

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ewald Dörken AG,
Petitioner

v.

Schaeffler Technologies AG & Co. KG,
Patent Owner

Case No. IPR2024-01365

Patent No. 11,098,756

Filing Date: January 21, 2020

Issue Date: August 24, 2021

Title: WHEEL BEARING ARRANGEMENT HAVING A COATING

**PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 11,098,756
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *ET SEQ.***

Table of Contents

I.	INTRODUCTION.....	1
II.	U.S. PATENT 11,098,756	2
A.	Summary of the ‘756 Patent	2
B.	Prosecution History	2
C.	Level of Ordinary Skill in the Art.....	7
D.	Claim Construction	8
III.	REQUIREMENTS FOR INTER PARTES REVIEW	12
A.	Standing	12
B.	Identification of Challenge and Requested Relief	12
IV.	GROUND OF UNPATENTABILITY.....	14
A.	Ground 1: Claims 1-7 of the ‘756 Patent are Obvious over ‘741 Publication in view of ‘835 Publication.....	14
1.	Overview of ‘741 Publication	14
2.	Overview of ‘835 Publication	15
3.	The Combination of ‘741 Publication and ‘835 Publication	17
B.	Ground 2: Claims 1-7 of the ‘756 Patent are Obvious over ‘091 Publication in view of ‘340 Publication.....	29
1.	Overview of ‘091 Publication	29
2.	Overview of ‘340 Publication	30
3.	The Combination of ‘091 Publication and ‘340 Publication	31
C.	Ground 3: Claims 1-7 of the ‘756 Patent are Obvious over ‘013 Publication in view of ‘794 Publication.....	43
1.	Overview of ‘013 Publication	43

2.	Overview of ‘794 Publication	44
3.	The Combination of ‘013 Publication and ‘794 Publication.....	45
V.	CONCLUSION.....	58
	MANDATORY NOTICES.....	59
A.	Real Parties-in-Interest	59
B.	Related Matters.....	59
C.	Lead and Back-Up Counsel	59
	APPENDIX OF EXHIBITS	61
	CERTIFICATION OF WORD COUNT	62
	CERTIFICATE OF SERVICE	63

I. INTRODUCTION

Ewald Dörken AG (“Petitioner”) respectfully requests *inter partes* review (“IPR”) of Claims 1-7 (“the Challenged Claims”) of U.S. Patent No. 11,098,756 (“the ‘756 Patent”) (EX1001) owned (according to publicly available assignments) by Schaeffler Technologies AG & Co, Industriestrasse 1-3, Herzogenaurach, 91074 Germany. (*See* Reel/Frame 052168/0803.)

II. U.S. PATENT 11,098,756

A. Summary of the ‘756 Patent

The ‘756 Patent was filed as a national stage entry of PCT application No. PCT/DE2018/100605 and was assigned the U.S. filing date of 21 January 2020 under 35 U.S.C. § 371(c). The PCT application claims priority to German patent application Serial No. 102017116514.2 filed 21 July 2017. Although Petitioner does not concede that the ‘756 Patent is entitled to this priority date, Petitioner assumes this date for purposes of this Petition. The U.S. Application (Serial No. 16/632,746; the “‘746 Application”) published on 21 May 2020 as U.S. Publication No. 20200158165 A1. The ‘756 Patent issued from this application on 24 August 2021 and has an expected expiration date, assuming timely payment of all maintenance fees, of 3 July 2038. A PDF copy of the ‘756 Patent is attached as Exhibit 1000 (EX1001). No continuation or divisional applications related to the ‘756 Patent were filed.

B. Prosecution History

A PDF copy of the complete file history of the ‘756 Patent is attached as Exhibit 1100 (EX1011). The ‘746 application was filed as a U.S. National Stage application under 35 U.S.C. § 371 on 21 January 2020 with a Preliminary Amendment that amended the specification to add a paragraph stating the chain of priority applications and introduce other minor amendments to the text, and amended the claims to remove multiple dependencies and to specify that the surface coating “formed as a zinc flake coating” is formed from a coating medium comprising “zinc powder, aluminum

powder, titanium tetrabutanolate and further constituents.” The U.S. Examiner issued a Restriction Requirement on 19 November 2020 separating the claims into two groups:

Group 1, claims 1-6 and 8, drawn to a wheel bearing arrangement comprising a surface coating formed of zinc powder, aluminum powder, and titanium tetrabutanolate; and

Group 2, claims 10-15, drawn to a method of coating a wheel bearing arrangement with a surface coating formed of zinc powder, aluminum powder, and titanium tetrabutanolate.

The Examiner made this restriction even though claim 4 (which eventually issued as claim 3 of the ‘756 Patent), as originally filed and subsequently amended in the Preliminary Amendment of 21 January 2020, recites “A method for coating a wheel bearing arrangement” The Applicant filed a Response on 8 December 2020 electing, without traverse, to prosecute Group 1 including claims 1-6 and 8.

A first, non-final Office Action issued on 8 January 2021 confirming that examination would proceed under the first inventor provisions of the AIA and that claims 10-15 had been withdrawn from further consideration. The Office Action entered an objection for informalities in claim 1, and a rejection of claims 1, 4-6, 8, and 9 under 35 U.S.C. § 103 as unpatentable over the combination of USPGPUB No. 2017/0219013 (Yokota) and USPGPUB No. 2004/0206266 (Maze). The Examiner explained that Yokota discloses a wheel bearing arrangement for a motor vehicle

comprising all apparatus components recited in claim 1 of the '746 Application, but Yokota discloses the surface coating formed generally of zinc plating and “does not expressly disclose the surface coating being formed as a zinc flake coating, wherein a coating medium used to form the surface coating comprises zinc powder, aluminum powder, titanium tetrabutanolate and further constituents.” The Examiner noted that “Maze teaches that the use of surface coatings formed as zinc flake coatings, wherein a coating medium used to form the surface coating comprises zinc powder, aluminum powder ([0037]), titanium tetrabutanolate ([0059]) and further constituents ([0060]), [which] was known at the time of the invention for providing corrosion protection of metal components ([0009]).” At page 4 of the Office Action, the Examiner further explained that:

The substitution of one known element (the surface coating formed of zinc coating as described in Yokota) with another (the surface coating formed of zinc flake coating as described in Maze) would have been obvious to one of ordinary skill in the art at the time of the invention, since the substitution of a surface coating formed of zinc flake coating in Maze would have yielded the predictable result of providing corrosion protection for the surfaces of metal components, such as the wheel hub and/or the inner and outer rings of the wheel bearing arrangement in Yokota.

The Examiner also explained that claims 4-6 and 8 were regarded as product by process claims that are examined with respect to the final product and are thus obvious

if the final product is itself obvious, even if that product was made by a different process.

Finally, the Examiner explained that claim 2 (directed to the wheel bearing arrangement of claim 1 wherein the surface coating has a layer thickness of at least 10 μ m) and claim 3 (directed to the wheel bearing arrangement of 1 wherein the surface coating has a layer thickness of at most 20 μ m) of the '746 application would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In response to this first Office Action, the Applicant filed an Amendment on 8 April 2021 that made a minor grammatical correction to claim 1 to overcome the Examiner's objection to that claim, and added the limitation of claim 2 ("wherein the surface coating has a layer thickness of at least 10 μ m") to claim 1 while cancelling claim 2. In response to the obviousness rejection based on Yokota and Maze, the Applicant did not address the substance of the rejection but simply stated:

Claim 1 was amended to include all the limitations of Claim 2. As such, Applicant respectfully submits that Claim 1 and all Claims depending therefrom are in allowable condition. The rejections under 35 U.S.C. §103 do not need to be addressed further. Withdrawal of the rejections is respectfully requested.

Applicant's Amendment Under 37 C.F.R. § 1.111, page 5.

Thereafter, the Examiner issued a Notice of Allowance and Fee(s) Due on 21 April 2021 that cancelled withdrawn claims 10-15 and rejoined withdrawn claim 9. The Applicant paid the Issue Fee on 15 July 2021 and an Issue Notification stating the issue date (24 August 2021) and patent number (11,098,756) and Patent Term Adjustment of 0 days was issued.

The '756 Patent issued with seven claims, including three apparatus claims (claims 1, 2, and 7) and four method claims (claims 3, 4, 5, and 6) that read as follows:

1. A wheel bearing arrangement for a motor vehicle, comprising a wheel hub, wherein the wheel hub is connected to a wheel flange, wherein a multi-row anti-friction bearing having an outer ring and an inner ring is arranged on the wheel hub, wherein the inner ring comprises two bearing inner rings, wherein an axially outer bearing inner ring is formed in one piece on the wheel hub and wherein an axially inner bearing inner ring is a separate component which is mounted on the wheel hub and is axially pretensioned by a collar, that acts on an end surface of the inner bearing inner ring, of the wheel hub, wherein at least partially a surface coating for improving corrosion protection is formed on the wheel bearing arrangement, wherein the surface coating is formed as a zinc flake coating, wherein a coating medium used to form the surface coating comprises zinc powder, aluminum powder, titanium tetrabutanolate and further constituents, wherein the surface coating has a layer thickness of at least 10 μm .

2. The wheel bearing arrangement as claimed in claim 1, wherein the surface coating has a layer thickness of at most 20 μm .

3. A method for coating a wheel bearing arrangement as claimed in claim 1, wherein the method comprises the following method steps: cleaning at least one component surface to be coated of the wheel bearing arrangement by means of a fluid cleaning medium; at least partial removal of the cleaning medium from the at least one component surface; coating the at least one component surface with a coating medium for generating a surface coating formed as a zinc flake coating, wherein the coating medium used to form the surface coating comprises zinc powder, aluminum powder, and titanium tetrabutanolate; and curing the surface coating at a curing temperature of at least 15° C. and at most 80° C.

4. The method as claimed in claim 3, wherein the coating of the at least one component surface is performed by means of a spraying process.

5. The method as claimed in claim 3, wherein the cleaning medium contains solvent.

6. The method as claimed in claim 3, wherein the curing of the surface coating is performed over a curing period of at least 10 minutes.

