

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

To:

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

Applicant's or agent's file reference
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FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2020/058511

International filing date (day/month/year)
26.03.2020

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27.03.2019

International Patent Classification (IPC) or both national classification and IPC
INV. B60W30/188 B60W50/00 ADD. F02D41/14

Applicant
VOLVO TRUCK CORPORATION

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 and 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 usually 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.

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this opinion

see form
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Box No. I Basis of the 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, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

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)	Yes: Claims	<u>2-11, 16-25</u>
	No: Claims	<u>1, 12-15, 26-28</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-28</u>
Industrial applicability (IA)	Yes: Claims	<u>1-28</u>
	No: Claims	

2. Citations and explanations

see separate sheet

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:

see separate sheet

1 **Re Item VIII**

Certain observations on the international application

The application does not meet the requirements of Article 6 PCT, because claims 1, 5, 10, 11 and 13-15 are not clear.

1.1 **claim 1:**

1.1.1 The expression "operational areas" is not clear. Based on the understanding of the examiner, this refers to an engine speed range and this is the only possibility foreseen by the description which should be used to clarify the claim. Claim 6 could be used to clarify claim 1.

1.1.2 It is not clear what is meant by the feature of "*mapping the operational area propulsive capacities (CA1-CA3) to the expected mission stage (MS1-MS12)*". Present claims 3 or 5 should be used to clearly define this feature as this is the only way foreseen by this application.

1.2 Claim 5 is redundant with claim 3.

1.3 In claims 10 and 11, it is not clear how the use of sample data may provide the propulsive capacity. Sample data are not necessarily representing the maximum output of the engine such that the engine's characteristic curves of power and torque cannot be derived from sample data. Should this invention uses a particular way to derive the propulsion capacity from sample data, this must be specified in the claims.

1.4 The concept of "simulations" is not clear in claims 13-15 because this wording can encompass a variety of interpretations. For example, simulation can be understood as a mental act for defining a predefined table linking operational data to capacity, a mathematical function based on physical equations linking operational data to capacity but also some real test bench data where a component failure is voluntarily perform to measure the engine capacity.

2 **Re Item V**

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

2.1 Reference is made to the following documents:

D1 EP 2 617 617 A2 (ROLLS ROYCE PLC [GB]) 24 July 2013
(2013-07-24)

- D2 WO 2018/106575 A1 (CUMMINS INC [US]) 14 June 2018
(2018-06-14)
- D3 US 2014/121868 A1 (ZHANG YANCHAI [US] ET AL) 1 May 2014
(2014-05-01)
- D4 US 2015/361915 A1 (SUJAN VIVEK A [US] ET AL) 17 December
2015 (2015-12-17)

2.2 The present application does not meet the criteria of Article 33(2) PCT, because the subject-matter of claim 1 is not new.

D1 discloses:

A method for controlling a vehicle (**see [0029]**) comprising a drivetrain comprising at least one drive device adapted to generate mechanical power, the method comprising

- controlling the vehicle to perform a mission comprising a plurality of stages (**see [0039]**),
- collecting operational data relevant to the operation of the drivetrain, wherein the operational data indicate a de-rate of a component of the drivetrain, a fault of a component of the drivetrain, and/or an environmental condition which influences the drivetrain operation (**see [0019]**), and
- determining an expected mission stage (**see e.g. [0045]**),
- determining, in dependence on the operational data, the propulsive capacity in at least two different operational areas of the drive device (see e.g. "*The IPM 101 combines all of the incoming data together to generate a planned course of action to best deploy the **available** power sources*" in **[0040]**). The available power must be determined for all area as otherwise the system would not be able to perform the optimisation),
- mapping the operational area propulsive capacities to the expected mission stage, and controlling the vehicle in dependence on said mapping (see e.g. "*Based on this knowledge, a **prediction of required vehicle energy requirements and a consequent planned mission energy supply are derived***", "*The technology may offer **dynamic in-mission re-planning in response to a change in any of the environment factors listed or change in the mission plan, vehicle route or power system health***" in **[0029]**).

- 2.3 The reasoning above applies mutatis mutandis to the other independent claims 26-28, referring to the independent claim 1.
- 2.4 In addition, D2 and D3 (see references in the search report) also disclose an analysis of a required propulsive power compared to propulsive capacity along a mission route such as to optimise the vehicle operation. Although these document do not specifically disclose the determination of a propulsive capacity as a function of de-rate, failure or environmental conditions, it should be noted that these features are common in engine control systems where the maximum allowable torque can typically be limited by a variety of factors, in particular de-rate due to particular operating conditions or limp-mode due to failure of a component. Hence the subject-matter of the independent claims 1, 26-28 are not inventive because those propulsive capability adaptations are typically built-in an engine control management and the skilled person would therefore consider using those adaptations when implementing the disclosures of D2 or D3.
- 2.5 In view of the extensive clarity issues of the independent claim 1 as well as of the dependent claims, it is not at present possible to perform a meaningful evaluation of inventive step of the dependent claims. In addition, D2 clearly addresses the issue of propulsion capacity of a load carrying vehicle during a mission by managing the vehicle speed, its authorised payload and even the need to withdraw vehicle from operations (see [0050]-[0051]). This appears to correspond to the idea of the dependent claims 2-25 which cannot therefore be recognise as involving an inventive step.
- As a remark:
- 2.5.1 The limitation of the number of areas or propulsive capacity values in claim 7-9 represents an obvious simplification with expected disadvantages. In particular, having a single value per area would render the "mapping" process and resulting vehicle control irrelevant for areas like A1 in figure 4 where the real propulsive capacity varies a lot. In that case the area should be sub-divided in a multiplicity of areas being equivalent to having a multiplicity of capacity values for one area. No surprising technical effect can be derived from those claims.
- 2.5.2 Claim 12 is not new because D1 already considers the health status of the drivetrain and calculates the capacity accordingly (see argumentation on claim 1) such that D1 de-rate the engine capacity by a software of the control unit.

- 2.5.3 Claims 13-15 do not appear to be new in view of D1. D1 calculates the capacity based on the health status which implies a pre-established relationship between them and as such, can be considered as obtained from some kind of simulation (see clarity issue in 1.4).