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D E C I S I O N
of 9 March 1999

Case Number: T 0376/98 - 3.2.1

Application Number: 92201263.8

Publication Number: 0549001

IPC: B60K 41/06

Language of the proceedings: EN

Title of invention:

Method and apparatus for managing engine torque

Applicant:

Delphi France Automotive Systems

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 56

EPC R. 67

Keyword:

"Inventive step (yes)"

"Substantial procedural violation (no)"

Decisions cited:

T 0433/93, T 0951/97

Catchword:

-



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Boards of Appeal

Chambres de recours

Case Number: T 0376/98 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 9 March 1999

Appellant: Delphi France Automotive Systems
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Representative: Mantiz, Finsterwald & Partner
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Decision under appeal: Decision of the Examining Division of the European Patent Office posted 5 December 1997 refusing European patent application No. 92 201 263.8 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: F. A. Gumbel
Members: P. Alting van Geusau
V. Di Cerbo

Summary of Facts and Submissions

- I. European Patent application No. 92 201 263.8, filed on 6 May 1992 and published under the publication No. 0 549 001, was refused by a decision of the Examining Division announced during oral proceedings held on 28 November 1997 and issued in writing on 5 December 1997.

The Examining Division held that the subject-matter of claim 1, filed with the applicant's letter dated 26 October 1994, did not involve an inventive step having regard to the prior art disclosed in:

D1: EP-A-0 011 088 and

D4: EP-A-0 362 885.

The minutes of the oral proceedings indicate that document D4 had been introduced by the Examining Division during the oral proceedings as proof of the known experimental approach to determine data concerning the time of start and end of torque management in a manner similar to that of the present application. The Examining Division was of the opinion that, when compared to the prior art disclosed in D1, the single novel feature remaining in the method of claim 1 of the application related to such experimentally determined data and that therefore the combination of teachings of D1 and D4 would lead the skilled person in an obvious manner to the subject-matter claimed.

The oral proceedings had been interrupted between 09.15 and 09.30 hrs for deliberation on the applicant's side after which the applicant requested a decision to be issued on the basis of the claims and description on file.

II. On 13 January 1998 a notice of appeal was lodged against that decision together with payment of the appeal fee. In the statement of grounds of appeal, filed on 19 March 1998, the appellant (applicant) submitted that the introduction of D4 during the oral proceedings had led to a substantial procedural violation requiring reimbursement of the appeal fee.

III. With a communication in preparation for oral proceedings, the appellant was informed that the Board did not see sufficient proof of a substantial procedural violation. The minutes of the oral proceedings, the content of which had not been contested by the appellant, revealed that the oral proceedings had been interrupted to give the applicant time for consideration and it was the appellant who requested a decision based on the documents on file.

It would be necessary to discuss at the oral proceedings whether the subject-matter of the amended claims 1 and 15 contained novel and inventive subject-matter vis-à-vis the prior art disclosed in D4, and in the alternative whether there was an inventive step having regard to the combined teachings of D4 and D1.

IV. With a letter dated 8 February 1999 the appellant filed new claims 1 and 15 which read as follows:

"1. A method of managing the torque of an engine (12) during a gear change so as to reduce the engine torque between a start and an end time during the gear change, comprising the steps of determining the type of gear change on the basis of the gear to be disengaged and the gear to be engaged; measuring one or more engine operating parameters and in addition optionally at least one transmission operating parameter during the gear change; obtaining one or more values for determining the most appropriate start and/or end time of torque management from a storage medium on the basis of the determined type of gear change and the measured operating parameter or parameters, each of the values in the storage medium being experimentally derived and selected from the storage medium on the basis of the engine operating parameter or parameters; and managing the engine torque between the determined start and/or end time."