7. A motor vehicle, comprising a wheel bearing arrangement as claimed in claim 1.

C. Level of Ordinary Skill in the Art

A person having ordinary skill in the art (“POSITA”) would have been a person having, as of 21 July 2017: (1) at least an undergraduate degree in engineering and/or

material science, or similar education; and (2) two or more years of experience with coatings. Such a POSITA would have been capable of understanding the ‘756 Patent and the prior art references discussed herein.

D. Claim Construction

In post-grant proceedings, claims are construed under the same standard used in Article III courts (the *Phillips* standard). *See* 37 C.F.R. § 42.100(b); *see also Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*).

As recited above, claim 1 of the ‘756 Patent includes a “wherein clause” limitation that describes the components of the surface coating formed on the wheel bearing arrangement, which clause reads:

...wherein a coating medium used to form the surface coating
comprises zinc powder, aluminum powder, titanium tetrabutanolate and
further constituents, . . .

(Emphasis added.)

The phrase “and further constituents” is unclear and indefinite. It is not clear how “further constituents” are to be considered part of a chemical composition that “comprises” three specific chemical constituents (zinc powder, aluminum powder, and titanium tetrabutanolate). Specifically, the open-ended phrase “comprising” in this clause of claim 1, suggests that this list of chemical components may include other unclaimed elements. With the addition of the phrase “and further constituents” to the end of the list of chemical components “comprising” a coating medium used to form the surface coating, one of skill in the art is not reasonably certain if “further

constituents” are required or essential as part of the chemical components comprising the coating medium or if the phrase “and further constituents” is simply a redundant restatement of the understood meaning of the term “comprising.” A literal reading of this ‘wherein’ clause appears to indicate that “further constituents” are essential as named elements included in the coating medium used to form the surface coating, but the ‘756 Patent provides no guidance as to what the essential further constituents are. Thus, it is not clear which species are covered by this claim. There is no verbatim support for this wherein clause in the ‘756 Patent, but the phrase appears at column 2, lines 3-5, of the specification. Additionally, at column 2, lines 6-12, the specification provides two examples of “possible” coating compositions that each include zinc powder, aluminum powder, titanium tetrabutanolate and either “butyl titanate monomer and hydrocarbons,” or “trimethoxyvinyl silane and hydrocarbons.” Based on this disclosure in the specification of the ‘756 Patent, the “further constituents” required by claim 1, and therefore all dependent claims, would be “hydrocarbons” and one or both of butyl titanate monomer and trimethoxyvinyl silane. Further uncertainty then arises in the definition and scope of the required “hydrocarbons.”

Additionally, as recited above, dependent claim 5 requires the use of a cleaning medium containing a “solvent.” The ‘756 Patent does not provide a definition or an example of any specific solvent other than the functional description:

Cleaning media which contain solvent are characterized by rapid action, good material compatibility and ease of use. The cleaning medium thus

does not react with the surfaces to be treated, i.e. the material of the wheel bearing arrangement.

(*See*, ‘756 Patent at column 3, lines 14-20.)

In sum, a POSITA cannot determine the metes and bounds of the claimed “further constituents,” of the coating composition recited in claim 1, or any specific “solvent” required by dependent claim 5 of the ‘756 Patent, and the specification does not provide sufficient guidance to define those terms. Additionally, no analysis or arguments regarding these terms were made during prosecution of the ‘746 patent application.

Finally, the PubChem Compound Summary, CID 21801, “Titanium tetrabutoxide” is provided here as Exhibit 1070 (EX1008) as evidence the organic chemical “titanium tetrabutanolate” as recited in claims 1 and 3 of the ‘756 Patent is synonymous with “titanium butylate,” “tetra-n-butyl-orthotitanate,” and “tetrabutylorthotitanate,” which are used and taught in the prior art documents cited below. *See*, EX1008, page 7, § 2.4.2, “Depositor-Supplied Synonyms.”

Moreover, Petitioner notes that a single claim which claims both an apparatus and the method steps of using the apparatus is indefinite under 35 U.S.C. § 112(b) or pre-AIA 35 U.S.C. § 112, second paragraph. *See In re Katz Interactive Call Processing Patent Litigation*, 639 F.3d 1303, 1318, 97 USPQ2d 1737, 1748-49 (Fed. Cir. 2011). This further frustrates Petitioner’s ability to determine the metes and bounds of claims

3-6 which are dependent claims directed to a method and depend from independent apparatus claim 1.

At this time, Petitioner submits that, despite the lack of clarity and/or specificity regarding these terms in the issued claims, the claims should be given their plain and ordinary meaning and that regardless of the interpretation of the above indefinite limitations, the '756 Patent claims are obvious under any reasonable claim construction as all elements are shown in the references including additional components that could be considered the "further constituents."

III. REQUIREMENTS FOR INTER PARTES REVIEW

A. Standing

Petitioner certifies that the ‘756 Patent is available for IPR and that Petitioner is not barred or estopped from requesting an IPR. 37 C.F.R. § 42.104(a).

B. Identification of Challenge and Requested Relief

In view of the prior art, evidence, and analysis discussed herein, Petitioner requests IPR of claims 1-7 of the ‘756 Patent under pre-AIA 35 U.S.C. § 103. 37 C.F.R. §§ 42.104(b)(1) and 42.22.

Prior Art:

- U.S. Patent Application Pre-Grant Publication No. 2005/0254741 to Norimatsu (**EX1002**, US‘741), filed 16 May 2005 and published 17 Nov 2005 (prior art under 35 U.S.C. § 102(a), (b), (e));
- U.S. Patent Application Pre-Grant Publication No. 2012/0177835 to Sepeur et al. (**EX1003**, US‘835), filed 15 Sept. 2010 and published 12 July 2012 (prior art under 35 U.S.C. § 102(a), (b), (e));
- U.S. Patent Application Pre-Grant Publication No. 2012/0009340 to Sepeur et al. (**EX1004**, US‘340), filed 17 Sept. 2009 and published 12 Jan. 2012 (prior art under 35 U.S.C. § 102(a), (b), (e));
- U.S. Patent Application Pre-Grant Publication No. 2010/0175794 to Sepeur et al. (**EX1005**, US‘794), filed 12 August 2008 and published 15 July 2010 (prior art under 35 U.S.C. § 102(a), (b), (e));

- U.S. Patent Application Pre-Grant Publication No. 2009/0148091 to Kametaka et al. (**EX1006**, US‘091), filed 16 Feb. 2009 and published 11 June 2009 (prior art under 35 U.S.C. § 102(a), (b), (e));
- U.S. Patent Application Pre-Grant Publication No. 2017/0219013 to Yokota et al. (**EX1007**, US‘013), filed 23 Jan. 2017 and published 3 Aug. 2017 (prior art under 35 U.S.C. § 102(a), (e));

Grounds:

Ground	Claims	Challenge
1	1-7	Obviousness under § 103 over US‘741 and US‘835
2	1-7	Obviousness under § 103 over US‘091 and US‘340
3	1-7	Obviousness under § 103 over US‘013 and US‘794

Section II, *supra*, discusses the ‘756 Patent, including the issued claims and the prosecution history of the ‘746 application. 37 C.F.R. § 42.104(b)(3). Section IV, *infra*, identifies where each element of the Challenged Claims is found in the prior art. 37 C.F.R. § 42.104(b)(4). Exhibits 1001-1011 are also attached, and the relevance of the evidence to the challenges raised is provided in Section IV. 37 C.F.R. § 42.104(b)(5).

IV. GROUNDS OF UNPATENTABILITY.

A. Ground 1: Claims 1-7 of the ‘756 Patent are Obvious over ‘741 Publication in view of ‘835 Publication.

1. *Overview of ‘741 Publication*

US‘741 was filed 16 May 2005, published on 17 November 2005, and eventually issued as U.S. Patent No. 7,648,284 on 19 January 2010. This patent claims priority to one Japanese patent document having a filing date of 17 May 2004. US‘741 is analogous art to the ‘756 Patent because it relates to a third-generation wheel bearing hub, including a “preservation film” formed on the surface of the hub to prevent rust formation. *See*, US‘741 (EX1002), [0011], [0018].

US‘741 explains the disadvantages of prior art vehicle wheel bearing hubs, including reduced rigidity of the wheel hub on the inboard side of the wheel hub, thereby reducing the strength and durability of the wheel hub. *See*, US‘741(EX1002), [0008]. US‘741 also teaches the susceptibility of the prior art wheel hub bearing apparatus to “delayed fracture” caused by hydrogen embrittlement which causes destruction of the metallic grain boundary when the bearing apparatus is exposed to cold, wet environments and road salts. *See*, US‘741 (EX1002), [0010].

US‘741 teaches an improved third-generation wheel bearing hub, composed of medium and high carbon steel, that has reduced weight and size of the wheel hub while maintaining high rigidity. US‘741 (EX1002), [0011], [0037], [0038]. The wheel bearing hub includes a “preservation film” formed on the surface of the inner ring to

prevent rust forming on the portion of the inner ring exposed to the ambient environment and to provide high resistance against abrasion. US‘741 (EX1002), [0018]. The preservation film may be a zinc/nickel alloy that provides a strong rust resistive effect under severe environmental conditions. US‘741 (EX1002), [0018], [0043].

While US‘741 describes advantages of applying the preservation film, such as a zinc/nickel alloy plating, to the vehicle wheel bearing hub, it does not provide a detailed description of the materials and methods for forming and depositing a zinc plating on the disclosed third-generation type vehicle wheel bearing hub.

2. *Overview of ‘835 Publication*

US‘835 was filed 15 September 2010 and published 12 July 2012. This patent application claims priority to a German patent document having a filing date of 17 September 2009. US‘835 is analogous art to the ‘756 Patent because it relates to a coating agent for preventing cathodic corrosion or white rust on different metals. *See*, US‘835 (EX1003), [0006], [0010].

US‘835 Publication teaches that prior art zinc flake coatings show very good corrosion resistance, even when applied in relatively thin layers of 5 to 10 μm thickness, but are unsuitable for spray application because curing temperatures of at least 250°C are required. *See*, US‘835 (EX1003), [0005]. The disclosed zinc and aluminum metallic coatings overcome these problems of the prior art zinc flake

coatings by providing cathodic corrosion protection to metals and can be applied as an aerosol and cure at room temperature. *See*, US‘835 (EX1003), [0006].

