

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DUPLO U.S.A. CORPORATION,
Petitioner,

v.

MGI DIGITAL TECHNOLOGY S.A.,
Patent Owner.

Case IPR2023-00936
Patent 8,783,806

PATENT OWNER PRELIMINARY RESPONSE

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2002	C.D. Cal. Ruling Setting Date for Expert Reports
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2004	C.D. Cal. Median Time-to-Trial Statistics
2005	C.D. Cal. Ruling Order Denying Motion to Appeal SM-5 Order
2006	C.D. Cal. Ruling Order Denying Motion to Appoint Commissioner
2007	Duplo's Invalidity Contentions Served in C.D. Cal. Proceeding
2008	C.D. Cal. Order Resetting Case Schedule Deadlines
2009	C.D. Cal. Scheduling Order

Pursuant to 35 U.S.C. § 313, 37 C.F.R. § 42.107 and the Notice of Filing Date Accorded to Petitioner, MGI Digital Technology S.A. (“MGI” or “Patent Owner”) hereby timely submits its Preliminary Response to the Petition for *Inter Partes* Review (“IPR”) of U.S. Patent No. 8,783,806 (“’806 Patent”) filed May 19, 2023, by Duplo USA Corporation (“Petitioner”), which also names Duplo Corporation as a real party-in-interest.

I. INTRODUCTION

The Petition should be denied, both because of the advanced stage of the related litigation that encompasses all the issues presented here and moreover because of the substantive weakness and lack of merit (let alone compelling merit) in the grounds asserted. Petitioner filed this substantively deficient Petition at the last possible moment, after significant investment into a parallel litigation proceeding in the Central District of California, without any stipulation on *Fintiv* factors, without moving to stay the parallel proceeding, and challenging only a subset of the asserted claims of the ’806 Patent, which is only one of the patents in that suit. Worse yet, any Final Written Decision issued in this matter would issue almost a full year after the scheduled trial date. Every single *Fintiv* factor — including the merits — weighs heavily against institution.

By delaying filing their petition for a full year, Petitioner has waited too late to obtain effective relief from the Board. Based on the current case schedule, which

has not been delayed even a single time after a year of litigation, the district court trial is likely to begin around the same time that the Patent Owner Response would be due, and the Board would render the Final Written Decision about a year after the trial. Under these facts, the Board should deny institution and allow the District Court to handle matters of validity.

Moreover, as mentioned above, the Petition also lacks substantive merit. For its primary invalidation ground, Petitioner misinterprets the prior art and deceptively quotes only a portion of some sentences, thereby taking statements from the prior art out of context to fit an invalidity theory. Additionally, one of Petitioner's grounds presents a modification that causes the primary reference to perform a function it already performs, thereby defeating the very motivation Petitioner argues exists. In another one of Petitioner's grounds, the primary reference includes preventative measures that specifically prevent the function Petitioner seeks to include through combination. Each of these illogical combinations are deficient under obviousness law and lend even more support for discretionary denial.

The substantive defects in Petitioner's grounds certainly warrant denial, but even if those grounds had any merit (and they do not) the Board should still exercise its discretion to deny institution here, given the state of the related pending district court litigation.

II. BACKGROUND

A. The Patent and Challenge

1. Overview of the '806 Patent

The '806 Patent is directed to precise control over ink jet printing. EX1001, col. 1, ¶¶. 18–24. More specifically, the '806 Patent is directed to precise control over individual nozzles of an ink jet printer depositing a protective layer of covering ink or varnish. EX1001, col. 1, ¶¶. 28–37.

Protective layers of ink, also known as selective varnish printing, apply a glossy surface or a matte to a specific surface to highlight a specific area. *Id.* Before application of the varnish coating, a conventional printer prints conventional printer ink (cyan, black, yellow, magenta) on a substrate upstream of a selective varnish printer. *Id.* Then, the printed substrate is fed into a selective varnish printer where the varnish embellishment is added. *Id.* In this way, selective varnish printing is a finishing process. *Id.* Selective application of the varnish embellishment enhances graphic value of the printed substrate, while also providing protection. *Id.*

MGI's invention added another enhancement, which is texture. The varnish selectively distributed by the printers disclosed by the '806 Patent can apply varnish at differing heights to provide an element of texture, which can be felt by potential consumers and very appealing. EX1001, col. 4, ¶¶. 37–40, col. 5, ¶¶. 44–

52, col. 5, ll. 62–67, col. 6, ll. 55–61. Texture using varnish further enhances graphic appeal while also enticing potential consumers to touch the product and further engage with it. EX2001 at 14–15. The selective application of varnish varies not only in location but also varies in amount of varnish applied at each location where varnish is applied. EX1001, col. 4, ll. 37–40, col. 5, ll. 44–52, col. 5, ll. 62–67, col. 6, ll. 55–61.

Prior art systems required a stencil or applied varnish to an entire surface of a printed document (e.g., lamination). Patent Owner invented the first on-demand, selective varnish printer, which carries out, on a single machine, in a single pass, finishing operations that were impossible to implement with precision and at an industrial rate using prior art methods. EX2001 at 3.

