough lath martensite structure and suppress the appearance of ferrite which deteriorates the hardenability (cf. also D2, page 8, lines 17 to 20). To this end, the total of Cr + Mn is set being at least 3% or more. Therefore, steel Nr. 2 comprises 2.5% Cr and 1.6% Mn (Cr + Mn = 4.1%) as to achieve the desired (almost) fully lath martensite structure (cf. D2, page 12, lines 29 to 31). Due to this microstructure the steel of example 2 is expected to have the same machining properties as claimed in the application. It



is therefore doubtful that criterion (c) is actually met by the claimed steel alloy.

The appellant further argued that the skilled practitioner putting into practice the teaching of D2 would not have seriously contemplated working in the range of overlap. Specifically, he would not have provided steel alloys comprising 3 to 5% Cr since according to D2, Tables 3 and 4, the preferred range for Cr was between 2.20 to 2.40% and chromium was an expensive component. Moreover, the exemplifying steels 2 to 9 of D2, Table 1 exhibited Cr-contents between 2.2 and 2.5% and the skilled person would adhere to these steel compositions.

The Board cannot, however, follow this line of arguments. It is undisputed that the preferred alloys of D2 in the form of examples 2 to 9 comprise 2.2 to 2.5% Cr. It is however important to note that all steels include manganese in the range of 1.3 to 1.6% to satisfy the requirement of  $Mn+Cr \geq 3$ . The skilled person reading document D2 is therefore aware that a lath martensite structure is obtained in steels either having high amounts of chromium together with low manganese contents (as in the application) or, vice versa, having medium amounts of Cr in combination with relatively high amounts of Mn (as in D2). The overall teaching of document D2 is, therefore, clearly not limited to the chromium content featuring in the examples 2 to 9 of Table 1 but goes beyond this. There may be, for example, reasons of cost which favour the production of the steel compositions described in Table 1 of D2, as mentioned by the appellant, but the economical situation may change. No special reason is

derivable from the disclosure of D2 as to why the production of steel alloys comprising chromium close the preferred upper limit of 2.8% (cf. D2, claim 20), or 3.0% (cf. D2, claim 18), or in the broadest aspect of D2, even to the upper limit of 5% should not be contemplated or even totally excluded by a skilled person when putting into practice the technical teaching given in document D2.

The subject matter of claim 1 therefore lacks novelty with respect to the technical disclosure of document D2.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:

V. Commare

T. K. H. Kriner