US‘835 also teaches that the disclosed zinc and aluminum coatings provide good cathodic protection that effectively prevents contact corrosion on substrates consisting of different metals, in particular steel or steel alloys. *See*, US‘835 (EX1003), [0010], [0013], [0014]. US‘835 Publication teaches that the disclosed zinc and aluminum coatings provide a controlled reduction in activity by covering the individual metal particles in the coatings with conductive or semi-conductive metal oxide coatings (for example a titanium dioxide coating on zinc), such that the metal particles are passivated “*in situ*” by the metal alkoxide, preventing the formation of white rust typical of conventional zinc coatings that cure at room temperature. Advantageously, weldability of the coated metal substrate is preserved, and the disclosed coatings can be overpainted. The surface of the disclosed zinc and aluminum coatings is dirt-repellent and has hydrophobic and oleophobic properties. The disclosed zinc and aluminum coatings demonstrate a “self-healing surface” such that the coating is relatively scratch-proof and abrasion resistant and offers a good adhesion surface for polyurethane sealants and silicone sealants. *See*, US‘835 (EX1003), [0010].

US‘835 provides an example demonstrating that a coating comprising zinc, aluminum, and tetra-n-butyl-orthotitanate (i.e., titanium tetrabutanolate; *see*, EX1008) spray-coated onto degreased and cleaned steel sheets forms an abrasion-resistant grey-

metallic coating which provides good, active corrosion protection. *See*, US‘835 (EX1003), [0033].

3. *The Combination of ‘741 Publication and ‘835 Publication*

US‘741 discloses every mechanical element of the claimed wheel bearing apparatus of the ‘756 Patent. US‘835 is cited for teaching a metal surface coating for improving corrosion protection identical to the coating recited in independent claims 1 and 3 of the ‘756 Patent. Combined, these two prior art documents teach each and every element of the claimed wheel bearing arrangement for a motor vehicle comprising a surface coating for improving corrosion protection as set forth in the issued claims of the ‘756 patent.

As set forth in Dr. Haber’s Declaration accompanying this Petition, and copied here, the following chart identifies the claim limitations of the ‘756 Patent and the corresponding elements of US‘741 and US‘835. *See* Haber Decl. (EX1009), ¶ 35.

Claim 1 of the ‘756 Patent	Citations within US‘741 and US‘835
A wheel bearing arrangement for a motor vehicle, comprising,	A vehicle wheel bearing apparatus for supporting a driven wheel of a vehicle (US‘741 Abstract) The coating agent of the invention may be applied by spraying, in particular from an aerosol can or a spray gun, brushing or roller application onto a metallic substrate, in particular steel, alloy steels, zinc, galvanized steel sheet, aluminium or aluminium alloys, and subsequently dried at room

	temperature. The substrate may also be a composite material comprising two or more of these metals joined together, for example by means of welding, bolting or riveting. (US'835 [0014])
a wheel hub, wherein the wheel hub is connected to a wheel flange,	The inner member 1 includes a wheel hub 2 and an inner ring 3 press-fit on the wheel hub 2 . The wheel hub 2 is integrally formed, at its outboard side end, with a wheel mounting flange 4 to mount a wheel (not shown) on the vehicle. (US'741 [0032]; FIG. 1)
wherein a multi-row anti-friction bearing having an outer ring and an inner ring is arranged on the wheel hub,	The wheel hub 2 has an inner raceway surface 2 a on its outer circumferential surface and a cylindrical portion 2 b axially extending from the inner raceway surface 2 a. (US'741 [0033]; FIG. 1) The outer member 10 is integrally formed with a body mounting flange 10 b and has double row outer raceway surfaces 10 a and 10 a on its inner circumferential surface. (US'741 [0035]; FIG. 1)
wherein the inner ring comprises two bearing inner rings,	Double row rolling elements 6 and 6 are contained between the double row outer raceway surfaces 10 a , 10 a and the opposing inner raceway surfaces 2 a , 3 a . (US'741 [0035]; FIG. 1)

wherein an axially outer bearing inner ring is formed in one piece on the wheel hub and	The wheel hub 2 has an inner raceway surface 2 a on its outer circumferential surface and a cylindrical portion 2 b axially extending from the inner raceway surface 2 a . (US'741 [0033]; FIG. 1)
wherein an axially inner bearing inner ring is a separate component which is mounted on the wheel hub and is axially pretensioned by a collar, that acts on an end surface of the inner bearing inner ring, of the wheel hub,	The inner ring 3 with an inner raceway surface 3 a formed on its outer surface is press-fit on the cylindrical portion 2 b of the wheel hub 2. The inner ring 3 is secured on the wheel hub 2 by a caulked portion 2 c. (US'741 [0033]; FIG. 1) The caulked portion 2 c is formed by plastically deforming the end of the axially extending cylindrical portion 2 b radially outward to prevent the inner ring 3 from slipping off of the wheel hub 2. According to this embodiment, the adoption of a so-called self-retaining structure, enables control of the preload of the bearing without using any fastening means, such as a nut, and thus makes it easy to assemble the bearing to a vehicle and to maintain the preload for a long term. (US'741 [0034]; FIG. 1)
wherein at least partially a surface coating for improving corrosion	The object of this invention is thus to create a room-temperature-curing coating agent that provides cathodic corrosion protection and is applicable as an aerosol and as brush-on paint. (US'835 [0006])

protection is formed on the wheel bearing arrangement,	
wherein the surface coating is formed as a zinc flake coating,	It is within the scope of the invention that the metal pigment is selected from the group consisting of zinc, aluminium and magnesium, as well as mixtures and alloys thereof. (US'835 [0018]) Zinc and mixtures or alloys of zinc and aluminium are preferred. (US'835 [0019])
wherein a coating medium used to form the surface coating comprises zinc powder, aluminum powder, titanium tetrabutanolate and further constituents,	Zinc and mixtures or alloys of zinc and aluminium are preferred. (US'835 [0019]) coating agent being produced according to the following method: Mixing 5 to 95 wt. % metal alkoxide with 5 to 95 wt. % metal pigment . . . (US'835 [0007], [0008]) A preferred embodiment of the invention consists in that the metal alkoxide is selected from the group consisting of titanium alkoxide, in particular titanium butylate (US'835 [0017]) tetra-n-butyl-orthotitanate are stirred into the reaction mixture under an atmosphere of dried nitrogen, the mixture homogenized for 1 h with a

	slow stirrer and then refluxed for 12 h. The zinc and aluminium particles are surface-modified with the organometal component during this process. (US'835 [0030])
wherein the surface coating has a layer thickness of at least 10 μm .	the coating agent is applied in layer thicknesses of 5 to 60 μm , preferably in layer thicknesses of 5 to 25 μm and even more preferably in layer thicknesses of 10 to 15 μm . (US'835 [0015])

Claim 2 of the '756 Patent	Citations within US'741 and US'835
The wheel bearing arrangement as claimed in claim 1, wherein the surface coating has a layer thickness of at most 20 μm .	the coating agent is applied in layer thicknesses of 5 to 60 μm , preferably in layer thicknesses of 5 to 25 μm and even more preferably in layer thicknesses of 10 to 15 μm . (US'835 [0015])

Claim 3 of the '756 Patent	Citations within US'741 and US'835
A method for coating a wheel bearing arrangement as claimed in claim 1, wherein the method comprises the following method steps: cleaning at least one component surface to be coated of the wheel bearing	The spray-can content is applied by way of the cross-hatch technique to degreased and cleaned steel sheet (US'835 [0033])

arrangement by means of a fluid cleaning medium;	
at least partial removal of the cleaning medium from the at least one component surface;	The spray-can content is applied by way of the cross-hatch technique to degreased and cleaned steel sheet (US'835 [0033])
coating the at least one component surface with a coating medium for generating a surface coating formed as a zinc flake coating,	The object of this invention is thus to create a room-temperature-curing coating agent that provides cathodic corrosion protection and is applicable as an aerosol and as brush-on paint. (US'835 [0006]) It is within the scope of the invention that the metal pigment is selected from the group consisting of zinc, aluminium and magnesium, as well as mixtures and alloys thereof. (US'835 [0018])
wherein the coating medium used to form the surface coating comprises zinc powder, aluminum powder, and titanium tetrabutanolate;	Zinc and mixtures or alloys of zinc and aluminium are preferred. (US'835 [0019]) coating agent being produced according to the following method: Mixing 5 to 95 wt. % metal alkoxide with 5 to 95 wt. % metal pigment . . . (US'835 [0007], [0008])

	A preferred embodiment of the invention consists in that the metal alkoxide is selected from the group consisting of titanium alkoxide, in particular titanium butylate (US'835 [0017]) tetra-n-butyl-orthotitanate are stirred into the reaction mixture under an atmosphere of dried nitrogen, the mixture homogenized for 1 h with a slow stirrer and then refluxed for 12 h. The zinc and aluminium particles are surface-modified with the organometal component during this process (US'835 [0030])
and curing the surface coating at a curing temperature of at least 15° C. and at most 80° C.	The coating agent of the invention may be applied by spraying, in particular from an aerosol can or a spray gun, brushing or roller application onto a metallic substrate, in particular steel, alloy steels, zinc, galvanized steel sheet, aluminium or aluminium alloys, and subsequently dried at room temperature. (US'835 [0014]) The spray-can content is applied by way of the cross-hatch technique to degreased and cleaned steel sheet and dried for 1 day at room temperature (20 to 25° C.) (US'835 [0033])