The selective varnish printer invented by the Patent Owner was first described in EP 1 749 670 (“the ’670 Patent”).¹ As described by the ’670 Patent, the ink jet machine controls the size and shape of droplets ejected by individual nozzles in a printhead by controlling the duration and amplitude of an electric wave applied to piezoelectric actuators within the printhead. EX1001, col. 1, ll. 42–50. The ’806 Patent and claims described improvements related to specific

¹ Notably, the ’670 Patent is the parent application of U.S. Patent No. RE45,067 (“the ’067 Patent”). The ’067 Patent is also asserted against Petitioner in the parallel litigation, but has not been challenged at the PTAB.

control to the waveform shape to provide even more control over droplet shapes and accounting for numerous printing conditions. EX1001, col. 6, ll. 50–67.

2. Prosecution History of the '806 Patent

Patent Owner filed the application that issued as the '806 Patent on July 23, 2019, with claims directed towards a method for applying droplets of covering ink to a substrate. EX1002 at 105–111, 128. The '806 Patent claims priority to U.S. Patent Application No. 12/649,765, filed on December 30, 2009, which became U.S. Patent No. 8,506,031.² The claims of the '806 Patent were never amended during prosecution, and the Examiner never issued a rejection in view of prior art under either § 102 or § 103. EX1002. However, the application was a child application of the '031 Patent, which overcame two § 102 rejections based on two different prior art references. EX1014, at 79–87, 46–54. Also, the Examiner was the same in both the '031 Patent prosecution and the '806 Patent prosecution, so the Examiner and the applicant were familiar with each other and the prior art. EX1001 at 58; EX1014 at 79.

The examined allowed the '806 patent to issue after the prosecution resolved two double patenting rejections with the filing of a terminal disclaimer. EX1002 at 58–63, 38–43, 10–18.

² Petitioner also challenged the '031 Patent on similar grounds in IRP2023-00935.

3. The Asserted Art

a. Nagashima

Nagashima teaches a printhead that outputs uniform droplet sizes and various compensation techniques to ensure uniform droplet size. EX1004, ¶¶ [0008], [0211], [0213]–[0215], [0219]–[0220]. One such compensation technique occurs when a nozzle size is too small or too large due to a manufacturing error. EX1004, ¶¶ [0219]–[0220]. To compensate for the manufacturing error, Nagashima raises or lowers ink temperature prior to droplet ejection to cause the ink droplet to be a uniform “target” size. EX1004, ¶ [0211].

b. Ricoh

Ricoh teaches drive signals for an image formation device. EX1005, ¶ [0001]. The Petition solely asserts Ricoh against challenged dependent claims of the '806 Patent.

c. Takatsuka

Takatsuka teaches a liquid ejection head that also ejects uniform droplet shapes. EX1006, col. 8, ll. 18–20, col. 11, ll. 27–37, col. 7, ll. 26–31. In fact, Takatsuka includes multiple error prevention mechanisms and methods to ensure that droplet sizes do *not* vary. *Id.*

d. Chang

Chang teaches an ink jet recorder that relies upon a carriage mechanism that moves a recording head across the page in a scanning and sub-scanning direction. EX1007, col. 1, ll. 12–19, col. 11, ll. 5–33. Chang teaches a driving waveform comprised of driving pulses that eject ink droplets and connection elements that do not eject ink droplets. Col. 9, ll. 38–45. Chang teaches one connection element called a “minute vibration pulse” that prevents ink solvent evaporation. EX1007, col. 2, ll. 11–25. The driving pulses of Chang are ink viscosity agnostic, and only the minute vibration pulse, which does not eject or shape ink droplets, considers ink viscosity. EX1007, col. 11, ll. 41–49, col. 12, ll. 38–47, col. 9, ll. 38–41, col. 12, ll. 52–57.

e. Dainnipon

Dainnipon teaches a spray nozzle head that sprays varnish and a printing system using printing plates. EX1008, at [57] (Abstract), col. 3, ll. 6–15.

B. Preliminary Matters and Reservation of Rights

The Board should deny institution for the reasons explained herein, which do not require the Board to address any disputes in certain preliminary issues such as any disputes in claim construction or level of ordinary skill in the art. If, however, the Board nevertheless institutes trial, Patent Owner reserves the right to address these issues in Patent Owner’s Response. Patent Owner reserves all rights

to make additional arguments in and present additional claim constructions and evidence with its Patent Owner Response. Patent Owner's silence on any particular claim or limitation at this time is not a concession that the Petition's discussion of that claim or limitation is properly supported. Patent Owner also reserves the right to dispute the level of ordinary skill in the art if the Board decides to institute *inter partes* review. Accordingly, Patent Owner reserves the right to submit additional or alternative arguments and nothing in this Preliminary Response acts or should be construed to act as an admission, acquiescence, or estoppel on the merits of the Petition.

Additionally, the Petition does not separately set forth supposed "material facts" pursuant to 37 C.F.R. § 42.23, and no listing of facts admitted or denied is required in the Preliminary Response. If the Board institutes trial on the petition, Patent Owner reserves the right to dispute any facts asserted by the Petition in Patent Owner's Response.

1. Claim Construction

At this stage, Patent Owner does not submit any terms for construction. Patent Owner respectfully submits that the Board can and should deny institution on procedural grounds under 35 U.S.C. §§ 325(d) or 314(a) for the reasons discussed below, therefore the Board does not need to construe the claims to deny institution.

Patent Owner notes that the Special Master in the parallel litigation has construed the term “nozzle arrangement” to mean “a structure, or group of structures, that includes one or more ink jet nozzles.” EX1021 at 65. Patent Owner agrees with this construction. The Special Master’s construction of those terms is correct and should be the only construction considered by the Board in this proceeding, as Petitioner acknowledged in the Petition. Paper 2 at 5.

