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D E C I S I O N
of 28 February 2005

Case Number: T 1321/04 - 3.2.4

Application Number: 97304349.0

Publication Number: 0814249

IPC: F02D 41/14

Language of the proceedings: EN

Title of invention:

Method for controlling engine exhaust gas system

Applicant:

NGK INSULATORS, LTD.

Opponent:

-

Headword:

Meaning of terms used in patent documents

Relevant legal provisions:

EPC Art. 54(1), (2)

Keyword:

"Normal and special meaning of terms used in patent documents"
"Novelty (yes)"

Decisions cited:

T 0523/00, T 0311/93, T 0312/94, T 0969/92

Catchword:

Terms used in patent documents should be given their normal meaning in the relevant art, unless the description gives the terms a special meaning. The patent document may be its own dictionary (T 523/00, T 311/93, neither published in the OJ EPO).

Thus, if a special meaning can be derived from the patent document, only this meaning is ultimately decisive.



Case Number: T 1321/04 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 28 February 2005

Appellant:

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Representative:

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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 3 June 2004
refusing European application No. 97304349.0
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: M. Ceyte
Members: M. Poock
T. Bokor

Summary of Facts and Submissions

I. On 10 August 2004 the appellant (applicant) lodged an appeal against the decision of the examining division refusing European patent application No. 97 304 349 and paid the prescribed appeal fee. The statement of grounds of appeal was filed on 12 October 2004.

II. The examining division held that the subject-matter of claim 1 is not new having regard to document US-A-5 452 576 (D1).

It was argued in particular that the HC/COS value disclosed in D1, "acts as and thus is" the predetermined value of the nitrogen oxide concentration mentioned in claim 1. In support thereof the examining division cited three US patents to demonstrate that in the relevant technical field of plant control a "predetermined value" could well be a "variable value obtained by instantaneous sensing of conditions".

III. The appellant requested that the decision under appeal be set aside and that claim 1 of the main request received on 13 January 2003 be acknowledged as novel over D1 and the application remitted to the examining division. An auxiliary request was filed with the statement of grounds of appeal. Oral proceedings were requested in the event that the board formed the intention to reject the main request.

IV. Claim 1 of the main request reads as follows:

"1. A method for controlling an engine exhaust gas system, comprising the steps of:

detecting the air-fuel ratio of exhaust gas discharged from an internal engine (30) by an oxygen sensor (71)

controlling said exhaust gas to near the stoichiometric air-fuel ratio by a closed-loop control referring to a resultant signal;

leading said exhaust gas to a three-way catalyst (40) to treat nitrogen oxide, hydrocarbon and carbon monoxide;

measuring nitrogen oxide concentration by means of a nitrogen oxide sensor (70) provided downstream of said three-way catalyst (40);

obtaining a comparison signal by comparing the measured nitrogen oxide concentration with a predetermined value of nitrogen oxide concentration;

and correcting the air-fuel ratio of the closed loop control on the basis of said comparison signal so as to set the nitrogen oxide concentration at said predetermined value."

V. In support of the main request, the appellant made essentially the following submissions:

- (a) The term "predetermined value" in claim 1 means that the value is fixed in time.
- (b) The HC/COS value of D1 does not correspond to the "predetermined value of the nitrogen oxide concentration" of claim 1 because
 - (i) it does not give an indication of nitrogen oxide concentration;
 - (ii) it is not predetermined, because it is "a constantly varying value depending on the state of the exhaust".

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Interpretation of claim 1*

- 2.1 Regarding the different interpretations of the term "predetermined value", it is necessary to establish which meaning the person skilled in the art attributes to the wording "predetermined value of nitrogen oxide concentration" in claim 1.

- 2.2 Terms used in patent documents should be given their normal meaning in the relevant art, unless the description gives the terms a special meaning. The patent document may be its own dictionary (T 523/00, T 311/93, neither published in the OJ EPO).

Thus, if a special meaning can be derived from the patent document, only this meaning is ultimately decisive.

- 2.3 For understanding the meaning of the terms used in a patent document, the person skilled in the art does not consider the terms in isolation from the remainder of the document, ie with their literal meaning. On the contrary, the terms are considered in the context of the contents of the document as a whole (T 312/94, T 969/92, neither published in the OJ EPO).

Therefore, terms must be construed as they would be by the person skilled in the art according to the whole content of the application, taking into account what is achieved by the invention.

These findings are in line with the principle laid down by the boards of appeal that the description and the drawings are used to interpret a claim when an objective assessment of its content has to be made (see "Case Law of the Boards of Appeal of the European Patent Office", 4th edition, II.B.4.3, 2nd paragraph).