Claim 4 of the '756 Patent	Citations within US'741 and US'835
The method as claimed in claim 3, wherein the coating of the at least one component surface is performed by means of a spraying process.	The object of this invention is thus to create a room-temperature-curing coating agent that provides cathodic corrosion protection and is applicable as an aerosol and as brush-on paint. (US'835 [0006]) The coating agent of the invention may be applied by spraying, in particular from an aerosol can or a spray gun (US'835 [0014])
Claim 5 of the '756 Patent	Citations within US'741 and US'835
The method as claimed in claim 3, wherein the cleaning medium contains solvent.	The spray-can content is applied by way of the cross-hatch technique to degreased and cleaned steel sheet (US'835 [0033])
Claim 6 of the '756 Patent	Citations within US'741 and US'835
The method as claimed in claim 3, wherein the curing of the surface coating is performed over a curing period of at least 10 minutes.	The spray-can content is applied by way of the cross-hatch technique to degreased and cleaned steel sheet and dried for 1 day at room temperature (20 to 25° C.) (US'835 [0033])
Claim 7 of the '756 Patent	Citations within US'741 and US'835
A motor vehicle, comprising a wheel bearing arrangement as claimed in claim 1.	A vehicle wheel bearing apparatus for supporting a driven wheel of a vehicle (US'741 Abstract)

Prior to the filing date of the '756 Patent, it would have been obvious to a POSITA to substitute the zinc/nickel alloy plating 'preservation film' on the vehicle wheel bearing apparatus of US'741 with the zinc and aluminum coatings disclosed in US'835 because the mere substitution of one element for another known in the field would have been obvious. *See United States v. Adams*, 383 U.S. 39, 50-51 (1966). US'741 teaches that such third-generation type vehicle wheel bearing hubs are routinely exposed to cold, muddy water including salt and anti-freezing agents, and that a corrosion-resistant zinc plating exhibits a strong rust resistive effect under these severe environmental conditions (US'741(EX1002), [0018], [0019]) and US'835 teaches several advantages of the disclosed zinc and aluminum coatings over the zinc/nickel alloy plating of US'741, such as better protection against the formation of white rust as well as the scratch-proof and abrasion resistant properties of the zinc and aluminum coatings. Haber Decl. (EX1009), ¶ 36.

A POSITA would have been motivated to apply the zinc and aluminum metal coating agents of US'835 to the vehicle wheel bearing hubs of US'741 because US'835 teaches and demonstrates the formation of an abrasion-resistant coating with good, active corrosion protection that provides a good adhesion surface for polyurethane sealants and silicone sealants, and advantageously cures at room temperature. The POSITA would have had a reasonable expectation of success in doing so because US'835 teaches and demonstrates that the disclosed zinc and aluminum coatings can be easily formed, applied as an aerosol to steel or steel alloys (such as the steel

components of the vehicle wheel hub of US‘741), and cured at room temperature. Haber Decl. (EX1009), ¶ 38.

Regarding dependent claim 2, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of US‘835 to the vehicle wheel bearing hubs of US‘741 in a layer thickness of at most 20 μm , and would have had a reasonable expectation of success in doing so, because US‘835 taught that the most preferred zinc and aluminum layer thickness is 10-15 μm and demonstrated that with such layer “An abrasion-resistant grey-metallic coating which provides good, active corrosion protection is obtained” (US‘835 (EX1003), [0033]). Thus, US‘835 taught that sufficient corrosion protection is obtained using a layer thickness of 10-15 μm and, as Dr. Haber explains, a POSITA would have understood that a greater layer thickness, would needlessly increase material costs without providing any additional benefit. (i.e., would be wasted materials and money). Haber Decl. (EX1009), ¶ 4.

Regarding claim 3 of the ‘756 Patent, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of US‘835 to the vehicle wheel bearing hubs of US‘741 using the method steps of claim 3 of the ‘756 Patent, and would have had a reasonable expectation of success of doing so, because US‘835 demonstrated that “An abrasion-resistant grey-metallic coating which provides good, active corrosion protection is obtained” on a steel sheet that is first degreased and cleaned prior to deposition of a layer of zinc and aluminum powder and tetra-n-butyl-orthotitanate from a spray-can and then “dried for 1 day at room temperature (20 to 25

C)” (US‘835 (EX1003), [0029]-[0033]). Thus, as Dr. Haber explains, US‘835 demonstrated sufficient corrosion protection is obtained by this application method and additional energy was not required to cure the sprayed layer by heating the wheel bearing with the sprayed layer above room temperature (i.e., would use unnecessary energy in heating). Haber Decl. (EX1009), ¶ 43.

Regarding dependent claim 4 of the ‘756 Patent, a POSITA would have been motivated to apply the zinc and aluminum metal coatings of US‘835 to the vehicle wheel bearing hubs of US‘741 using the method steps of claim 3 of the ‘756 Patent, and would have had a reasonable expectation of success in doing so, because US‘835 taught and demonstrated the application of a zinc, aluminum, and tetra-n-butyl-orthotitanate layer by spraying to form “An abrasion-resistant grey-metallic coating which provides good, active corrosion protection” (US‘835 (EX1003), [0014] and [0033]). Haber Decl. (EX1009), ¶ 45.

Regarding dependent claim 5 of the ‘756 Patent, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of US‘835 to the vehicle wheel bearing hubs of US‘741 that had been cleaned with a solvent, and would have had a reasonable expectation of success in doing so, because US‘835 demonstrated that "An abrasion-resistant grey-metallic coating which provides good, active corrosion protection is obtained” following degreasing of the test substrate (US‘835 (EX1003), [0033]) and as Dr. Haber explains, a POSITA would have

understood that removing grease from a metal substrate requires the use of a solvent. Haber Decl. (EX1009), ¶ 47.

Regarding dependent claim 6 of the '756 Patent, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of US'835 to the vehicle wheel bearing hubs of US'741 by curing the anti-corrosion spray coating for a period of at least 10 minutes, and would have had a reasonable expectation of success in doing so, because US'835 demonstrated that "An abrasion-resistant grey-metallic coating which provides good, active corrosion protection is obtained" on a steel sheet by deposition of a layer of zinc and aluminum powder and tetra-n-butyl-orthotitanate from a spray-can which is then "dried for 1 day" (US'835 (EX1003), [0033]). Thus, US'835 taught that sufficient corrosion protection was obtained using this application method and the application of additional energy was not required to cure the sprayed anti-corrosion layer over a period of at least 10 minutes. Haber Decl. (EX1009), ¶ 49.

Regarding claim 7 of the '756 Patent, this claim is similar to an omnibus claim and merely recites any motor vehicle that contains the wheel bearing arrangement of claim 1. A POSITA would have been motivated to use the third-generation type vehicle wheel bearing apparatus of US'741 including an anti-corrosion coating as described in US'835, in a motor vehicle because US'741 describes the use of the disclosed vehicle wheel bearing apparatus "for supporting a driven wheel of a vehicle." *See*, US'741 (EX1002), Abstract). A POSITA would have clearly been motivated to

use the disclosed invention for its intended purpose as a wheel bearing on a motor vehicle. Haber Decl. (EX1009), ¶ 50.

B. Ground 2: Claims 1-7 of the ‘756 Patent are Obvious over ‘091 Publication in view of ‘340 Publication.

1. Overview of ‘091 Publication

US‘091 was filed 16 February 2009, published on 11 June 2009, and issued as US 7,651,275 on 26 January 2010. This patent claims priority to four Japanese patent documents having filing dates of 17 August 2006 or 30 August 2006. US‘091 is analogous art to the ‘756 Patent because it relates to a third-generation wheel bearing hub, including an “insulating coating” formed on a surface of the hub to prevent the generation of electric corrosion. *See*, US‘091 (EX1006), [0004], [0018], [0030].

Like the ‘756 Patent, US‘091 describes a third-generation type vehicle wheel bearing hub (US‘091 (EX1006), [0053] and [0085]) and explains the differences between the first- to fourth-generation type wheel bearing hubs (US‘091 (EX1006), [0004]). US‘091 teaches a third-generation type vehicle wheel bearing hub having an advantageous combination of reduced weight and size of the bearing apparatus and increased rigidity of the bearing apparatus (US‘091 (EX1006), [0009] - [0016]). US‘091 teaches the use of an insulating coating on at least the outer member of the wheel bearing apparatus to prevent premature electric corrosion of the knuckle that may be caused by a combination of different metals (i.e., “galvanic corrosion”). *See*, US‘091 (EX1006), [0085] - [0087]. US‘091 teaches that the insulating coating may be

a “zinc plating” and may be applied to a whole outer circumferential surface to reduce manufacturing steps such as masking (US‘091 (EX1006), [0087]), and that the use of such insulating coating prevents the generation of electric corrosion on the knuckle, caused by a combination of the steel outer member and the light alloy knuckle, to provide a wheel bearing having reduced weight and size. *See*, US‘091 (EX1006), [0091].

While US‘091 describes the advantages of applying an insulating coating, such as zinc plating, to the entirety or parts of the vehicle wheel bearing hub, US‘091 does not provide a detailed description of the formation and deposition of the insulating coating on the disclosed vehicle wheel bearing hubs.

2. *Overview of ‘340 Publication*

US‘340 was filed 17 September 2009 and published on 12 January 2012. This patent application claims priority to a German patent document having a filing date of 16 October 2008. US‘340 is analogous art to the ‘756 Patent because it relates to the production of corrosion protection layers on metallic surfaces of components, in particular motor vehicles and vehicle attachments. *See*, US‘340 (EX1004), [0033].

US‘340 teaches economical methods for producing deformable corrosion protection layers on a metallic surface for cathodic corrosion protection of the metal by mixing metallic zinc and aluminum in the form of pigments, powders, pastes (flakes) or pellets with at least one metal compound, and applying the resulting surface-modified metal particles to a metal surface, and hardening the layer on the

surface-modified metal particles at temperatures between room temperature and 350°C. *See*, US‘340 (EX1004), Abstract.

US‘340 also teaches that a metal substrate coated with the disclosed zinc and aluminum coatings can be deformed (unlike conventional zinc flake coatings), overpainted, welded, coated, colored, and reflect heat, and that these coatings with titanium dioxide on zinc and aluminum impart cathodic corrosion protection when applied to composites of steel and aluminum. *See*, US‘340 (EX1004), [0013].