While Patent Owner does not submit any claim language for construction at this time, Patent Owner reserves the right to subsequently submit claim terms for construction should the Board institute *inter partes* review.

2. Level of Ordinary Skill

Patent Owner believes that Petitioner has understated the level of ordinary skill in an effort to belittle Patent Owner’s technology, and Patent Owner reserves the right to submit a different level of ordinary skill in Patent Owner’s Response if the Board institutes *inter partes* review. However, that dispute need not be addressed in order to dispose of this petition, which the Board should deny without the need to address the level of ordinary skill in the art. As will be seen throughout, Petitioner has failed to demonstrate a reasonable likelihood that any challenged claim is unpatentable even under its asserted level of ordinary skill, and the Petition should also be denied institution under 35 U.S.C. §§ 314 and/or 325. Thus, the Board need not resolve any disagreements regarding the level of ordinary skill

to deny institution. Here, the references cited as art of record reflects the level of ordinary skill in the art and adequately allows the board to ascertain that the grounds of invalidity asserted lack merit. *See In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (finding that the Board of Patent Appeals and Interferences did not err in concluding that the level of ordinary skill was best determined by the references of record); *In re Oelrich*, 579 F.2d 86, 91(C.C.P.A. 1978) (“[T]he PTO usually must evaluate . . . the level of ordinary skill solely on the cold words of the literature.”).

3. Additional Reasons The Petition Grounds Lack Merit.

Patent Owner provides herein several reasons why the Petition fails to demonstrate anticipation or obviousness of the challenged claims. Patent Owner’s arguments were narrowly tailored for the purposes of this preliminary patent owner response to clearly show reasons sufficient why no *inter partes* review should be instituted. *See* 37 CFR § 42.107. However, other arguments and positions put forth by Petitioner also lack merit, and the fact that Patent Owner does not directly address those incorrect positions in no way concedes or acquiesces to Petitioner’s positions and arguments. For example, Petitioner has not adequately supported its assertions of obviousness and anticipation of the dependent claims, even if its asserted grounds were sufficient for the independent claims (which they are not). The Board need not consider the arguments related to the dependent claims

because Petitioner failed to demonstrate obviousness or anticipation of the independent claims, so Patent Owner here has not addressed arguments related to the dependent claims, but reserves the right to do in Patent Owner's Response so if *inter partes* review is instituted.

III. REASONS THE BOARD SHOULD DENY INSTITUTION.

A. The Board Should Exercise Its Discretion To Deny Institution In Because These Issues Are Already Being Litigated In District Court.

The Board considers the status of parallel litigation in deciding whether to exercise its discretion to deny institution under 35 U.S.C. § 314(a). *NHK Spring Co. v. Intri-Plex Techs., Inc.*, No. IPR2018-00752 (P.T.A.B. Sept. 12, 2018), Paper 8 . In deciding whether to discretionarily deny institution, the Board considers six factors. *Apple, Inc. v. Fintiv, Inc.*, No. IPR2020-00019 (P.T.A.B. Mar. 20, 2020), Paper 11 . Here, every one of the six factors ***strongly*** favors discretionary denial. Petitioner Duplo USA does not dispute that none of these factors are in its favor, except for a bare assertion of “compelling merits,” which the grounds asserted in the petition simply do not support.

1. Factor 1 — No Stay Has Even Been Requested And The Court Has Indicated That No Stay Would Be Granted.

There is no basis to speculate that any stay will issue in the parallel litigation, and every indication is to the contrary. Fact discovery in that case has

now closed. The Court very recently, on August 30, entered an order resetting case schedule deadlines to provide specific deadlines for expert reports different from the default values under the Federal Rules of Civil Procedure, but in doing so it expressly *preserved* its trial date and certainly did *not* stay proceedings. (EX2008) Petitioner argues that this factor is “neutral” because the Board should not “attempt to predict” whether the District Court will or will not grant a motion to stay, citing *Sand Revolution II, LLC v. Continental Intermodal Group-Trucking LLC*, No. IPR2019-01393, slip op. at 7 (P.T.A.B. Jun. 16, 2020), Paper 24. But in *Sand*, the parties provided no evidence of the district court’s practice concerning stays or extensions, and the district court there had postponed the jury trial in its most recent order, unlike here where the district court preserved the trial date. In its initial scheduled order, the Court specifically warned that any continuance “is *highly unlikely*,” even with the parties’ stipulation. (EX2009 at 8) (emphasis by the Court). This case, where the Court has expressly said that any continuance is highly unlikely, and where its most recent adjustment in the scheduling order did not change the trial date, is entirely different from *Sand*, in which there was no evidence of whether the district court might grant a continuance or stay except that the district court had already entered at least one continuance of the trial date.

Petitioner has not even moved to stay the District Court proceedings in view of this Petition. It has been over three months since Petitioner filed its petition, and

no motion to stay has been filed or indicated that it will be filed by Petitioner.

Thus, this factor strongly weights in favor of discretionary denial.

This factor undeniably favors discretionary denial because the parties are actively moving the discovery phases, including expert discovery, along at a rapid rate, indicating that there is no anticipated slowdown in District Court activity, let alone a stay. EX2002 at 2.

