Internal distribution code:

(A) [-] Publication in OJ
(B) [-] To Chairmen and Members
(C) [-] To Chairmen
(D) [X] No distribution

Datasheet for the decision of 17 December 2014

Case Number: T 0457/12 - 3.2.01

Application Number: 00121598.7

Publication Number: 1090827

IPC: B62D5/04, F16H55/06

Language of the proceedings: EN

Title of invention:
Electric power steering device

Patent Proprietor:
JTEKT Corporation

Opponents:
IMS Gear GmbH
ZF Lenksysteme GmbH

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step (main request : no; auxiliary requests 1,2,2', 3 to 5, 5': no)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern
Boards of Appeal
Chambres de recours

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 0457/12 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 17 December 2014

Appellant: (Patent Proprietor)	JTEKT Corporation 5-8, Minamisemba 3-chome Chuo-ku, Osaka-shi Osaka 542-8502 (JP)
Representative:	Hering, Hartmut Patentanwälte Berendt, Leyh & Hering Innere Wiener Strasse 20 81667 München (DE)
Respondent I: (Opponent 1)	IMS Gear GmbH Hauptstrasse 52 79871 Eisenbach (DE)
Representative:	Göhring, Robert Westphal - Mussgnug & Partner Patentanwälte Am Riettor 5 78048 Villingen-Schwenningen (DE)
Respondent II: (Opponent 2)	ZF Lenksysteme GmbH Richard-Bullinger-Strasse 77 73527 Schwäbisch Gmünd (DE)
Representative:	Lorenz, Markus Lorenz & Kollegen Patentanwälte Partnerschaftsgesellschaft mbB Alte Ulmer Straße 2 89522 Heidenheim (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 23 December 2011 revoking European patent No. 1090827 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	G. Pricolo
Members:	C. Narcisi
	D. T. Keeling

Summary of Facts and Submissions

I. European patent No. 1 090 827 was revoked by the decision of the Opposition Division posted on 23 December 2011. Against this decision an appeal was lodged by the Patentee on 15 February 2012 and the appeal fee was paid at the same time. The statement of grounds of appeal was filed on 9 April 2012.

II. Oral proceedings were held on 17 December 2014. The Appellant (Patentee) requested that the decision under appeal be set aside and the patent maintained on the basis of the claims of the main request or of one of auxiliary requests 1 to 5, all filed by letter of 30 October 2014, or of auxiliary request 2' or auxiliary request 5', both filed by letter of 11 November 2014. Respondents I and II (Opponents I and II) requested that the appeal be dismissed.

Claim 1 of the main request reads as follows:

"An electric power steering device which transmits rotation of an electric actuator (8) for generating auxiliary steering power to a wheel (6) via a worm (9) and a worm wheel (10) which meshes with the worm (9), wherein the worm wheel (10) is molded from pelletized synthetic resin material, characterized in that the synthetic resin is PA66 and a number of average molecular weight of the pelletized synthetic resin material is greater than or equal to 30000 and less than or equal 60000; the worm wheel (10) is injection molded from the pelletized synthetic resin material; and the pelletized synthetic resin material is pure material."

Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the wording "from the pelletized synthetic resin material" is replaced by the wording "from the pelletized synthetic resin material in a state in which a metal sleeve (11) is inserted in a mold for the injection molding".

Claim 1 of auxiliary request 2 differs from claim 1 of auxiliary request 1 in that the wording "for the injection molding" is replaced by the wording "for the injection molding so as to be formed integrally with the outer periphery of the metal sleeve (11)".

Claim 1 of auxiliary request 2' differs from claim 1 of auxiliary request 2 in that the wording "so as to be formed integrally with" is replaced by the wording "and is formed integrally with".

Claim 1 of auxiliary request 3 differs from claim 1 of the main request in that the wording "pure material" is replaced by the wording "pure material into which nothing has been filled".

Claim 1 of auxiliary request 4 differs from claim 1 of auxiliary request 1 in that the wording "pure material" is replaced by the wording "pure material into which nothing has been filled".

Claim 1 of auxiliary request 5 differs from claim 1 of auxiliary request 4 in that the wording "for the injection molding" is replaced by the wording "for the injection molding so as to be formed integrally with the outer periphery of the metal sleeve (11)".

Claim 1 of auxiliary request 5' differs from claim 1 of auxiliary request 5 in that the wording "so as to be

formed integrally with" is replaced by the wording "and is formed integrally with".