US‘340 provides Examples demonstrating that steel sheets covered with the disclosed surface-modified zinc and aluminum particles advantageously form anti-corrosion protection layers so firmly adhered to the treated steel substrate that the steel sheet, with the coating, can advantageously be formed into a component without the coating chipping off. *See*, US‘340 (EX1004), [0040], [0053].

3. *The Combination of ‘091 Publication and ‘340 Publication*

US‘091 discloses every mechanical element of the claimed wheel bearing apparatus of the ‘756 Patent. US‘340 is cited for teaching an anti-corrosion zinc and aluminum coating identical to the coating recited in independent claims 1 and 3 of the ‘756 Patent. Combined, these two prior art documents teach the claimed wheel bearing arrangement for a motor vehicle comprising a surface coating for improving corrosion protection as set forth in the issued claims of the ‘756 patent.

As set forth in Dr. Haber’s Declaration accompanying this Petition, and copied here, the following chart identifies the claim limitations of the ‘756 Patent and the corresponding elements of US‘091 and US‘340. *See*, Haber Decl. (EX1009), ¶ 58.

Claim 1 of the ‘756 Patent	Citations within US‘091 and US‘340
A wheel bearing arrangement for a motor vehicle, comprising,	A vehicle wheel bearing apparatus . . . (US‘091 Abstract) the scope of the invention also includes use of the method of the invention for producing deformable corrosion protection layers on . . . rail vehicles, in particular motor vehicles and motor vehicle attachments, motors/engines and motor/engine attachments (US‘340 [0033])
a wheel hub, wherein the wheel hub is connected to a wheel flange,	The wheel hub 4 is integrally formed with a wheel mounting flange 6 at its one end. (US‘091 [0054]; FIG. 1)
wherein a multi-row anti-friction bearing having an outer ring and an inner ring is arranged on the wheel hub,	includes an inner member 1 , an outer member 2 , and double row rolling element (ball) groups 3, 3 rollably contained between the inner and outer members 1, 2 . The inner member 1 has the wheel hub 4 and an inner ring 5 press fit onto the wheel hub 4 . (US‘091 [0053]; FIG. 1)

wherein the inner ring comprises two bearing inner rings,	The inner member 1 has the wheel hub 4 and an inner ring 5 press fit onto the wheel hub 4. (US'091 [0053]; FIG. 1) One (outer side) inner raceway surface 4 a is on its outer circumference. (US'091 [0054]; FIG. 1)
wherein an axially outer bearing inner ring is formed in one piece on the wheel hub and	The inner member 1 has the wheel hub 4 and an inner ring 5 press fit onto the wheel hub 4. (US'091 [0053]; FIG. 1)
wherein an axially inner bearing inner ring is a separate component which is mounted on the wheel hub and is axially pretensioned by a collar, that acts on an end surface of the inner bearing inner ring, of the wheel hub,	The inner ring 5 is formed on its outer circumference with the other (inner side) inner raceway surface 5 a. It is adapted to be press fit onto the cylindrical portion 4 b of the wheel hub 4 to form a double row angular contact ball bearing of a back-to-back duplex type. It is axially secured by a caulked portion 4 c formed by plastically deforming the end of the cylindrical portion 4 b. (US'091 [0055]; FIG. 1)
wherein at least partially a surface coating for improving corrosion protection is formed on the wheel bearing arrangement,	a method for producing deformable corrosion protection layers on a metallic surface (US'340 Abstract)

wherein the surface coating is formed as a zinc flake coating,	preparation of a corrosion protection layer containing zinc and aluminum as “pastes (flakes)” (US‘340 Abstract, [0021]) Especially in corrosion tests such as the neutral salt spray test, these zinc flake coatings provide distinctly better corrosion protection than zinc-metal coatings of comparable thickness. (US‘340 [0004])
wherein a coating medium used to form the surface coating comprises zinc powder, aluminum powder, titanium tetrabutanolate and further constituents,	Mixing 5 to 95 wt. % metallic magnesium, zinc, aluminium or titanium particles, or mixtures or alloys containing at least one of these metals, in the form of pigments, powders, pastes (flakes) or pellets with 5 to 95 wt. % of at least one metal compound, wherein a reaction between the metal particles and metal compound(s) results in surface-modified metal particles; (US‘340 [0010]) A preferred embodiment of the invention consists in that the metal compound is a metal alkoxide, a metal salt or a mixture of metal alkoxides and/or metal salts. (US‘340 [0022]) In this connection, it is preferable for the metal alkoxide to be selected from the group consisting of

	titanium alkoxide, especially titanium butylate, titanium propylate or titanium isopropylate, zirconium alkoxide, aluminium alkoxide and tin alkoxide. (US'340 [0023]) Example 3 describes the application of an anti-corrosion coating for press-hardened steel parts. The coating is composed of Al pigment paste and Zn pigment paste dissolved in tetrabutylorthotitanate and applied by a paint spray gun. (US'340 [0049]-[0051])
wherein the surface coating has a layer thickness of at least 10 μm .	the coating agent is applied in layer thicknesses of 2 to 25 μm , preferably in layer thicknesses of 2 to 15 μm (US'340 [0017])

Claim 2 of the '756 Patent	Citations within US'091 and US'340
The wheel bearing arrangement as claimed in claim 1, wherein the surface coating has a layer thickness of at most 20 μm .	the coating agent is applied in layer thicknesses of 2 to 25 μm , preferably in layer thicknesses of 2 to 15 μm (US'340 [0017])

Claim 3 of the '756 Patent	Citations within US'091 and US'340
A method for coating a wheel bearing arrangement as claimed in claim 1, wherein the method	

comprises the following method steps: cleaning at least one component surface to be coated of the wheel bearing arrangement by means of a fluid cleaning medium;	The coating material is applied by roll applicator to both sides of degreased and cleaned steel sheets (US'340 [0052])
at least partial removal of the cleaning medium from the at least one component surface;	The coating material is applied by roll applicator to both sides of degreased and cleaned steel sheets (US'340 [0052])
coating the at least one component surface with a coating medium for generating a surface coating formed as a zinc flake coating,	Surprisingly, it was found that the corrosion tendency of magnesium particles or zinc particles in the magnesium-containing or zinc-containing layers can be effectively prevented by coating the surface of each individual particle with a thin layer containing electrically conducting or semiconducting constituents, without preventing the active corrosion-protection effect of the magnesium or zinc, in themselves very base metals. The metal particles are passivated "in situ" by the metal compound, preventing the formation of white rust typical of conventional zinc coatings hardenable at room temperature. (US'340 [0015])

	It is preferable for the particles, pigments, powders, pastes (flakes) or pellets to have an individual grain size of 100 nm to 100 μm , more preferably of 1 μm to 30 μm . (US'340 [0021])
wherein the coating medium used to form the surface coating comprises zinc powder, aluminum powder, and titanium tetrabutanolate;	The invention provides for the use of 10 to 80 wt. %, more preferably 25 to 75 wt. % and most preferably 40 to 60 wt. % metallic magnesium, zinc, aluminium or titanium particles in the form of pigments, powders, pastes (flakes) or pellets. (US'340 [0019])
and curing the surface coating at a curing temperature of at least 15° C. and at most 80° C.	It is within the scope of the invention that, in step c), hardening is carried out at temperatures ranging from room temperature to 500° C., preferably between room temperature and 350° C. (US'340 [0031])

Claim 4 of the '756 Patent	Citations within US'091 and US'340
The method as claimed in claim 3, wherein the coating of the at least one component surface is performed by means of a spraying process.	It is within the scope of the invention that, in step b), application of the resulting surface-modified metal particles onto the metallic surface is by way of a wet-chemical process, in particular by spray (US'340 [0029])

Claim 5 of the '756 Patent	Citations within US'091 and US'340
-----------------------------------	---

The method as claimed in claim 3, wherein the cleaning medium contains solvent.	The coating material is applied by roll applicator to both sides of degreased and cleaned steel sheets (US‘340 [0052])
---	--

Claim 6 of the ‘756 Patent	Citations within US‘091 and US‘340
The method as claimed in claim 3, wherein the curing of the surface coating is performed over a curing period of at least 10 minutes.	It is within the scope of the invention that, in step c), hardening is carried out at temperatures ranging from room temperature to 500° C., preferably between room temperature and 350° C., . . . for a period of between 30 s and 1 day, preferably for a period of between 30 s and 1 h (US‘340 [0031])

Claim 7 of the ‘756 Patent	Citations within US‘091 and US‘340
A motor vehicle, comprising a wheel bearing arrangement as claimed in claim 1.	The present disclosure relates to a vehicle wheel bearing apparatus (US‘091 [0002]) the scope of the invention also includes use of the method of the invention for producing deformable corrosion protection layers on . . . motor vehicles and motor vehicle attachments (US‘340 [0033])

Prior to the filing date of the ‘756 Patent, it would have been obvious to substitute the zinc plating insulating coating on the third-generation type vehicle wheel bearing apparatus of US‘091 with the zinc and aluminum coatings disclosed in US‘340 because the mere substitution of one element for another known in the field would have been obvious. *See, Adams*, 383 U.S. at 50-51. US‘091 teaches that third-

generation type vehicle wheel bearing hubs comprising such insulating coatings have reduced weight and size and increased rigidity, thereby improving the life of the bearing apparatus (US‘091 (EX1006), [0015], [0016]) and US‘340 discloses zinc and aluminum coatings that have several advantages over conventional zinc plating, such as the ability to form/deform the coatings without damage to the coating, and the metal substrate to which the coatings are applied can also be deformed, overpainted, welded, coated and colored, without damage to the coatings. *See*, US‘340 (EX1004), [0013]. The zinc and aluminum coatings of US‘340 also advantageously reflect heat, and provide a composite of steel and aluminum with cathodic corrosion protection. *See*, US‘340 (EX1004), [0013]; Haber Decl. (EX1009), ¶ 59.