Even if Patent Owner were to file a motion to stay now or after any institution decision, the District Court is *highly unlikely* to grant such a stay. Petitioner has not challenged all the patents asserted in the parallel litigation; and Petitioner did not even challenge every asserted claim of the '806 Patent currently under review. Previous orders from Judge Carter, the Judge presiding over the parallel litigation, where movants did not challenge all the asserted claims at the Board have not resulted in a stay. *Pinn, Inc. v. Apple, Inc.*, No. SA CV 19-01805-DOC-JDE, 2020 WL 6064642, at *2 (C.D. Cal. Aug. 27, 2020), ECF No. 194; *Ellison Educ. Equip., Inc. v. Stephanie Barnard Designs, Inc.*, No. SA CV 18-2043-DOC (ADSx), 2020 WL 2084674, at *2 (C.D. Cal. Jan. 13, 2020). Therefore, Factor 1 strongly favors discretionary denial.

2. Factor 2 — The Court’s Trial Date Is Far Before The Board’s Projected Deadline For A Final Written Decision.

The Board will not issue a Final Written Decision on this matter until *long* after the Court’s trial date in the parallel litigation. The District Court’s trial date is set for February 6, 2024. This date has not moved since the original scheduling order. This timing of the Final Written Decision being a year after the district court trial resulted because Patent Owner waited until the last possible day to file this Petition under 35 U.S.C. § 325. EX1020; Paper 2 at 84.

Meanwhile, if the Board instituted *inter partes* review, a Final Written Decision would not be expected to issue until, at earliest, November 19, 2024 — over 9 months after the scheduled District Court trial date. Even applying Director Vidal’s *Fintiv* guidance, which applies median time-to-trial statistics, the Final Written Decision will still issue around the same time as the median time-to-trial estimate for the trial date of the parallel litigation. EX2004. However, it should be noted that to hit the median time-to-trial number for the Central District, the parallel litigation would need to be delayed over a year even though expert discovery is currently ongoing and scheduled to end on October 31, 2023. EX2008. As such, Factor 2 strongly favors discretionary denial.

3. Factor 3 — The Parties And Court Have Already Invested Substantial Resources In The Parallel Proceeding.

Both parties have invested significant time and money into the parallel proceeding; so has the District Court. Currently, the parallel litigation is in the expert discovery phase, and fact discovery is closed. EX2003, EX2002 at 2; EX2009 at 1. By the time the Board issues an institution decision, expert reports will have been exchanged. *Id.* Before Patent Owner's response, summary judgment will have been addressed, pretrial work will have completed, and the trial will be ready to begin. *Id.*

The investment by the parties and the court also includes appointment of a Special Master in the parallel litigation. The Special Master meets regularly with both parties, has held hearings and prepared reports and recommendation on issues including claim construction, discovery, and other matters, and the Court through the Special Master has issued a claim construction ruling and multiple discovery dispute rulings. EX1021; EX2005; EX2006. The parallel litigation is extremely advanced — far beyond the typical District Court setting when the Board would decide institution, and this factor strongly favors the exercise of discretion to deny institution.

4. Factor 4 — The Issues Raised in the IPR Are Completely Subsumed By Issues in the litigation.

Petitioner asserts invalidity of the same claims in the parallel litigation. EX2007 at 24, 28, 50-53. It's invalidity contentions even purport to incorporate grounds alleged in the IPR, although it also asserts other invalidity contentions. Despite this clear and unequivocal overlap, Petitioner has also not filed a *Sotera* stipulation or any other stipulation that would mitigate any concerns of duplicative efforts between the district court and the Board, as well as any concerns of potentially conflicting decisions. *Sotera Wireless, Inc. v. Masimo Corp.*, No. IPR2020-01019, slip op. at p. 19 (P.T.A.B. Dec. 1, 2020), Paper 12. As a result, conflicting decisions are entirely possible, and the District Court is almost certain to have issued a ruling on the validity of the '806 Patent by the time the Board issues a Final Written Decision. This situation is exactly what *Fintiv* and *Sotera* sought to prevent, and this Factor weighs strongly in favor of discretionary denial.

5. Factor 5 — The Parties Are The Same As In The District Court Case.

The parties are the same in both proceedings. MGI is Plaintiff in the district court and Patent Owner here. Dupo USA is Defendant in the district court and Petitioner here. As such, this factor strongly weights in favor of discretionary denial.

6. Factor 6 — No Other Circumstances Favor The Exercise Of Discretion To Review Including The Merits, Which Far From Being Compelling Are Instead Lacking.

Petitioner’s only argument against discretionary denial is its assertion that it presents “strong” obviousness grounds. (“The strength of the obviousness analysis detailed in §V strongly favors institution”) Paper 2 at 82. But even if that characterization were accurate (and it is not), a “strong” challenge is *not* the standard under the new guidance interpreting Factor 6 for instituting despite all other *Fintiv* factors favoring discretionary denial. Instead, the standard is “compelling, meritorious challenges”. Director’s June 21, 2022 Memorandum (“Memorandum”)³ at 4. Director Vidal later clarified that “compelling, meritorious challenges” is not a replacement standard for the “substantial likelihood of success” standard set by 35 U.S.C. § 314(a), but instead is a heightened standard. Indeed, Director Vidal herself wrote,

To be clear, a compelling-merits challenge is a higher standard than the reasonable likelihood required for the institution of an IPR under 35 U.S.C. § 314(a). A challenge can only “plainly lead to a conclusion that one or more claims are unpatentable” (*id.*) if it is highly likely that the petitioner would prevail with respect to at least one challenged claim.