"15. Apparatus for managing the torque of an engine during a gear change so as to reduce the engine torque between a start and an end time during the gear change, comprising detection means (14, 16, 30) operative to determine the type of gear change required on the basis of the gear to be disengaged and the gear to be engaged; sensing means (14, 16) operative to measuring one or more engine operating parameters and in addition optionally at least one transmission operating parameter during the gear change; a storage medium for storing a plurality of values for use in determining the start and/or end time of torque management, each of the values being experimentally derived, and selected from the storage medium on the basis of the engine operating parameter or parameters; processing means

(32) operative to obtain one or more values from the storage medium on the basis of the determined type of gear change and the measured operating parameter or parameters and to determine the most appropriate start and/or end time for torque management; and means (32, 36) for managing the engine torque between the determined start and/or end time."

V. During oral proceedings, held on 9 March 1999, the appellant filed new claims 1 to 30 in accordance with an auxiliary request. The independent claims 1, 2, 16 and 17 of this request read as follows:

"1. A method of managing the torque of an engine (12) during an upshift gear change so as to reduce the engine torque between a start and an end time during the gear change, comprising the steps of:

- a) determining the type of gear change on the basis of the gear to be disengaged and the gear to be engaged;
- b) measuring the engine speed (NE) and at least one more engine operating parameter during the gear change;
- c) selecting a value (K1) from a storage medium to determine the start time, on the basis of the determined type of gear change and the operating parameter measured during the gear change, each of the values in the storage medium being experimentally derived to provide substantially the most appropriate start time for torque management;
- d) selecting a value (K2) from the storage medium to determine the end time, on the basis of the determined gear change and the engine speed (NE)

- measured during the gear change, each of the values in the storage medium being experimentally derived to provide substantially the most appropriate end time for torque management;
- e) determining the most appropriate start and end time of torque management on the basis of the selected values and the engine speed (NE) measured during the gear change; and
 - f) managing the engine torque between the determined start and end time."

"2. A method of managing the torque of an engine (12) during a downshift gear change so as to reduce the engine torque between a start and an end time during the gear change, comprising the steps of:

- a) determining the type of gear change on the basis of the gear to be disengaged and the gear to be engaged;
- b) measuring the engine speed (NE) and at least one transmission operating parameter (OS) during the gear change;
- c) selecting a value (NE_{ref1}) from a storage medium to determine the start time, on the basis of the determined type of gear change and the transmission operating parameter (OS) measured during the gear change, each of the values in the storage medium being experimentally derived to provide substantially the most appropriate start time for torque management;
- d) selecting a value (NE_{ref2}) from the storage medium to determine the end time, on the basis of the determined gear change and the transmission operating parameter (OS) measured during the gear change, each of the values in the storage medium

being experimentally derived to provide substantially the most appropriate end time for torque management;

- e) determining the most appropriate start and end time of torque management on the basis of the selected values and the engine speed (NE) measured during the gear change; and
- f) managing the engine torque between the determined start and end time."

"16. Apparatus for managing the torque of an engine (12) during an upshift gear change so as to reduce the engine torque between a start and an end time during the gear change, comprising:

- a) detection means (14, 16, 30) operative to determine the type of gear change required on the basis of the gear to be disengaged and the gear to be engaged;
- b) sensing means (14, 16) operative to measuring the engine speed (NE) and at least one more engine operating parameter during the gear change;
- c) a storage medium for storing a plurality of values, each of the values being experimentally derived to provide substantially the most appropriate start and end times for torque management;
- d) processing means (32) operative to select a value (K1) from the storage medium to determine the start time, on the basis of the determined type of gear change and the operating parameter measured during the gear change each of the values in the storage medium being experimentally derived and to select a value (K2) from the storage medium to determine the end time, on the basis of the

determined type of gear change and the engine speed (NE) measured during the gear change, each of the values in the storage medium being experimentally derived and to determine the most appropriate start and end time of torque management on the basis of the selected values and the engine speed (NE) measured during the gear change; and

- f) means (32, 36) for controlling the engine torque between the determined start and end time."