A POSITA would have been motivated to apply the zinc and aluminum metal coating compositions of US‘340 to the vehicle wheel bearing hubs of US‘091 because as Dr. Haber explains, a POSITA would have understood that US‘340 teaches zinc and aluminum coatings have several advantages, including relatively easy and economically preparation and application to vehicle components and they provide effective cathodic corrosion protection and protection from white rust. *See*, US‘340 (EX1004), [0015]; Haber Decl. (EX1009), ¶¶ 45-47. A POSITA would have a reasonable expectation of success in doing so because US‘340 teaches that the disclosed zinc coatings can be applied by conventional means, such as spray painting, to motor vehicles attachments. *See*, US‘340 (EX1004), [0029], [0033]; Haber Decl. (EX1009), ¶ 60.

Regarding dependent claim 2, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of US‘340 to the vehicle wheel bearing hubs of US‘741 in a layer thickness of at most 20 μm , and would have had a reasonable expectation of success in doing so, because US‘340 teaches the use of a “preferred” zinc and aluminum layer thickness of 2-15 μm and teaches that with such layers provide “a composite of steel and aluminum with cathodic corrosion protection.” *See*, US‘340 (EX1004), [0013], [0017]. Thus, as Dr. Haber explains, a POSITA would have understood that a greater layer thickness, such as above 20 μm , would have unnecessarily increased material production costs. Haber Decl. (EX1009), ¶ 65.

Regarding claim 3 of the ‘756 Patent, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of US‘340 to the vehicle wheel bearing hubs of US‘091 using the method steps of claim 3 of the ‘756 Patent, and would have had a reasonable expectation of success in doing so, because US‘340 teaches and demonstrates the methods of producing deformable corrosion protection layers comprising zinc and aluminum powder and tetra-n-butyl-orthotitanate on cleaned and degreased steel substrates, specifically including motor vehicle components and attachments, which layers are preferably hardened at a temperature between “room temperature and 350°C.” *See*, US‘340 (EX1004), [0013], [0031], [0033], [0049]-[0052]. Thus, US‘340 teaches that sufficient corrosion protection is obtained using these application method steps and as Dr. Haber explains, a POSITA would have understood that additional energy expenditure was not required to cure the

sprayed layer of zinc, aluminum, and titanium tetrabutanolate by heating above room temperature. Haber Decl. (EX1009), ¶ 67.

Regarding dependent claim 4 of the ‘756 Patent, a POSITA would have been motivated to apply the zinc and aluminum metal coatings of US‘340 to the vehicle wheel bearing hubs of US‘091 using the method steps recited in claim 3 of the ‘756 Patent, and would have had a reasonable expectation of success of doing so, because US‘340 teaches the application of the zinc, aluminum, and tetra-n-butyl-orthotitanate layer using a “wet chemical process, in particular by spray painting” to form a deformable, weldable, cathodic corrosion protection layer that can be coated, colored and reflects heat. *See*, US‘340 (EX1004), [0013], [0029]; Haber Decl. (EX1009), ¶ 69.

Regarding dependent claim 5 of the ‘756 Patent, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of US‘340 to the vehicle wheel bearing hubs of US‘091 that had been cleaned with a solvent, and would have had a reasonable expectation of success of doing so, because US‘340 demonstrates the successful application of a cathodic anti-corrosion layer of zinc, aluminum, and tetra-n-butyl-orthotitanate to degreased and cleaned steel sheets (US‘340 (EX1004), [0052]) and as Dr. Haber explains, a POSITA would have understood that removing grease from a metal substrate requires the use of a solvent. Haber Decl. (EX1009), ¶ 71.

Regarding dependent claim 6 of the ‘756 Patent, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of US‘340 to the

vehicle wheel bearing hubs of US‘091 by curing the anti-corrosion spray coating for a period of at least 10 minutes, and would have had a reasonable expectation of success in doing so, because US‘340 teaches the production of deformable corrosion protection layers comprising zinc and aluminum powder and tetra-n-butyl-orthotitanate on cleaned and degreased steel substrates, specifically including motor vehicle components and attachments, which layers are hardened at a temperature between “room temperature and 350° C for a period of between 30 s and 1 day, preferably for a period of between 30 s and 1h ...” *See*, US‘340 (EX1004), [0013], [0031], [0033]. Thus, US340 taught that sufficient corrosion protection was obtained using this application method and as Dr. Haber explains, a POSITA would have understood that an additional energy expenditure was not required to cure the sprayed anti-corrosion layer for a curing period of less than 10 minutes. Haber Decl. (EX1009), ¶ 73.

Regarding claim 7 of the ‘756 Patent, this claim is similar to an omnibus claim and merely recites any motor vehicle that contains the wheel bearing arrangement of claim 1. A POSITA would have been motivated to use the third-generation type vehicle wheel bearing apparatus of US‘091 including an anti-corrosion coating as described in US‘340 that advantageously reflect heat, and provide a composite of steel and aluminum with cathodic corrosion protection, in a motor vehicle because US‘091 describes the production and use of a vehicle wheel bearing apparatus used for a driven wheel that includes a zinc plating to prevent galvanic corrosion (US‘091 (EX1006), [0053], [0086], [0087]), and US‘340 teaches a zinc and aluminum coating with

advantageous physical properties for use on motor vehicle attachments. *See*, US‘340 (EX1004), [0033]. A POSITA would have clearly been motivated to use the disclosed invention for its intended purpose as a wheel bearing on a motor vehicle. Haber Decl. (EX1009), ¶ 74.

C. Ground 3: Claims 1-7 of the ‘756 Patent are Obvious over ‘013 Publication in view of ‘794 Publication.

1. Overview of ‘013 Publication

US‘013 was filed 23 January 2017, published on 3 August 2017, and subsequently issued as US Patent No. 9,939,024 on 10 April 2018. This patent claims priority to one Japanese patent document having a filing date of 28 January 2016. US‘013 is analogous art to the ‘756 Patent because it relates to a wheel bearing apparatus with corrosion resistance, and a method of manufacturing the same, and was cited by the U.S. Patent Examiner for this disclosure during the examination of the ‘746 patent application as USPGPUB No. 2017/0219013 (Yokota). *See*, US‘013 (EX1007), [0010] and Section II.B. “Prosecution History,” *supra*.

The ‘756 Patent generally describes and claims a “third-generation” type vehicle wheel bearing hub, falling within international patent classification group F16C19/186. US‘013 also describes a third-generation type vehicle wheel bearing hub (US‘013 (EX1007), [0037]) and teaches that it is common in the art for each surface of the outer ring and the hub spindle of such wheel bearing apparatus to be coated with

nickel or zinc plating to improve corrosion resistance and quality of appearance. *See*, US‘013 (EX1007), [0006].

US‘013 discloses a method of manufacturing a wheel bearing apparatus including the steps of plating a predetermined area including the spindle end portion of the hub spindle; removing the plating from at least a portion of the spindle end portion in the predetermined area; and clinching the spindle end portion to form the clinched portion after removing the plating (US‘013 (EX1007), [0010], [0011]). The protective plating is nickel or zinc plating that improves the corrosion resistance and quality of appearance of the wheel bearing apparatus. *See*, US‘013 (EX1007), [0025].

US‘013 also teaches a method of applying a corrosion protective plating, such as a zinc plating, to a predetermined area of the hub spindle, the spindle raceway surface, the step, and the outer periphery of the small-diameter portion of the hub. A non-plated portion of the assembly is formed by then removing the plating from a portion of the predetermined area, the remaining portion of the predetermined area is thus the plated portion of the assembly. *See*, US‘013 (EX1007), [0025], [0030]).

2. Overview of ‘794 Publication

US‘794 was filed 12 August 2008 and published on 15 July 2010. This patent application claims priority to a German patent document having a filing date of 13 August 2007. US‘794 is analogous art to the ‘756 Patent because it relates to a process for producing an active anti-corrosion coating on components or assemblies for “ABS

and braking systems, brake discs, chassis components, wheels.” *See*, US‘794 (EX1005), Abstract, [0046].

US‘794 teaches a process for producing anti-corrosive components or assemblies for machine construction, in particular vehicle construction, on an industrial scale using conventional means, such as dipping or spraying. *See*, US‘794 (EX1005), Abstract, [0009]. US‘794 teaches that application of the zinc pigment and aluminum pigment coating compositions protect steel vehicle components, including ABS and braking systems, brake discs, chassis components, wheels, and rims, from corrosion, even when applied in a layer thickness in the lower micron range. *See*, US‘794 (EX1005), [0019], [0046].

US‘794 provides examples demonstrating that steel or steel alloy components covered with the zinc and aluminum anti-corrosion protection layers firmly adhered to the treated substrate, and when exposed to a salt spray test in accordance with DIN EN ISO 9227 after 1000 hours, the coating showed no red rust formation on the surface nor at a cruciform injury site. *See*, US‘794 (EX1005), [0062]. US‘794 further teaches that the coated vehicle components and assemblies have an electrical resistance of <10 mOhm and can thus be welded to other steel parts. *See*, US‘794 (EX1005), [0062].

3. *The Combination of ‘013 Publication and ‘794 Publication*

US‘013 discloses every mechanical element of the claimed wheel bearing apparatus of the ‘756 Patent. US‘794 is cited for teaching an active anti-corrosion coating for steel parts identical to the coating recited in independent claims 1 and 3 of

the ‘756 Patent. Combined, these two prior art documents teach the claimed wheel bearing arrangement for a motor vehicle comprising a surface coating for improving corrosion protection as set forth in the issued claims of the ‘756 patent.

As set forth in Dr. Haber’s Declaration accompanying this Petition, and copied here, the following chart identifies the claim limitations of the ‘756 Patent and the corresponding elements of US‘013 and US‘794. *See*, Haber Decl. (EX1009), ¶ 78.