³ Available at www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

OpenSky Industries, LLC v. VLSI Technology LLC, No. IPR2021-01064, slip op. at 49 (P.T.A.B. Oct. 4, 2022), Paper 102.

Petitioner never argued that their Petition demonstrated a “compelling, meritorious challenge”. Instead, Petitioner simply, and baselessly, argued the Petition grounds are “strong”. However, such a statement by a petitioner is of no use to the Board in deciding whether to exercise its discretion to deny a petition. Certainly, every petitioner believes that its grounds are strong, or else it would not pay the nearly \$45,000 filing fee. So, Petitioner’s throw-away argument about the “strength” of the petition’s grounds is not evidence strongly favoring institution.

Even if “strong arguments” alone could overcome five other factors strongly favoring discretionary denial, the Petition nevertheless fails to meet that petitioner-invented standard. Petitioner’s grounds fail to show that the prior art teaches or discloses every limitation of the independent claims. Instead, Petitioner misapprehends, misinterprets, or misquotes the prior art.

Most glaringly, Petitioner quotes only select portions of the prior art to remove context and make it appear as though the prior art teaches the claimed invention, when in fact, the prior art teaches the opposite, reaching *away from* the claimed invention. Section III.B.1.a. For example, Petitioner’s primary reference, Nagashima, supposedly teaches the claim limitation “controlling by a computer the shapes of the droplets by controlling the shape of an electric waveform applied to

the piezoelectric actuator.” However, as is explained in detail below, Nagashima actually teaches that all droplets must be uniform in size and shape.

Additionally, Petitioner’s secondary reference (Chang) for Grounds 2 and 3 does not consider ink viscosity when applying a piezoelectric driving waveform, as Petitioner suggests. Instead, the driving waveforms remain uniform regardless of viscosity, and only preparatory signals can change in view of viscosity. Moreover, Petitioner’s third ground misconstrues a comparison to the claimed technology as teaching the claimed technology. Thus, Petitioner has not presented a single obviousness ground that teaches all the limitations any independent claim. Unlike many obviousness grounds, the validity or invalidity of the patent claims does not hinge on whether there is a sufficient motivation to combine or a reasonable expectation of success (although the petition also fails to show those factors); instead, Petitioner simply failed to show that the prior art combinations teach all the claim limitations. Notably, this petition does not solely rely on arguments against proposed combinations, which Director Vidal has found not to be a strong enough rebuttal to prevent a compelling, meritorious challenge. *Patent Quality Assurance, LLC v. VLSI Technology LLC*, IPR2021-01229, slip op. at 62 (P.T.A.B. Dec. 22, 2022), Paper 102. There is nothing “strong” about a glaring omission of this nature in a Petition.

All-in-all, Petitioner’s grounds do not demonstrate a “compelling, meritorious challenge” or even a “strong” challenge, as Petitioner asserts. Instead, Petitioner has presented weak grounds, which fail to teach every claim limitation of the independent claims, and rely on misinterpretation, misapprehensions, and/or out-of-context quotations. Thus, even the merits of the petition favor discretionary denial.

Not a single *Fintiv* factor favors institution. Instead, every factor *strongly* favors discretionary denial. The District Court is the better venue for considering the validity of the ’806 Patent at this late stage, and the Board should exercise discretionary denial here.

B. The Petition Should Be Denied Because It Also Lacks Merit.

1. Ground 1A – The Petition Fails To Show That Claims 1, 2, 9 & 10 Are Obvious Over Nagashima Alone.

a. Nagashima Does Not Teach a “Controlling by a Computer the Shapes of the Droplets by Controlling the Shape of an Electric Waveform Applied to the Piezoelectric Actuator” Because Nagashima Ejects a Uniform Droplet Shape

Nagashima is directed to a continuous printing device with the goal of increasing image resolution of a printed image. EX1004, ¶ [0008] (“For the purpose of forming a high-quality image, high resolution is required”). In order to increase printed image resolution, Nagashima describes an ink ejection head that

outputs a **uniform** droplet size, and multiple compensation techniques to ensure uniform droplet size. Specifically, Nagashima explains that ejection drive force is adjusted according to the ink temperature. EX1004, ¶ [0211]. For example, if the ink temperature is low, meaning the ink viscosity is higher, then the ejection force is increased to compensate for this decrease in temperature/increase in ink viscosity. *Id.*; *see also* EX1004, ¶¶ [0213]–[0214]. In other words, if an ink temperature increase would result in an undesired droplet size, ejection force changes to ensure that the droplet size remains uniform. *Id.* Nagashima specifically says that these compensation techniques are necessary to ensure the ink ejection amount remains at a “target value” (i.e., uniform droplet size). EX1004, ¶ [0211].