"17. Apparatus for managing the torque of an engine (12) during a downshift gear change so as to reduce the engine torque between a start and an end time during the gear change, comprising:

- a) detection means (14, 16, 30) operative to determine the type of gear change required on the basis of the gear to be disengaged and the gear to be engaged;
- b) sensing means (14, 16) operative to measuring the engine speed (NE) and at least one more engine operating parameter during the gear change;
- c) a storage medium for storing a plurality of values, each of the values being experimentally derived to provide substantially the most appropriate start and end times for torque management;
- d) processing means (32) operative to select a value (NE_{ref1}) from the storage medium to determine the start time, on the basis of the determined type of gear change and transmission operating parameter measured during the gear change each of the values in the storage medium being experimentally derived and to select a value (NE_{ref2}) from the storage

medium to determine the end time, on the basis of the determined type of gear change and the transmission operating parameter (OS) measured during the gear change, each of the values in the storage medium being experimentally derived and to determine the most appropriate start and end time of torque management on the basis of the selected values and the engine speed (NE) measured during the gear change; and

- f) means (32, 36) for controlling the engine torque between the determined start and end time."

The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of:

(main request)

- claims 1 and 15 filed on 8 February 1999; claims 2 to 14 and 16 to 28 and
- description and drawings underlying the appealed decision

or (auxiliary request)

- claims 1 to 30 submitted at the oral proceedings of 9 March 1999,
- description: page 1 filed on 6 April 1996; pages 1a and 1b filed at the oral proceedings on 9 March 1999; pages 2 to 17 as originally filed,
- drawings as originally filed.

The request for reimbursement of the appeal fee was maintained.

VI. In support of its requests the appellant relied on the

following submissions:

Request for reimbursement of the appeal fee

Even though it had been marked as a particularly relevant document in the search report, document D4 had never been discussed during the examination procedure and had only been introduced at the oral proceedings. As indicated in the minutes of the oral proceedings, the appellant was given 15 minutes for studying D4, a document comprising more than 12 pages with partly confusing contents and 19 figures. Such an approach taken by the Examining Division constituted a procedural violation. Attention was drawn to decisions T 433/93 (OJ 1997, 509) and T 951/97 (OJ 1998, 440, item 4.1). In the latter decision the appeal fee was refunded because the decision to refuse an application was based on a document which had already been mentioned in the search report but which was introduced for the first time into the procedure during the oral proceedings.

Furthermore the decision to refuse the present application included objections to the dependent claims which were based on the disclosure of D4. At no stage of the oral proceedings was there a mention of D4 being a ground for objection to the dependent claims. The applicants had never been given an opportunity to comment on this issue, so also in this respect a procedural violation requiring reimbursement of the appeal fee had occurred.

Novelty and inventive step

None of the cited documents disclosed a method or apparatus for managing the torque of an engine by using experimentally determined values which were selected on the basis of operating parameters measured during the gear change and therefore the subject matter of the independent claims was novel.

By using the momentary operating parameters, it was possible to react to sudden changes in the engine speed or changes in other operating parameters, for example the throttle position. Furthermore, by selecting experimentally derived values for the start and end time of torque control such control could be initiated very quickly because the values concerned did not have to be calculated in some process first.

In document D4 the experimentally derived values related to varying time delays between the start of the gear change and the start of the torque control. The throttle opening value which was used for determining the time delay value had to be measured before the start of the actual gear shifting and therefore no account could be taken of a changing throttle opening during the gear change. Document D1 disclosed two possibilities for determining the start and end time of torque control but also here the start and end time were determined at the start of the gear change and were not determined on the basis of an operating parameter measured during the gear change. The subject-matter of the application was therefore novel and inventive over the cited prior art.

The claims in accordance with the main request defined the inventive subject-matter of the present invention

in a manner sufficiently complete to meet the requirements of Article 84 EPC. The claims in accordance with the auxiliary request took account of the different operating parameters for selecting start and end values when an upshift or a downshift gear change was concerned.

Reasons for the Decision

1. The appeal is admissible.

2. *Main request*

2.1 In accordance with the disclosure of the single embodiment of the invention presented in the patent application, the determination of the start and end time of torque management relies on a comparison between a value based on

- a value selected from look-up tables (containing values of the amounts K_1 , K_2 , NE_{ref1} and NE_{ref2}) in accordance with measured operating parameters (in fact the throttle, engine speed or transmission output speed) and
- the engine speed NE .

