

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

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

<p>To:</p> <p style="text-align: center;">see form PCT/ISA/220</p>	<p>Date of mailing (day/month/year) see form PCT/ISA/210 (second sheet)</p>
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Applicant's or agent's file reference see form PCT/ISA/220	FOR FURTHER ACTION See paragraph 2 below
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International application No. PCT/EP2017/071644	International filing date (day/month/year) 29.08.2017	Priority date (day/month/year)
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International Patent Classification (IPC) or both national classification and IPC INV. B62D5/00

Applicant THYSSENKRUPP PRESTA AG

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 43*bis*.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 66.1*bis*(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.

Name and mailing address of the ISA:  European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016	Date of completion of this opinion see form PCT/ISA/210	Authorized Officer Kamara, Amadou Telephone No. +31 70 340-0
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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>1-7</u>
	No: Claims	

Inventive step (IS)	Yes: Claims	<u>1-7</u>
	No: Claims	

Industrial applicability (IA)	Yes: Claims	<u>1-7</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

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

1 Reference is made to the following documents:

D1 US 2001/052893 A1 (JOLLY MARK R [US] ET AL) 20 December 2001
(2001-12-20)

D2 DE 603 03 081 T2 (DELPHI TECH INC [US]) 20 July 2006 (2006-07-20)

D3 WO 2017/001696 A1 (INVENTUS ENG GMBH [AT]) 5 January 2017
(2017-01-05)

2 D1 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses a steer-by-wire steering system for a motorized vehicle (Fig. 1c, 3, [0044]) comprising a feedback actuator (Fig. 3, (24) to simulate a steering feel to a steering device (Fig. 3, (26)), wherein said feedback actuator (24).

3 The subject-matter of claim 1 therefore differs from this known system in that it further comprises has an electric motor with a motor shaft connected to a driver input shaft to be able to transmit a torque, wherein said motor shaft is able to be rotated in at least one rolling bearing, in that the rolling elements of the at least one rolling bearing are arranged in a magnetorheological fluid and that the feedback actuator further comprises means to pass a magnetic field through said magnetorheological fluid for stiffening said fluid and restricting movement of said rolling elements.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as providing a compact and simple power assistance and feedback actuator system to a vehicle with a steer-by-wire device.

4 The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: departing from D1 a skilled person in charge with the problem posed would at the outmost integrate the construction of the actuator 24 of Fig. 4a/b into an electric motor as disclosed in paragraphs [0004]-[0008]. It is thus unlikely that he would integrate a magnetorheological fluid exactly into a motor bearing.

- 5 Claims 2-7 dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step (Article 33(2), (3) PCT).