2.4 Wording of claim 1

The penultimate feature of claim 1 contrasts the "measured" nitrogen oxide concentration with a "predetermined value" of nitrogen oxide concentration. This indicates that the "predetermined value" is not a value based on current measurements of the nitrogen oxide concentration.

2.5 Interpretation of "predetermined value" as a value fixed in time.

In this interpretation, the "predetermined value" is a constant target value of nitrogen oxide concentration to which the measured nitrogen oxide concentration has to be compared. According to the last feature of claim 1 the air-fuel ratio is then corrected so as to set the nitrogen oxide concentration at this constant target value.

As a result the nitrogen oxide concentration in the exhaust gas cannot exceed the target value so that the

exhaust amount of nitrogen oxide is controlled accurately and sudden exhausts of nitrogen oxide under transient operating conditions are avoided.

It can be concluded that the method of claim 1 in this interpretation achieves the effects which are described in the application on page 1, line 7 and page 1, lines 52, 53 in connection with page 5, lines 23 to 26 (refers to the A2 publication).

Therefore this interpretation is fully consistent with the description.

2.6 Interpretation of "predetermined value" as variable value.

If "predetermined value" were used in the meaning as a variable value obtained by instantaneous sensing of conditions, as held by the examining division, the penultimate feature of claim 1 would require that the measured nitrogen oxide concentration is compared with another value obtained by instantaneous sensing of the nitrogen oxide concentration. Both values vary depending on the state of the exhaust. Thus, this interpretation means that two variable values of measured nitrogen oxide concentrations are compared which is meaningless in the context of the feedback control described as an essential feature of the invention on page 4, lines 9 to 13.

The last feature of claim 1 requires the air-fuel ratio to be corrected so as to set the nitrogen oxide concentration at said other variable value. Neither sudden exhausts of nitrogen oxide under transient

operating conditions can be avoided nor can the exhaust amount of nitrogen oxide be controlled accurately.

Thus such interpretation would exclude that the method achieves the effects described in the application on page 1, line 7 and page 1, lines 52, 53 in connection with page 5, lines 23 to 26.

Therefore this interpretation is not consistent with the description and would thus be ruled out by the person skilled in the art.

- 2.7 These findings are fully consistent with other parts of the application:

According to the example described on page 5, lines 15 to 26 and shown in figures 2 and 3 of the application, the output signal of the nitrogen oxide sensor is compared with a constant voltage of 0.25 V in order to control the nitrogen oxide emissions near 100 ppm. This confirms that the term "predetermined value" is used in the meaning as a constant target value. If the term "predetermined value" covered also a variable value, the nitrogen oxide emissions could exceed 100 ppm so that the envisaged effects to avoid sudden exhausts of nitrogen oxide under transient operating conditions and to accurately control the exhaust amount of nitrogen oxide could not be achieved.

- 2.8 The board comes to the conclusion that the person skilled in the art understands the wording "predetermined value of nitrogen oxide concentration" as a constant value which is independent of the instantaneous condition of the exhaust gas and which is

selected as a value to which it is sought to set the nitrogen oxide.

2.9 Therefore and in view of the considerations of section 2.2 above, it is irrelevant how the term "predetermined value" is used in the field of plant control.

3. *Novelty*

3.1 It is well established practice that any prior disclosure is novelty destroying if the claimed subject-matter can be inferred directly and unambiguously from that disclosure (see "Case Law of the Boards of Appeal of the European Patent Office, 4th ed, I.C.2.3, 2nd paragraph).

3.2 D1 relates to an engine air/fuel control system, in particular it discloses (using the wording of claim 1) a method for controlling an engine exhaust gas system (see for example claim 11 and col. 1, lines 7 to 10) which comprises the following steps:

- detecting the air-fuel ratio of exhaust gas discharged from an internal engine 28 (col. 2, line 65 - col. 3, line 9) by an oxygen sensor 44 (figure 1);
- controlling said exhaust gas to near the stoichiometric air-fuel ratio (figures 1, 4; col. 2, line 65 - col. 3, line 9; col. 4, lines 7 to 16) by a closed-loop control referring to a resultant signal (col. 4, lines 7 to 56, figure 4);

- leading (figure 1) said exhaust gas to a three-way catalyst 50 to treat nitrogen oxide, hydrocarbon and carbon monoxide; and
- measuring nitrogen oxide concentration by means of a nitrogen oxide sensor 46 provided downstream of said three-way catalyst 50 (eg col. 2, lines 46 to 59; figure 1).

This disclosure was not in dispute.

3.3 In relation to the question of novelty, the crucial issue is whether or not D1 also discloses the method steps described in the last two features of claim 1.