Nagashima explains that ejection force compensation is controlled by changing the amplitude *AjtS* of the ejection drive waveform. EX1004, ¶¶ [0213]–[0215]. Again, the result is droplets having a *uniform* size. *Id.*

However, the claim limitation in the patent at issue is directed to varying multiple droplet shapes so that covering varnish can have various thicknesses (e.g., “controlling by a computer the **shapes** of the droplets by controlling the shape of the electric waveform applied to the piezoelectric actuator”), not maintaining one droplet shape at all costs as in Nagashima. In other words, the ’031 Patent seeks to eject droplets of **varying** shapes so that covering varnish having varying thicknesses can result. The ’031 Patent would not have used the word “shapes”, in

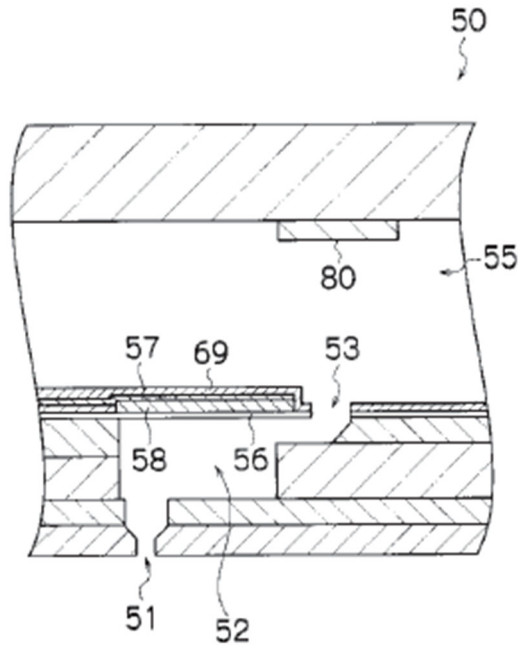
the plural, if multiple droplet shapes were not the result of the claimed method.

Nagashima teaches the opposite: a uniform droplet shape at all costs.

This difference in function and objective makes sense. Nagashima is directed to a typical image printer that prints colored inks (EX1004, ¶ [0039]), whereas the '031 Patent is directed to covering ink that can have different thicknesses. For a covering ink, thickness and accuracy matters so that texture and image protection can result. When 2D image resolution matters, it is important to make droplets uniform and as small as possible. EX1007, col. 1, ll. 41–47. Again, the opposite is true for a printer depositing a protective layer. It is important to maintain flexibility in droplet shapes so that different textures can arise.

Nagashima's disclosure solely teaches uniform droplet ejection volume. One of the primary ways that Nagashima ensures a uniform droplet size is by controlling ink temperature within the pressure chamber 52 where ink resides before ejection.

【图 4】



EX1004, FIG. 4. Nagashima teaches that a heating waveform is applied to the piezoelectric body 58, which vibrates the piezoelectric body 58 enough to generate heat that is passed to the ink stored in the pressure chamber 52. However, the heating drive waveform is not an ink ejection waveform. EX1004, ¶ [0101].

Nagashima selectively applies the heating drive waveform depending on whether the ink's temperature is too low. EX1004, ¶ [0141]. That is, if the ink temperature is determined to be too low (i.e., ink viscosity too high), then the droplet ejected by the ejection drive waveform would not be uniform in size; it would be too small. So, the print controller 150 compensates and heats the ink in the pressure chamber 52 using the heating drive waveform, prior to applying an ejection waveform, so that the ink droplet is the target value volume. So, again, the shape of the drive

waveform applied to the piezoelectric body 58 in Nagashima changes to ensure uniform droplet shape. The Petition discusses the heating drive waveform 92 in detail, but Nagashima fails to teach that the print controller 150 applies the heating drive waveform to generate a larger droplet than the target droplet (or a smaller droplet than the target droplet). Rather, Nagashima teaches the print controller 150 selectively applies the heating drive waveform to compensate for the situation where ink temperature in the pressure chamber 52 is too low, which would result in a droplet size being smaller than the target value. *Id.* Nagashima never teaches that the heating drive waveform is applied to change the droplet size from anything size other than the target value.

Instead, the Petitioner misapprehends and misquotes Nagashima. Petitioner references paragraphs 219 and 220 that discuss controlling dot size “large” or “small” by either raising or lowering ink temperature near the nozzle. However, when Nagashima discusses large and small dot sizes, Nagashima is referring to printing *errors*. Notably absent from Petitioner’s direct quote of Nagashima is the introductory clause of paragraph 219. The *full* sentence reads “For a nozzle in which the dot size is stably **reduced due to a manufacturing error or the like**, the dot size is controlled large by raising the ink temperature near the nozzle, and the dot size is made to **a desired size**”. EX1004, ¶ [0219] (emphasis added). Here, Nagashima again discloses a compensation technique for nozzle size errors created

during manufacturing of the nozzles, not varying droplet shapes as claimed in the '806 Patent.

Nozzles are extremely small holes in a printhead. EX1001, col. 4, ¶¶ 17–20. It was common, especially in 2006 when Nagashima was written, that some nozzles had larger or smaller circumferences than the desired nozzle size due to manufacturing errors. EX1004, ¶¶ [0219]–[0220]. In the situation where a nozzle size was smaller or larger, the resulting dot size was also too large or too small. *Id.* In a system seeking to maximize image resolution, any dot size variation due to manufacturing defects would reduce and hinder image resolution. *See* EX1007, col. 1, ¶¶ 41–47.

Knowing manufacturing errors exist, Nagashima sought to, again, compensate for these manufacturing defects. Rather than throw out an entire printhead because of one poorly manufactured nozzle, Nagashima compensated for printing errors/dot size errors and sought to control temperature in defective nozzles so that “the dot size is made *to the desired size*,” a constant size. EX1004, ¶ [0219]. If a dot size was too big because a nozzle was defectively manufactured too big, Nagashima causes the ink temperature in the pressure chamber 52 associated with the defective nozzle to be lower than other pressure chambers so that the resulting droplet output by the defective nozzle is the same, “desired size” as the droplets ejected by non-defective nozzles. EX1004, ¶ [0220]. Alternatively,

if a dot size was too small because a nozzle was defectively manufactured too small, Nagashima causes the ink temperature in the pressure chamber 52 associated with the defective nozzle to be higher than other pressure chambers so that the resulting droplet output by the defective nozzle is the same, “desired size” as the droplets ejected by non-defective nozzles. EX1004, ¶ [0219]. Yet again, Nagashima stands for the opposite of Petitioner’s contention.