In each case of upshift or downshift of gears the decision for starting or stopping the torque control depends on the condition that the measured engine speed gets lower or respectively higher than the value based on the value selected from the look-up table.

In addition there is an override back-up of the start and end time of torque control based on a predetermined time amount (C, E, T_{\min} , T_{\max}).

2.2 It is to be noted that the independent claims 1 and 15 of the main request lack any reference to such a basis for determination of the start and end time of the torque control. All that can be derived from the independent claims 1 and 15 is that the selection of the appropriate start and end time of torque management is based on the determined type of gear change and of the measured operating parameter or parameters.

2.3 In the Board's opinion the step of determining the most appropriate start and/or end time of torque management on the basis of the selected values and the engine speed measured during the gear change is an essential feature of the invention disclosed and in fact there is no other basis for the determination of the most appropriate start and end time of torque management to be found in the application as filed. In particular there is no disclosure, either explicit or implicit, of a direct selection of the most appropriate start and end time of torque management on the basis of a given operating parameter, as is implied by the present text of claims 1 and 15.

For this reason the present independent claims do not meet the requirements of Article 84 in respect of support by the description and clarity and therefore the main request must be rejected.

3. *Auxiliary request*

3.1 Amendments

3.1.1 The independent method claims 1 and 2, and the apparatus claims 16 and 17 are based on the originally filed method claim 1 and apparatus claim 15, respectively. Because of the different operating parameters concerned in case of an upshift or a downshift gear change, the originally filed method and apparatus claims were redrafted to take account of this difference so that method claim 1 and apparatus claim 16 relate to the upshift condition and method claim 2 and apparatus claim 17 relate to the downshift condition.

3.1.2 The method claims were further clarified in that

- the engine speed and at least one more engine operating parameter (claim 1) or transmission operating parameter (claim 2) are measured during the gear change,
- a value is selected from the storage medium to determine the start time of torque control on the basis of the determined type of gear change and the (engine) operating parameter measured during the gear change (claim 1) or the transmission operating parameter (claim 2),
- a value is selected from the storage medium to determine the end time of torque control on the basis of the predetermined type of gear change and the engine speed (claim 1) or the transmission

parameter (claim 2)

- the start and end time of torque management are determined on the basis of the selected values and the engine speed measured during the gear change.

These amendments are supported by the originally filed description of the preferred embodiment and take account of the deficiencies (Article 84 EPC) raised in respect of claim 1 of the main request (point 2.3).

Corresponding features used for clarifying the method claims were introduced in the apparatus claims 16 and 17 which therefore also meet the requirements of support and clarity in accordance with Article 84 EPC.

- 3.1.3 The dependent claims 3 to 15 and 18 to 30 correspond to the originally filed claims 2 to 14 and 16 to 28, respectively. In view of these assessments no objections under Article 123(2) EPC arise against the claims according to the auxiliary request. The description was adapted to take account of the prior art disclosed in D1 and D4 and also does not give rise to objections under the EPC.

3.2 *Novelty*

Novelty of the subject-matter of the independent claims 1, 2, 16 and 17 follows from the fact that none of the documents cited in the European search report discloses a method or apparatus for managing the torque of an engine during a gear change, in which method or apparatus predetermined experimentally derived values for determining the start and end time of the torque

management are selected, on the basis of engine or transmission operating parameters measured during the gear change.

3.3 *Inventive step*

3.3.1 When starting from the prior art disclosed in D1 the subject-matter of the independent claims in accordance with the auxiliary request differs from that disclosed in D1 essentially in that

- the values selected from the storage medium and used to determine the start and end time of the torque control are experimentally derived values to provide the most appropriate start and end time for torque management,
- the values are selected from the storage medium on the basis of the determined type of gear change and an operating parameter measured during the gear change.

3.3.2 These features allow improved management of the engine torque during the gear change, firstly because the start and end time of torque control are selected in accordance with the momentary values of the measured operating parameter or parameters and, secondly because the stored values are predetermined experimentally derived values for providing the most appropriate start and end time for torque management which allow immediate access, thus without any further electronic processing, to the most appropriate data for the determination of the start and end time of torque control.

