

**PATENT COOPERATION TREATY**

**TRANSLATION**

From the  
INTERNATIONAL SEARCHING AUTHORITY

**PCT**

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing (day/month/year) **see form PCT/ISA/210**

Applicant's or agent's file reference  
**205714 WO**

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
**PCT/EP2015/065526**

International filing date (day/month/year)  
**07.07.2015**

Priority date (day/month/year)  
**09.07.2014**

International Patent Classification (IPC) or both national classification and IPC  
**F02D41/14**

Applicant  
**MTU FRIEDRICHSHAFEN GMBH**

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/EP	Date of completion of this opinion	Authorized officer
Facsimile No.		Telephone No.

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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
  - the international application in the language in which it was filed
  - a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2.  This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material
    - a sequence listing
    - table(s) related to the sequence listing
  - b. format of material
    - on paper
    - in electronic form
  - c. time of filing/furnishing
    - contained in the international application as filed
    - filed together with the international application in electronic form
    - furnished subsequently to this Authority for the purposes of search
4.  In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	8	YES
	Claims	1-7, 9-14	NO
Inventive step (IS)	Claims		YES
	Claims	1-14	NO
Industrial applicability (IA)	Claims	1-14	YES
	Claims		NO

2. Citations and explanations:

Reference is made to the following documents:

- D1 US 2011/264353 A1 (ATKINSON CHRISTOPHER M [US] ET AL) 27 October 2011 (2011-10-27)
- D2 WO2006/138545 A1 (HONEYWELL INT INC [US]; SAMAD TRAIQ [US]; STEWART GREGORY E [CA]; LU J) 28 December 2006 (2006-12-28)
- D3 US 2011/172897 A1 (TSUZUKI KOICHIRO [JP] ET AL) 14 July 2011 (2011-07-14)

**The subject matter of independent claim 1 is not novel**

The present application fails to comply with the requirements of PCT Article 33(1) because the subject matter of claim 1 is not novel (PCT Article 33(2)) for the following reasons:

Document D1 discloses:

a method for operating an internal combustion engine, at least one figure being used for the open-loop or closed-loop control of the internal combustion engine, said

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**Box No. V** Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

figure depicting at least one physical target variable of the internal combustion engine depending on a plurality of control variables of the internal combustion engine (§ 22-23; figure 2: reference sign [110]),

at least one condition for the at least one physical target variable (G) being established (§ 40; figure 2: reference sign [160]),

control variable values for the control variables being determined in real time based on the figure, by means of which control variable values the at least one condition is fulfilled by the at least one physical target variable, the internal combustion engine being activated using the control variable values determined in this way (§ 36; figure 2: reference sign [140]).

The applicant is also referred to the following documents, D2-D3. The subject matter of independent claim 1 is also not considered to be novel over the disclosure of D2 or D3:

Technical feature ↓	Document D2 ↓	Document D3 ↓
<i>Figure depending on control variables</i>	page 2, lines 14-19, page 15, lines 7-10, figure 5	§ 10, 60-61, 140 and 207
<i>Condition for physical target variable</i>	page 14, lines 14-20, page 15, lines 4-6	§ 49, 188, 191, 194-195, 199-200, 202-203, figures 26-29
<i>Determination of control variables in real time</i>	page 2, lines 22-26, figure 5	§ 188, 191, 194-195, 199-200, 202-203, figures 26-29

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**The subject matter of dependent claims 2-14 is not novel  
and/or not inventive**

Claim 2 is not novel:

See e.g. D1 (§ 40; figure 2).

Claim 3 is not novel:

See e.g. D1 (§ 26; figure 2).

Claim 4 is not novel:

See e.g. D1 (§ 26; figure 2).

Claim 5 is not novel:

See e.g. D1 (§ 36) or e.g. D3 (§ 202-203).

Claim 6 is not novel:

See e.g. D3 (§ 188, 191, 194-195 and 202-203).

Claim 7 is not novel:

See e.g. D1 (§ 22).

Claim 8 is not inventive:

It is known to a person skilled in the art to determine control variable values on the basis of gradient

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**Box No. V** Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;  
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formation within the scope of optimizing a cost function.

Claim 9 is not novel:

See e.g. D1 (§ 36) or e.g. D3 (§ 202-203).

Claim 10 is not novel:

See D2 (page 11, lines 4-14; figure 3).

Claims 11-14 are not novel:

See e.g. observations relating to claim 1.

**Box No. VIII**      **Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 1 does not meet the requirements of PCT Article 6 because the subject matter for which protection is sought is not clearly defined. A specific figure and an optimization of a plurality of target variables based thereon is described in such a general way that it is not possible for a person skilled in the art to clearly comprehend the invention. Furthermore, the few implementation-technical details mentioned in the description, such as e.g. a superimposition of correction factors (page 19, lines 15-17) or the calculation of an optimization gradient (page 40, lines 26-28 or page 46, line 6), are *per se* very general methods known to a person skilled in the art.