Claim 1 of the ‘756 Patent	Citations within US‘013 and US‘794
A wheel bearing arrangement for a motor vehicle, comprising,	Provided is a method of manufacturing a wheel bearing apparatus (US‘013, Abstract) a process for producing an active anti-corrosion coating on steel components (US‘794, Abstract) “the scope of the invention extends to use of the process according to the invention for producing anti-corrosive components or assemblies for . . . engines and engine attachments, pistons, sealing rings, exhaust systems, ABS and braking systems, brake discs, chassis components, wheels, rims” (US‘794 [0046])
a wheel hub, wherein the wheel hub is connected to a wheel flange,	FIG. 1 shows the wheel bearing apparatus 1 for a driving wheel of an automobile. On the axial first end side of the hub spindle 3, an annular flange portion 5 is formed integrally with the hub spindle 3, and extends outward in the radial

	direction from an outer periphery of the hub spindle 3. The flange portion 5 is provided with a plurality of bolt holes 5 a arranged in the circumferential direction and passing through the flange portion 5 in a thickness direction of the flange portion 5 (US'013 [0017], [0023]; FIG. 1)
wherein a multi-row anti-friction bearing having an outer ring and an inner ring is arranged on the wheel hub,	The rolling bearing 2 is, for example, a double row ball bearing and includes an outer ring 11 and an inner ring member 12. (US'013 [0019]; FIG. 1)
wherein the inner ring comprises two bearing inner rings,	The inner ring member 12 has an inner ring raceway surface 13 a on an outer periphery of the inner ring member 12. . . The spindle raceway surface 13 b faces the outer ring raceway surface 11 b that is on the axial first end side. (US'013 [0020]; FIG. 1)
wherein an axially outer bearing inner ring is formed in one piece on the wheel hub and	The hub wheel 4 has a cylindrical hub spindle 3 that serves as a raceway ring member for the rolling bearing 2. The hub spindle 3 of the hub wheel 4 has a large-diameter portion 6 and a small-diameter portion 8. The large-diameter portion 6 is formed on an axial first end side. The small-diameter portion 8 has a diameter smaller than that

	of the large-diameter portion 6, and is formed continuously to the large-diameter portion 6 via a step surface 7 and extending from the large-diameter portion 6 toward an axial second end side. (US'013 [0018]; FIG. 1)
wherein an axially inner bearing inner ring is a separate component which is mounted on the wheel hub and is axially pretensioned by a collar, that acts on an end surface of the inner bearing inner ring, of the wheel hub,	An inner periphery of the inner ring member 12 is fitted on the small-diameter portion 8 of the hub spindle 3. A spindle end portion 8 a of the small-diameter portion 8, which is on the axial second end side, is clinched outward in the radial direction by using a clinching punch (not shown), and thus a clinched portion 9 is formed. The inner ring member 12 is fitted and fixed on the small-diameter portion 8. (US'013 [0019]; FIG. 1)
wherein at least partially a surface coating for improving corrosion protection is formed on the wheel bearing arrangement,	“the scope of the invention extends to use of the process according to the invention for producing anti-corrosive components or assemblies for . . . engines and engine attachments, pistons, sealing rings, exhaust systems, ABS and braking systems, brake discs, chassis components, wheels, rims” (US'794 [0046])
wherein the surface coating is formed as a zinc flake coating,	the anti-corrosion layer contains between 10 and 100 wt. %, preferably between 50 and 100 wt. % and best of all between 70 and 95 wt. % metallic zinc pigment (US'794 [0032])

	It is also to advantage in this connection that the anti-corrosion layer contains up to 50 wt. % metallic aluminium pigment. (US'794 [0033]) coating is composed of Al pigment paste and Zn pigment paste dissolved in tetrabutylorthotitanate and applied by a paint spray gun. (US'794 [0050], [0051])
wherein a coating medium used to form the surface coating comprises zinc powder, aluminum powder, titanium tetrabutanolate and further constituents,	the binder used in the anti-corrosion layer contains 5 to 100 wt. % metal oxides, in particular titanium, aluminium or zirconium oxides. (US'794 [0034]) Example 1 demonstrates the application of an anti-corrosion coating for press-hardened steel parts. The coating is composed of Al pigment paste and Zn pigment paste dissolved in tetrabutylorthotitanate and applied by a paint spray gun. (US'794 [0050], [0051])
wherein the surface coating has a layer thickness of at least 10 μm.	the layer thickness of the anti-corrosion layer is less than 50 μm, preferably less than 20 μm (US'794 [0028])

Claim 2 of the '756 Patent	Citations within US'013 and US'794
The wheel bearing arrangement as claimed in claim 1, wherein the surface coating has a layer thickness of at most 20 µm.	the layer thickness of the anti-corrosion layer is . . . preferably less than 20 µm (US'794 [0028])

Claim 3 of the '756 Patent	Citations within US'013 and US'794
A method for coating a wheel bearing arrangement as claimed in claim 1, wherein the method comprises the following method steps: cleaning at least one component surface to be coated of the wheel bearing arrangement by means of a fluid cleaning medium;	Degreased 22MnB5A steel strip moving at 60 m/min is roll-coated in a coil coating line with a coating material (US'794 [0048])
at least partial removal of the cleaning medium from the at least one component surface;	Degreased 22MnB5A steel strip moving at 60 m/min is roll-coated in a coil coating line with a coating material (US'794 [0048])

coating the at least one component surface with a coating medium for generating a surface coating formed as a zinc flake coating,	The object of the invention is to develop an active anti-corrosion coating that can be applied on an industrial scale using conventional means (e.g. dipping, spraying, flooding or rolling) and is intended for hot-formed and, in particular, press-hardened steel parts provided with antiscaling means. (US'794 [0009]) Surprisingly, it was found that special coating compositions consisting of a metal oxide and metal pigment, in particular zinc pigment or zinc pigment and aluminium pigment, protect steel effectively against corrosion even when the layer thickness is in the lower μm range and irrespective of whether these coating compositions are applied directly onto the metallic steel surface or onto the reaction layer formed from the antiscaling coating during annealing. (US'794 [0019])
wherein the coating medium used to form the surface coating comprises zinc powder, aluminum powder, and titanium tetrabutanolate;	23.6 g of an aluminium pigment paste (e.g. Decomet Hochglanz Al 1002/10 from Schlenk) and 138.1 g of a zinc pigment paste (Stapa TE Zinc AT from Eckart) are stirred into 74.4 g of 1-butanol solvent and mixed in homogeneously for 20 minutes using a dissolver running at a speed of 1000 rpm. 163.3 g tetrabutylorthotitanate (from

	Fluka) are stirred into this solution. (US'794 [0050])
and curing the surface coating at a curing temperature of at least 15° C. and at most 80° C.	The coating solution hardens at room temperature within an hour of application (US'794 [0051])

Claim 4 of the '756 Patent	Citations within US'013 and US'794
The method as claimed in claim 3, wherein the coating of the at least one component surface is performed by means of a spraying process.	The coating solution is applied to the entire surface of the press-hardened part using a paint spray gun (US'794 [0051])

Claim 5 of the '756 Patent	Citations within US'013 and US'794
The method as claimed in claim 3, wherein the cleaning medium contains solvent.	Degreased 22MnB5A steel strip moving at 60 m/min is roll-coated in a coil coating line (US'794 [0048])

Claim 6 of the '756 Patent	Citations within US'013 and US'794
The method as claimed in claim 3, wherein the curing of the surface coating is performed over a curing	The coating solution hardens at room temperature within an hour of application (US'794 [0051])

period of at least 10 minutes.	
--------------------------------	--

Claim 7 of the '756 Patent	Citations within US'013 and US'794
A motor vehicle, comprising a wheel bearing arrangement as claimed in claim 1.	A vehicle, such as an automobile, is provided with a wheel bearing apparatus used to install a wheel so as to rotate with respect to the body of the vehicle. (US'013 [0005]) An object of the present invention is to provide a method of manufacturing a wheel bearing apparatus, and a wheel bearing apparatus. (US'013 [0010]) the scope of the invention extends to use of the process according to the invention for producing anti-corrosive components or assemblies for . . . engines and engine attachments, pistons, sealing rings, exhaust systems, ABS and braking systems, brake discs, chassis components, wheels, rims (US'794 [0046])

Prior to the filing date of the '756 Patent, it would have been obvious to substitute the insulating zinc plating on the third-generation type vehicle wheel bearing apparatus of US'013 with the zinc and aluminum metal coating compositions of US'794 because the mere substitution of one element for another known in the field would have been obvious. *See Adams*, 383 U.S. at 50-51. US'013 teaches third-

generation type vehicle wheel bearing hubs comprising nickel or zinc platings that are corrosion resistant but require a difficult and labor-intensive method of carefully applying a zinc plating to areas of the hub assembly and then removing the zinc plating from specified subsections on the hub assembly. *See*, US‘013 (EX1007), [0025]-[0030], [0037]. US‘794 teaches and demonstrates zinc and aluminum metal coating compositions that are relatively easy to prepare and apply to vehicle components and provide effective anti-corrosion rust resistance. *See*, US‘794 (EX1005), [0009], [0019], [0046]; Haber Decl. (EX1009), ¶ 79.

A POSITA would have been motivated to apply the zinc and aluminum metal coating compositions of US‘794 to the vehicle wheel bearing hubs of US‘013 because US‘794 teaches a metal oxide and metal pigment, in particular zinc pigment and aluminum pigment, that protect steel effectively against corrosion even when the layer thickness is in the lower micron range and that impart highly resistant edge protection to the coated steel component. *See*, US‘794 (EX1005), [0019]. US‘794 also teaches that the anti-corrosion coating advantageously can be overpainted, phosphated, or dip-coated without any problem. *See*, US‘794 (EX1005), [0019], [0062]; Haber Decl. (EX1009), ¶¶ 80-83.

The POSITA would have had a reasonable expectation of success in making this substitution because US‘794 teaches and demonstrates that the disclosed zinc and aluminum coatings can be applied on an industrial scale by conventional means, such as spraying, and hardened at room temperature to components and assemblies used in

vehicle construction. *See*, US‘794 (EX1005), [0009], [0046], [0051]; Haber Decl. (EX1009), ¶ 81.

Regarding dependent claim 2, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of US‘794 to the vehicle wheel bearing hubs of US‘013 in a layer thickness of at most 20 μm , and would have had a reasonable expectation of success of doing so, because US‘794 taught and demonstrated that a suitable, silver-grey, anti-corrosion coating for press-hardened steel parts was formed by spraying to “produce a layer thickness of 3-10 μm after drying and hardening” that “adhered firmly to the substrate” and when tested per DIN EN ISO9227 “showed no red-rust formation, neither on the surface nor at the cruciform injury site.” *See*, US‘794 (EX1005), [0051], [0062]. Thus, US‘794 teaches that sufficient corrosion protection was obtained using a layer thickness of at most 20 μm and a POSITA would have understood that a greater layer thickness would have unnecessarily increased material production costs. Haber Decl. (EX1009), ¶ 85.