3.4 The method of D1 includes the calculation of an emission signal ES which is expressed in step 122 of figure 2 by the equation $ES = HC/COS - NO_xS$.

NO_x , HC and CO are indications of the nitrogen oxide, hydrocarbon and carbon monoxide concentrations as measured by the respective sensors 46, 54 and 52 (col. 2, lines 54 to 56).

HC/CO is established from the outputs of sensors 52 and 54 which are either combined (col. 3, line 32) or divided (follows from the equation shown in step 122 of figure 2) to generate a single output signal related to the quantity of both hydrocarbon and carbon monoxide in the exhaust (col. 3, lines 33 to 35).

Obviously, a term ending in "S" shall indicate that the term is normalised with respect to engine speed and load (figure 2; col. 3, lines 36, 37 and 44, 45).

Thus, for the calculation of the emission signal ES, the normalized value of the nitrogen oxide concentration is subtracted from the normalized value of the HC/CO ratio (col. 3, lines 51 to 53).

3.5 The emission signal ES may be considered as a comparison signal because two values are subtracted from (ie compared with) each other.

3.5.1 However, in contrast to the penultimate feature of claim 1 which requires the concentration of the same pollutant, ie nitrogen oxide, to be compared, D1 teaches the comparison of the concentrations of different pollutants, ie hydrocarbon and carbon monoxides vs nitrogen oxide.

D1 does not disclose that the concentrations of hydrocarbon, carbon monoxide, or any combination thereof such as their ratio represent a nitrogen oxide concentration.

It discloses the comparison of the normalized value of the HC/CO ratio with the normalized value of the nitrogen oxide concentration in order to correct the fuel delivery to the engine 28 such that the emission signal ES is driven to zero in order to ensure maximum converter efficiency (figure 3D, col. 4, lines 34 to 56 in connection with col. 3, lines 54 to 57).

In contrast, the method described in claim 1 aims at controlling the exhaust amount of nitrogen oxide concentration accurately and in particular to avoid sudden exhausts of nitrogen oxide concentration under

transient operating conditions (page 1, line 7 and page 1, lines 52, 53 in connection with page 5, lines 23 to 26).

- 3.5.2 Moreover, the (normalized) value of the HC/CO ratio is not a "predetermined value" in the meaning of claim 1, ie a constant value (see section 2 above), because it is constantly recalculated in each loop (figure 2) based on the variable measurement signals of the hydrocarbon and carbon monoxide sensors 52 and 54.

Thus, with the method of D1, it cannot be ensured that the nitrogen oxide emissions do not exceed a constant target value.

- 3.5.3 Therefore it is concluded that D1 does not directly and unambiguously disclose the step of obtaining a comparison signal by comparing the measured nitrogen oxide concentration with a predetermined value of nitrogen oxide concentration.

- 3.6 The examining division argued that the HC/CO value of D1 "acts as and thus is" the predetermined value of nitrogen oxide concentration of claim 1.

However, whether this value acts as the predetermined value or not is irrelevant. The only decisive question is if the claimed subject-matter can be inferred directly and unambiguously from D1 (see item 3.1 above), ie if D1 discloses the comparison of the measured nitrogen oxide concentration with a predetermined value of nitrogen oxide concentration for obtaining a comparison signal. As set out above in items 3.5.1 and 3.5.2, the method disclosed in D1 does not compare the

- same pollutant or the measured nitrogen oxide concentration with a predetermined, ie constant value of nitrogen oxide concentration. Thus the board could not agree with the examining division's argument.
4. Therefore the subject-matter of claim 1 is distinguished from the method disclosed in D1 by the step of obtaining a comparison signal by comparing the measured nitrogen oxide concentration with a predetermined value of nitrogen oxide concentration and consequently also by the step of correcting the air-fuel ratio of the closed loop control on the basis of said comparison signal so as to set the nitrogen oxide concentration at said predetermined value.
 5. As the main request the appellant asked *inter alia* that the decision under appeal is set aside and the application is remitted to the examining division. In view of this request and in order to examine in particular whether the subject-matter of claim 1 is new over the remaining state of the art documents cited in the search report, ie the documents which are not mentioned in the decision under appeal, and whether the subject-matter of claim 1 is inventive over the state of the art documents cited in the search report, the case is remitted to the examining division pursuant to Article 111(1) EPC for further prosecution.

Auxiliary request

6. In view of the foregoing, it was not necessary for the board to consider the claims of the auxiliary request.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside
2. The case is remitted to the first instance for further prosecution.

The Registrar:

The Chairman:

G. Magouliotis

M. Ceyte