III. The Appellant's submissions may be summarized as follows:

The subject-matter of claim 1 of the main request involves an inventive step over D1 (EP-B1-748 735) and D3 (US-A-5 722 295). The main difference to prior art D1 resides in that the worm wheel is injection molded from pelletized synthetic resin material, wherein the resin material is PA66 having a molecular weight greater than or equal to 30000 and less than or equal to 60000. Moreover, from claim 1 and from the disclosure of the invention according to the patent specification (hereinafter designated as EP-B) it ensues that no heat treatment of the synthetic resin after injection molding is necessary. Given that the worm wheel is connected to, and mounted on, a metal sleeve (see claim 1 of auxiliary request 1), possible damage to said metal sleeve caused by the heat treatment is therefore avoided. Additionally, a sufficiently strong adhesion of the worm wheel to the metal sleeve is provided by the injection molding process itself, without it being likewise necessary to perform a heat treatment. Indeed, according to D3 and contrary to the invention, the heat treatment is essential to obtain the necessary strength and durability requirements, as is specifically demonstrated by the second embodiment disclosed in D3. The parameter range in claim 1, indicating the molecular weight of PA66, is furthermore not derivable from D3 and represents an inventive selection out of a broader range of parameters. In addition, the parameter range disclosed in D3 does not represent the molecular weight of the pelletized synthetic resin material

before injection molding, as in claim 1. Thus, the combination of D1 with D3, even if considered as obvious, would not lead to the claimed subject-matter. Anyway, the skilled person would not combine D1 and D3 at all, for D3 is directed to a gear ring for a crankshaft and not to a worm wheel for an electric power steering device as disclosed in D1. Thus, D1 and D3 do not relate to the same technical field. Also, the worm wheel disclosed in D1 and the gear ring disclosed in D3 are different technical objects with different mechanical strength and durability requirements.

The auxiliary requests 1 to 5, 2' and 5' include specific features which are essentially aimed at further elucidating and emphasizing the above mentioned inventive aspects of the subject-matter of claim 1 of the main request. In particular, it was further included in claim 1 of these requests (as compared to the main request) that the worm wheel is injection molded from said resin material in a state in which the metal sleeve is inserted in a mold for the injection molding (see auxiliary request 1, 2, 4, 5) so as to be formed integrally with the outer periphery of the metal sleeve (see auxiliary request 2 and 5), the resin material being a pure material into which nothing has been filled (see auxiliary request 5). Alternatively, it was also included in claim 1 of these requests (as compared to the main request) that said resin material is pure material into which nothing has been filled (see auxiliary requests 3, 4) and that the worm wheel is injection molded in a state in which a metal sleeve is inserted in a mold for the injection molding (see auxiliary request 4). In Claim 1 of auxiliary requests 2' and 5' (as compared to claim 1 of requests 2 and 5) the wording "and is formed integrally with the outer periphery of the metal sleeve" was chosen in order to

adhere more closely to the wording of the description of EP-B.

IV. The submissions of Respondents I and II may be summarized as follows:

The subject-matter of claim 1 of the main request is not inventive over D1 and D3. Claim 1 distinguishes from D1 by the features included in the characterizing portion of the claim and by the fact that the synthetic resin material is provided in pelletized form. The latter feature, to begin with, is part of the common general knowledge of the skilled person, for synthetic resin material is most commonly provided in pelletized form when intended for use in an injection molding process. The remaining features are known in combination from D3. In particular D3, discloses that pure synthetic resin material PA66 (column 3, lines 59-62; column 4, lines 11-15) is used in the injection molding process (D3, column 2, lines 52-55; column 4, lines 15-19) of a cam crankshaft gear and that the gear is integrally molded around a metallic insert ring (D3, column 2, lines 43-46) by injecting PA66 in the region around the outer periphery of the insert ring (D3, column 4, lines 11-15). The PA66 synthetic resin employed has a relative viscosity equal to or larger than 3.5 (D3, column 3, lines 60-65), where a relative viscosity of 3.5 corresponds to a number of average molecular weight larger than 26000 (see D13 (Bottenbruch & Binsack , Technische Thermoplaste-Polyamide Kunststoffhandbuch, Hanser Verlag, 1998, page 263, Tabelle 2.73)). Moreover, it is generally known to the skilled person (see D4 (Römpp Chemie Lexikon, 9. Auflage, Georg Thieme Verlag, page 3510)) that PA66 has a molecular weight ranging from 15000 to 50000 g/mol. Summarizing, the features not known from D1 are

nevertheless known in combination from D3 and, in addition, the parameter range indicated in claim 1 merely corresponds to a broad and known range of molecular weight values for all PA66 resin materials. Consequently, the combination of D1 and D3 directly and inevitably leads to the claimed subject-matter. This combination would be obvious for the skilled person, given that the respective technical fields of D1 and D3 are intimately related and that the strength and durability requirements in both cases are similar. Further, there is no disclosure whatsoever in EP-B that a heat treatment of the worm wheel after injection molding is excluded and that any advantage would possibly result from avoiding such a heat treatment. The wording of claim 1 likewise simply does not exclude a heat treatment after injection molding of the worm wheel. Analogously, there is no evidence for the Appellant's allegation that according to D3 the heat treatment is of essential and paramount importance for the obtention of the required strength and durability of the gear.

The amendments introduced into claim 1 according to the auxiliary requests are more of a formal than of a substantial nature and anyway it already results from the above discussion that these amendments could not possibly involve an inventive step.