The Petition argues, relying on testimony from Dr. Reinholtz, that a “POSITA would understand that, because the nozzle size is not variable, both the droplet volume (size) and the ink viscosity affect the shape of the droplet...” Paper 2, p. 16; EX1003, ¶ 100. However, Nagashima contradicts this statement. Nagashima specifically says “For a nozzle in which the dot size is stably reduced due to a manufacturing error or the like...”. Dot sizes depend on the nozzle size, as Dr. Reinholtz correctly notes. EX1003, ¶ 100. However, nozzle size *is* variable, due to “manufacturing errors and the like”. Thus, the entire premise of Petitioner’s argument that Nagashima allegedly teaches outputting different droplet sizes is undermined by the reference itself that strives to maintain a single, uniform droplet size. Paper 2 at 16-17; EX1004, ¶ [0219]. Notably, both the Petition and Dr. Reinholtz’s declaration omit the opening clause Nagashima paragraph 219. *Id.*

Finally, Petitioner asserts that the meniscus tickling waveform is yet another instance of controlling the shapes of droplets by controlling the shape of the

waveform. However, again, the meniscus ticking waveform is just another tool Nagashima uses to ensure *uniform droplet size*. Nagashima teaches that the meniscus tickling waveform suppresses a rise in viscosity due to the evaporation of a solvent in the ink. EX1004, ¶ [0124]. A rise in viscosity would lower the droplet size, so Nagashima prevents the ejection of a non-uniform droplet size by applying the meniscus tickling waveform. *Id.* But, this compensation technique does not result in the claimed invention which controls and varies “the shapes of the droplets” by controlling the shape of the waveform.

As is clear from Nagashima, varying droplet sizes in a high-resolution printed image is undesirable. EX1004, ¶¶ [0211], [0219]–[0220]. A large droplet would bleed over into smaller droplets on the paper, causing ink smears, changing colors, or other undesirable image effects. Instead, Nagashima seeks uniformity so that the resolution of the image can be predictable.

The Petition never suggests modifying Nagashima so that Nagashima outputs variable droplet sizes. Instead, the Petition solely misinterprets and misquotes Nagashima. As such, Nagashima fails to teach element 1.1.1, as Petitioner has so designated, and the claims are non-obvious over Nagashima. For the same reasons, Nagashima fails to teach element 9.4.1 of independent claim 9.

**b. Nagashima is Incompatible with the Claimed
“Covering Ink”**

Petitioner asserts that it would be a simple modification to substitute the colored printer ink taught by Nagashima (EX1004, ¶ [0039]) with the covering ink claimed by the '806 Patent. Petitioner further argues that Nagashima's ink ejection head 50 can distribute different types of ink because Nagashima teaches that the system reads and interprets different print cartridge identification numbers. EX1004, ¶¶ [0046]–[0047]. Essentially, Petitioner argues that it would be obvious to replace the conventional colored ink supply of Nagashima with covering ink or varnish to arrive at the invention. However, a POSITA would recognize that modifying a printer or an ink jet printhead so that it deposits varnish or covering ink (EX1001, col. 3, ¶¶ 21–22), rather than conventional colored ink, would not be a simple substitution of one ink cartridge for another.

To begin, the difference between covering ink or varnish and the conventional colored inks deposited by Nagashima is not simply a difference in viscosity, as Petitioner suggests. Paper 2 at 8. Covering ink is not intended to generate an image, like conventional colored inks. Instead, covering ink protects an already printed image or enhances the graphic value of that image. EX1001, col. 1, ¶¶ 28–41. As such, covering ink must have varying thicknesses to further enhance value. Indeed, the '806 Patent notes in several locations that the covering ink

applied has varying thicknesses. EX1001, col. 2, *ll.* 6, 23, col. 4, *ll.* 37–40; col. 5, *ll.* 16–27; col. 5, *ll.* 53–55; col. 5, *ll.* 66–67; col. 6, *ll.* 50–61. The thicknesses are varied by varying the shapes of droplets ejected by the nozzle arrangement. *Id.*

However, as discussed above, Nagashima describes an ink jet head that outputs uniform droplets, having the same uniform volume for each ejection. *See* Section III.B.1.a. Thus, Nagashima would be incapable of ejecting covering ink having varying thicknesses. At best, Nagashima could eject covering ink having a uniform thickness; essentially Nagashima would become an inefficient laminator. EX1008, col. 1, *ll.* 29–35.

A POSITA seeking to apply a coating of covering ink to a substrate would not simply insert a covering ink cartridge into Nagashima and expect success. Instead, a POSITA would recognize that numerous other modifications to Nagashima would be necessary to cause Nagashima's print ejection head 50 to apply a coating of covering ink onto a substrate in the manner taught and claimed by the '806 Patent. Among numerous modifications necessary to arrive at the claimed invention, Nagashima's print ejection head 50 must be modified to eject ink droplets having different sizes, such as by varying the waveforms applied to the piezoelectric actuators, defining waveforms in memory that correlate with ink ejection amounts, studying the properties of the covering ink to understand the relationship between ejection force and amount ejected. EX1001, col. 4, *ll.* 35–48,

col. 5, ll. 16–34, col. 5, ll. 39–55, col. 6, ll. 13–19, col. 7, ll. 4–57. However, these modifications would be hindsight, find no support in Nagashima, would defeat the goal of Nagashima, and, most importantly, was not a modification proposed by Petitioner.