3.3.3 Although in one embodiment disclosed in D1 the engine torque control is also based on a comparison between selected values and the engine speed for deciding the points relating to the start and end of torque control, the selected values are predetermined calculated values and are based on the engine speed measured at the start of gear change.

3.3.5 Document D4 discloses a gear shifting shock suppression system in which, in one embodiment, the torque management period is essentially based on predetermined experimentally derived time values T_a and T_r (page 7, lines 16 to 23). However, these values are selected once the shifting condition is satisfied.

Therefore, when trying to improve the system known from D1 the skilled person does not find exploitable suggestions in D4 leading him to the subject-matter of the present application because the experimentally derived values in D4 are time values which are unsuitable for use in the system known from D1 based on comparisons of engine speed values. Since D4 neither discloses nor suggests a selection of the values on the basis of the operating parameter measured during the gear change, it does not suggest to take account of the actual operating situation during the gear shift for determining the moment of start and end of the torque control.

3.3.6 In the absence of any disclosure or teaching in the available documents to the combination of features of the independent claims 1, 2, 16 or 17, the subject-matter of these claims does not derive in an obvious manner from the state of the art and therefore is

considered to involve an inventive step. Consequently, these claims as well as their dependent claims 2 to 15 and 18 to 30, relating to particular embodiments of the invention in accordance with Rule 29(3) EPC, are acceptable.

4. *Request for reimbursement of the appeal fee*

4.1 It is evident from the present file that the Examining Division referred to document D4 for the first time during the oral proceedings and also used the combination of teachings of D1 and D4 to support an objection of lack of inventive step with respect to the subject-matter of claim 1 then on file, for the first time in the examining proceedings.

As is stated in the minutes of the oral proceedings, the content of which was not contested by the appellant, after making the objection the Examining Division interrupted the oral proceedings to give the applicant time for consideration. When the oral proceedings were resumed the appellant requested a decision based on the documents on file.

4.2 The appellant submitted that the time granted of 15 minutes for studying D4, which comprised 12 pages with partly confusing contents and 19 figures, was not sufficient. With reference to decisions T 433/93 and T 951/97 it was argued that, in fact, no proper opportunity had been given to the appellant to take account of the newly cited prior art and that this constituted a substantial procedural violation requiring reimbursement of the appeal fee.

4.3 Regarding the introduction of D4 only at the oral proceedings, it is to be noted that no procedural limitations are placed upon the Examining Division to cite relevant documents during any stage of the examining proceedings as long as the applicant is given a fair chance to express his opinion with respect to the objections raised before a final decision is taken (Article 113 EPC).

In this respect no indication is given in the present file that the appellant was not allowed to express his view on the disclosure of D4 or to request a further interruption to study more carefully the newly cited document. Instead, after having been given the opportunity to consider the newly cited document D4, it was the appellant himself who requested that a decision be issued on the basis of the claims and description on file.

In the Board's opinion the appellant's request for a decision could only be interpreted to mean that the appellant was not interested in a further debate about the relevance of D4 or its importance for the decision. In fact the appellant's request left the Examining Division no other choice than to decide the case straight away and no procedural violation can be seen in the circumstances.

Since in the decided cases T 433/93 and T 951/97 the appellant had not requested a decision after having been given time to consider the case the outcome of those decisions cannot be seen to be relevant for the present case.

- 4.4 As regards the rejection of the subject-matter of the dependent claims, which was at least in part also based on the newly cited D4, it is to be noted that this part of the decision merely constitutes additional remarks which are not decisive for the rejection of claim 1 and thus for the refusal of the application. Therefore, it cannot be seen as a substantial procedural violation justifying the reimbursement of the appeal fee.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Examining Division for grant of a patent with the following documents:
 - claims 1 to 30 submitted during the oral proceedings of 9 March 1999,
 - description: page 1 filed on 6 April 1996, pages 1a and 1b filed at the oral proceedings of 9 March 1999, pages 2 to 17 as originally filed,
 - drawings (Figures 1 to 6) as originally filed.
3. The request for reimbursement of the appeal fee is rejected.

The Registrar:

The Chairman:

S. Fabiani

F. Gumbel