Regarding claim 3 of the ‘756 Patent, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of US‘794 to the vehicle wheel bearing hubs of US‘013 using the method steps of claim 3 of the ‘756 Patent, and would have had a reasonable expectation of success in doing so, because US‘794 taught and demonstrated that a suitable, silver-grey, anti-corrosion coating for press-hardened steel parts, composed of zinc, aluminum, and tetrabutylorthotitanate, was formed by spraying onto a steel substrate and then hardened “at room temperature

within an hour of application” to “produce a layer thickness of 3-10 μM after drying and hardening” that “adhered firmly to the substrate” and when tested per DIN EN ISO9227 “showed no red-rust formation, neither on the surface nor at the cruciform injury site” *See*, US‘794 (EX1005), [0032]-[0034], [0049]-[0051], [0062]. Thus, as Dr. Haber explains, US‘794 taught a POSITA that corrosion protection was obtained using this layer and application method and additional energy expenditure was not required to cure the sprayed layer by heating above room temperature. Haber Decl. (EX1009), ¶ 87.

Regarding dependent claim 4 of the ‘756 Patent, a POSITA would have been motivated to apply the zinc and aluminum metal coatings of US‘794 to the vehicle wheel bearing hubs of US‘013 by spraying the coatings onto a metal substrate, and would have had a reasonable expectation of success in doing so, because US‘794 demonstrated the application of zinc, aluminum, and tetra-n-butyl-orthotitanate layers onto a metal substrate using a “paint spray gun” to produce an anti-corrosion layer that “adhered firmly to the substrate” and when tested per DIN EN ISO9227 “showed no red-rust formation, neither on the surface nor at the cruciform injury site.” *See*, US‘794 (EX1005), [0049], [0051]; Haber Decl. (EX1009), ¶ 89.

Regarding dependent claim 5 of the ‘756 Patent, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of US‘794 to the vehicle wheel bearing hubs of US‘013 that had been cleaned with a solvent, and would have had a reasonable expectation of success of doing so, because US‘794

demonstrated the spray application of zinc, aluminum, and tetra-n-butyl-orthotitanate layers onto a degreased steel strip to produce an anti-corrosion layer that “adhered firmly to the substrate” and when tested per DIN EN ISO9227 “showed no red-rust formation, neither on the surface nor at the cruciform injury site.” *See*, US‘794 (EX1005), [0048]-[0051]. As explained by Dr. Haber, a POSITA would have understood that removing grease from a metal substrate required the use of a solvent. Haber Decl. (EX1009), ¶ 91.

Regarding dependent claim 6 of the ‘756 Patent, a POSITA would have been motivated to apply the zinc and aluminum metal coating agents of US‘794 to the vehicle wheel bearing hubs of US‘013 by curing the anti-corrosion spray coating for a period of at least 10 minutes, and would have had a reasonable expectation of success in doing so, because US‘794 demonstrated that a suitable, silver-grey, anti-corrosion coating for press-hardened steel parts was formed by spraying to produce a layer that “hardens at room temperature within an hour of application” and that “adhered firmly to the substrate” and when tested per DIN EN ISO9227 “showed no red-rust formation, neither on the surface nor at the cruciform injury site.” *See*, US‘794 (EX1005), [0051], [0062]. Thus, US‘794 taught that sufficient corrosion protection was obtained using this application method and, as explained by Dr. Haber, a POSITA would have therefore understood that additional energy was not required to cure the sprayed anti-corrosion layer within a period of less than 10 minutes. Haber Decl. (EX1009), ¶ 93.

Regarding claim 7 of the '756 Patent, this claim is similar to an omnibus claim and merely recites any motor vehicle that contains the wheel bearing arrangement of claim 1. A POSITA would have been motivated to use the third-generation type vehicle wheel bearing apparatus of US'091 including an anti-corrosion coating as described in US'794, in a motor vehicle because US'091 describes the production and use of a vehicle wheel bearing apparatus used for a driven wheel that includes a zinc plating, which advantageously prevents galvanic corrosion (US'013 (EX1007), [0053], [0086], [0087]), and US'794 discloses an effective anti-corrosion coating that is easily applied to an automotive component by spraying and cures within an hour at room temperature. A POSITA would have clearly been motivated to use the disclosed invention for its intended purpose as a wheel bearing on a motor vehicle. Haber Decl. (EX1009), ¶ 94.

V. CONCLUSION

For the foregoing reasons, Petitioner respectfully requests *inter partes* review of claims 1-7 of U.S. Patent 11,098,756.

Respectfully,

Dated: September 10, 2024

By: /Jason H. Vick/
Jason H. Vick
Reg. No. 45,285
1899 Wynkoop Street
Suite 750
Denver, CO 80202
720-983-1336
Jason.vick@wbd-us.com

MANDATORY NOTICES

A. Real Parties-in-Interest

Pursuant to 37 C.F.R. § 42.8(b)(1), Petitioner certifies that Ewald Dörken AG is the real party-in-interest, and further certifies that no other party exercised control or could exercise control over Ewald Dörken AG's participation in this proceeding, the filing of this petition, or the conduct of any ensuing trial.

B. Related Matters

Pursuant to 37 C.F.R. § 42.8(b)(2), Petitioner identifies the following related U.S. proceedings involving the '756 Patent: None

Petitioner has not previously challenged the '756 Patent, and Petitioner is unaware of any other challenges involving the particular grounds and evidence discussed herein. Petitioner's grounds should not be denied under the Board's discretion given the merits of Petitioner's obviousness challenge, the lack of prior challenges to the '756 Patent, including the lack of any previous review based on the particular prior art combinations presented herein.

C. Lead and Back-Up Counsel

Pursuant to 37 C.F.R. § 42.8(b)(3)-(4), Petitioner identifies the following designation and service information for lead and back-up counsel. Jason H. Vick will serve as lead counsel. Robert D. Traver will serve as first back-up counsel. Petitioner consents to electronic service of documents. Please direct all correspondence

regarding this proceeding to lead and back-up counsel at their respective email addresses listed below. 37 C.F.R. § 42.8(b)(4).

Lead Counsel	Back-Up Counsel
Jason H. Vick Reg. No. 45,285 Womble Bond Dickinson (US) LLP 1899 Wynkoop Street, Suite 750 Denver, CO 80202 720-983-1336 Jason.Vick@wbd-us.com	Robert D. Traver Reg. No. 47,999 Sheridan Ross P.C. 1560 Broadway, Suite 1200 Denver, CO 80202-5145 303-916-3446 rtraver@sheridanross.com

Dated: September 10, 2024

By: /Jason H. Vick/
Jason H. Vick
Reg. No. 45,285

Attorney for Petitioner

APPENDIX OF EXHIBITS

Exhibit	Description
1001	U.S. Patent 11,098,756 (the ‘756 Patent)
1002	U.S. Patent Application Pre-Grant Publication No. 2005/0254741 to Norimatsu (US‘741), filed 16 May 2005 and published 17 Nov. 2005
1003	U.S. Patent Application Pre-Grant Publication No. 2012/0177835 to Sepeur et al. (US‘835), filed 15 Sept. 2010 and published 12 July 2012
1004	U.S. Patent Application Pre-Grant Publication No. 2012/0009340 to Sepeur et al. (US‘340), filed 17 Sept. 2009 and published 12 Jan. 2012
1005	U.S. Patent Application Pre-Grant Publication No. 2010/0175794 to Sepeur et al. (US‘794), filed 12 August 2008 and published 15 July 2010
1006	U.S. Patent Application Pre-Grant Publication No. 2009/0148091 to Kametaka et al. (US‘091), filed 16 Feb. 2009 and published 11 June 2009
1007	U.S. Patent Application Pre-Grant Publication No. 2017/0219013 to Yokota et al. US‘013), filed 23 Jan. 2017 and published 3 Aug. 2017
1008	National Center for Biotechnology Information (2024). PubChem Compound Summary for CID 21801, Titanium tetrabutoxide. Retrieved May 31, 2024 from https://pubchem.ncbi.nlm.nih.gov/compound/Titanium-tetrabutoxide . (PUB CHEM Titanium tetrabutoxide).
1009	Declaration of Richard A. Haber, Ph.D.
1010	Curriculum Vitae of Richard A. Haber, Ph.D.
1011	File History of U.S. Patent 11,098,756 (the ‘756 Patent)

CERTIFICATION OF WORD COUNT

The undersigned certifies pursuant to 37 C.F.R. § 42.24 that the foregoing Petition for *Inter Partes* Review, excluding any table of contents, mandatory notices under 37 C.F.R. § 42.8, certificates of service or word count, or appendix of exhibits, contains 12,836 words according to the word-processing program used to prepare this document (Microsoft Word).

Dated: September 10, 2024

By: /Jason H. Vick/
Jason H. Vick
Reg. No. 45,285
Womble Bond Dickinson (US) LLP
1899 Wynkoop Street
Suite 750
Denver, CO 80202
720-983-1336
Jason.vick@wbd-us.com

Attorney for Petitioner

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105, the undersigned certifies that on September 10, 2024, a complete and entire copy of this Petition for *Inter Partes* Review, including all exhibits listed in the Appendix of Exhibits, as well as the accompanying Power of Attorney, was provided via Federal Express to the Owner of the '756 Patent by serving the counsel of record for the '756 Patent at the Correspondence address as listed in the U.S. Patent Office Patent Center records:

Schaeffler Group USA, Inc.
Intellectual Property Legal Department
1750 E. Big Beaver Road
Troy, MI 48083-2010
UNITED STATES

Dated: September 10, 2024

By: /Joanne Vos/
Joanne Vos
Paralegal
Womble Bond Dickinson (US) LLP
Suite 750
Denver, CO 80202
720-983-1352
Joanne.Vos@wbd-us.com