Reasons for the Decision

1. The appeal is admissible.

2. For the assessment of inventive step of the subject-matter of claim 1 of the main request D1 is considered as the closest prior art. D1 discloses the entirety of

the features of the preamble of claim 1, except for the "pelletized" form of the synthetic resin material. However, it is generally known in the art to use pelletized synthetic resin material for injection molding processes, due to its ease of handling, and this was also not objected to by the Appellant. As to the further features of the claim, D3 explicitly discloses the use of PA66 (see col. 3 line 60). This document moreover discloses (see column 3, lines 60 to 62) that "a polyamide resin such as nylon 66" is used having a "relative viscosity equal to or larger than 3.5". As shown in the textbook D13 (see table 2.73), a relative viscosity of 3.5 implies an average molecular weight of about 26000 (this value is specified for a relative viscosity of 3.4). D13 further shows (see table 2.73) that the molecular weight increases with increasing relative viscosity. Accordingly, D3 teaches the use of PA66 with a molecular weight greater than about 26000. Considering, as shown by textbook D4 (see page 3510, left column), that the mostly used polyamide types (PA6 and PA66) have an average molecular weight between 15000 and 50000, the Board concludes that the skilled person would seriously contemplate applying the teaching of D3 in the claimed range of 30000 to 60000. Accordingly, the claimed range of 30000 to 60000 is not novel over the disclosure of D3 of a range of greater than 26000 for the average molecular weight of PA66. Finally, the remaining features, relating to manufacturing the worm wheel by injection molding from a pure synthetic resin material, is also known from D3 (see column 4, lines 11-19). In this respect it is pointed out that according to D3 the "polyamide resin includes neither glass fiber nor an inorganic filler" (D3, column 2, lines 53, 54) such that this polyamide material can be regarded as "pure" within the

same meaning as in claim 1, no specific definition of a "pure" resin material being included in EP-B.

The Appellant's arguments relating to the absence of any heat treatment during manufacturing of the worm wheel (according to the invention) find no support in the patent specification (EP-B) and nor does the subject-matter of claim 1 in any way exclude such a heat treatment. No indication is likewise provided in EP-B that sufficiently strong adhesion of the injected resin material to the metal sleeve is obtained even in the absence of a heat treatment, thus rendering it superfluous. Similarly, it is immaterial that the parameter range for the molecular weight indicated in claim 1, contrary to D3, pertains to the resin material prior to and not after the injection molding process. In effect, claim 1 is directed to the finished product and therefore only the molecular weight after the injection molding process is relevant here and is to be compared. Anyway, given that the injection molding process may only result in a slight or minor reduction in molecular weight if at all, this will in no way significantly affect the indicated extremely broad parameter range of claim 1, which corresponds in essence, as already set out, to the mentioned generally known and common parameter ranges derivable from D3 and from D13.

From the above it ensues that the combination of D1 and D3 would lead to the claimed subject-matter. This combination would be obvious for the skilled person (Article 56 EPC), since the object of the invention (i.e. increasing the material strength of the worm wheel; EP-B, paragraphs [0005], [0006]) coincides with the object of D3, i.e. producing a gear having a high reliability, tenacity and strength (D3, column 2, lines

14-16, 49-50). The Board does not follow the argument of the Appellant, that the skilled person would not combine D1 and D3 because they relate to different technical fields. As a matter of fact, both D1 and D3 disclose mechanical parts, a worm wheel and a gear, having similar ring structure and both consisting of synthetic resin material located around an inner metal insert portion.

3. Concerning the auxiliary requests it is noted that the very minor amendments or specifications made in claim 1 of these requests do not substantially alter the above discussion on inventive step. In particular, the additional features introduced in claim 1 of auxiliary requests 1 and 2 are known from D3, which discloses that the annular toothed gear is integrally molded around the metal insert ring (D3, column 2, lines 43-46; column 3, lines 56-60; column 4, lines 11-15), and the added features in claim 1 of auxiliary request 3 are also known from D3, which discloses that PA66 employed for injection molding is a pure material, containing no reinforcing material (glass fiber or inorganic filler) (D3, column 2, lines 53-55; column 4, lines 15-16). Accordingly, when implementing the teaching of D3 in the device according to D1 as discussed above, the skilled person would regard it as obvious to include also these additional features. The further amendments included in claim 1 of auxiliary requests 4 and 5 amount merely to a respective combination of the amendments in claim 1 of the auxiliary requests 1 and 3 and in claim 1 of auxiliary requests 2 and 3 and hence cannot contribute to inventive step since no surprising or unforeseen technical effect arises through this combination. As to auxiliary requests 2' and 5', claim 1 of these requests differs from claim 1 of respective auxiliary requests 2

and 5 only through a formal change in wording (aiming at better complying with the original disclosure of the corresponding feature (in the description of EP-B and in the equivalent part of the application as filed)), which does not imply any change in substance. Consequently, the subject-matter of claim 1 of these auxiliary requests does not meet the requirements of Article 56 EPC.

Order

For these reasons it is decided that:

1. The appeal is dismissed.

The Registrar: The Chairman:

A. Vottner G. Pricolo

Decision electronically authenticated