

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference PLC005ZWO	FOR FURTHER ACTION		See item 4 below
International application No. PCT/EP2010/002378	International filing date (<i>day/month/year</i>) 19 April 2010 (19.04.2010)	Priority date (<i>day/month/year</i>) 20 April 2009 (20.04.2009)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant PRELATEC GMBH			

<p>1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).</p> <p>2. This REPORT consists of a total of 8 sheets, including this cover sheet.</p> <p>In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.</p>																								
<p>3. This report contains indications relating to the following items:</p> <table> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> <p>4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).</p>	<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input checked="" type="checkbox"/>	Box No. VIII	Certain observations on the international application
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	Date of issuance of this report 25 October 2011 (25.10.2011)
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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
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Applicant's or agent's file reference PLC005ZWO	FOR FURTHER ACTION See paragraph 2 below
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International application No. PCT/EP2010/002378	International filing date (day/month/year) 19.04.2010	Priority date (day/month/year) 20.04.2009
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International Patent Classification (IPC) or both national classification and IPC
F02M61/18 B23K26/38

Applicant
PRELATEC GMBH

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

<input checked="" type="checkbox"/>	Box No. I	Basis of the opinion
<input type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	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
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input checked="" type="checkbox"/>	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 43*bis*.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	1-21	YES
	Claims	_____	NO
Inventive step (IS)	Claims	_____	YES
	Claims	1-21	NO
Industrial applicability (IA)	Claims	1-21	YES
	Claims	_____	NO
2. Citations and explanations:			
<p>Reference is made to the following documents:</p> <p style="margin-left: 40px;">D1 EP 2 009 276 A1 (DELPHI TECH INC [US]) 31 December 2008</p> <p style="margin-left: 40px;">D2 US 2002/158152 A1 (HOCKENBERGER AXEL [TR]) 31 October 2002</p> <p style="margin-left: 40px;">D3 DE 102 19 608 A1 (BOSCH GMBH ROBERT [DE]) 20 November 2003</p> <p style="margin-left: 40px;">D4 DE 103 40 931 A1 (WALTER HERBERT [DE]) 31 March 2005</p> <p style="margin-left: 40px;">D5 DE 103 15 967 A1 (BOSCH GMBH ROBERT [DE]) 21 October 2004</p> <p style="margin-left: 40px;">D6 FR 2 528 915 A1 (SEMT [FR]) 23 December 1983 (1983-12-23)</p> <p style="margin-left: 40px;">D7 EP 2 048 354 A1 (YANMAR CO LTD; DENSO CORP [JP]) 15 April 2009</p> <p style="margin-left: 40px;">1. D1, cf. the entire document, is considered to be the prior art closest to the subject matter of claim 1 and discloses:</p> <p style="margin-left: 40px;">a nozzle having a rotationally symmetrical spray hole (1) for atomizing fluids, having diameters of the fluid outlet opening in the range from 20 µm to 500 µm, see</p>			

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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

[0023], and having an edgeless profile of the spray hole walls, in which the spray hole (1), as viewed in the flow direction of the fluid, is divided into regions of smaller and larger diameters (D , D_1 , D_2) and transition regions between said regions,

wherein the total volume of the spray hole is divided into the following three zones:

- the inflow zone with the volume V_E ,
- the transition and compression zone with the volume $V_{\ddot{U}}$,
and
- the outflow zone with the volume V_A ,

and wherein the volumes of said zones have the following relationship to one another:

$$V_E > V_{\ddot{U}}$$

Therefore, the subject matter of claim 1 differs from the known nozzle in that the volumes of the three zones have the following relationships to one another:

$$4 < V_E / V_{\ddot{U}} < 16 \text{ and } 2 < V_{\ddot{U}} / V_A < 20.$$

I) From pages 3 and 4 of the description, it would appear that the inflow zone V_E should be dimensioned such that

- the fluid, during the extreme flow deflection from the

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provision chamber, is subjected to intense flow calming already in the initial region of the inflow zone,

- the fluid then covers the path to the transition and compression zone with as low a flow resistance as possible, and

- cavitation is already entirely prevented in said zone.

Said results are also obtained with the inflow zone of D1, **see [0020]**.

II) Principally, it is to be expected in the transition and compression zone that

- the flow-related advantage obtained in the inflow zone, specifically low flow resistance and prevention of cavitation, is substantially maintained, and at the same time

- the **increase in flow speed** of the fluid for the entry into the outflow zone, such as is required for optimum injection, is obtained.

Said advantages are also obtained with the waisted portion (21, 32) of D1.

III) Finally, the volume V_A of the outflow zone should be dimensioned such that,

- despite the relatively small diameter required for high flow speeds, the flow resistance arising in said zone

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citations and explanations supporting such statement

remains as low as possible,

- optimum conditions are provided for the break-up of the jet bundle after exiting the spray hole, and

- occurrences of coking under the different operating conditions of the engine are eliminated.

Said results are also obtained with the outflow zone of D1, **see [0021]**.

The description does not give any explanation as to why the volume V_A of the outflow zone must be significantly smaller than the volume $V_{\bar{0}}$ of the transition and compression zone.

Therefore, said volume relationship is regarded as a routine design measure.

Therefore, the subject matter of claim 1 does not involve an inventive step (PCT Article 33(3)).

Such an argumentation against claim 1 could also be based on documents D2 or D5.

2. DEPENDENT CLAIMS 2-21

Claims 2-21 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, see documents D1 to D7 and the relevant passages indicated in the search report.

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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:

The features of claims 7 to 12, 14, 16 to 21 and, in part, of claims 4 and 5 relate more to the definition of a method in terms of the steps thereof.

To meet the requirements of PCT Article 6, said claims should be changed to method claims.

The subject matter of the invention illustrated in figure 2 and presented in claim 6 does not fall within the present claim 1. This inconsistency between the claims casts doubt on the subject matter for which protection is sought, and the claims are therefore unclear (PCT Article 6).

Note that the requirement of PCT Article 6, conciseness, is also not met because features already contained in claim 4 are repeated in claim 5.