In addition, a POSITA would need to further modify Nagashima to include a drying station. Covering ink dries differently than conventional colored ink. Conventional covering ink dries when the ink's solvent, which causes the ink to be liquid in nature, evaporates. EX1004, ¶¶ [0042], [0124]. In stark contrast, the covering ink taught by the '806 Patent does not dry by evaporation; it cures. EX1001, col. 7, ll. 60–63, col. 8, ll. 4–33. Preferably, the curing process relies upon ink having a photoinitiator that cures the ink in place in response to radiation having a certain wavelength or range of wavelengths. EX1001, col. 7, l. 58–col. 8, l. 34, *see also* Claim 6. Alternatively, a stream of heated air is required to quickly dry the varnish. EX1001, col. 4, ll. 51–55. Either way, the '806 Patent teaches that applying covering ink involves a drying station. *Id.* col. 4, ll. 49–58. The reason a drying station is necessary for covering ink is because covering ink has varying thicknesses. EX1001, col. 2, ll. 6, 23, col. 4, ll. 37–40; col. 5, ll. 16–27; col. 5, ll. 53–55; col. 5, ll. 66–67; col. 6, ll. 50–61. If the covering ink, having the desired thickness, is not immediately dried using a drying station, the covering ink may spread and equalize outward, thereby misaligning the protected areas or

patterns and deflating the desired thickness. Indeed, the '806 Patent specifically mentions that the distance between the ink jet nozzles and the drying station is carefully decided so that varnish remains in place after distribution. EX1001, col. 2, ¶. 46–¶. 55; col. 8, ¶¶. 9–13. The drying station is a critical feature of any printer that prints a covering ink.

And yet, the Petition does not propose to modify Nagashima to include a drying station. The Petition treats covering ink as nothing more than conventional printer ink having a unique viscosity, but that is simply too reductive. Paper 2 at 8-10. If the '806 Patent intended to cover every ink imaginable, then the claims would not have been limited to “applying a coating of covering ink”. Without a drying station of some type, using Nagashima to apply a coating of covering ink would result in misaligned patterns, no thickness, and undried ink, which may smear, smudge, or slip off a substrate entirely. Thus, Nagashima cannot obviously apply a coating of covering ink without additional modifications, which are not proposed in the Petition.

Petitioner asserts that it was known that ink jet printheads were able to deposit varnish, citing references other than Nagashima (Dainippon, Schneider). Paper 2 at 9. The background of the invention also acknowledges that it was known to apply covering ink using ink jet heads. EX1001, col. 1, ¶¶. 42–47. However, the applicant background statement and the two references cited by the

Petition show that additional factors must be considered to apply a coating of covering ink. For example, the applicant admitted prior art also includes a drying station (EX1010, col. 4, ll. 35–44), so does Dainippon (EX1008, col. 10, ll. 45–67) and Schneider (EX1011, col. 4, l. 49–62). All the prior art disputes Petitioner’s position that Nagashima, unmodified and lacking a drying station, would apply a coating of covering ink as claimed in the ’806 Patent.

Petitioner appears to misapprehend the standard for obviousness. It is nothing but sheer guesswork to claim that Nagashima’s ink ejection head 50 *could* eject covering ink simply by inserting a covering ink cartridge into Nagashima’s system, and that alone is not enough to render the claims obvious. Here, a POSITA would not have expected success in achieving the method and system claimed by the ’806 Patent because Nagashima cannot print any ink having variable thickness and Nagashima further could not properly handle the curing of a covering ink after deposition. Petitioner’s simplistic, hindsight-based arguments cannot overcome these deficiencies of Nagashima.

c. Claims 2 and 10 are Not Obvious

Because Nagashima fails to render obvious claims 1 and 9 of the ’806 Patent, Nagashima necessarily fails to teach dependent claims 2 and 10, which depend upon claim 1 or claim 9 respectively. As such, Petitioner has failed to demonstrate a reasonable likelihood of success on any claim in Ground 1.

2. Ground 1B – The Petition Fails To Show That Claims 4 and 12 Are Obvious Over Nagashima In View Of Ricoh.

Ground “1B” challenges only claims 4 and 12. However, as discussed above, Nagashima does not render claims 1 and 9 obvious. Petitioner only relies on Ricoh to challenge dependent claims 4 and 12. Therefore, Petitioner cannot rely on Ricoh to cure the deficiencies of Nagashima because the Petition must identify “in writing and with particularity, each claim challenged, the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim”. 35 U.S.C. § 322(a)(3).

Ground 1B addresses claims 4 and 12, which depend from independent claims 1 and 9. As explained above, Petitioner has not established a reasonable likelihood of success in invalidating claims 1 and 9. The arguments in Ground 1B do not resolve the deficiencies in Ground 1A. Therefore, Petitioner also has not shown a reasonable likelihood of success on Ground 1B.

Regardless, Ricoh fails to cure the deficiencies of Nagashima. Like Nagashima, Ricoh is directed to maintaining a uniform droplet size. EX1005, at [57] (Abstract). Indeed, Ricoh specifically mentions that varying droplet size is the very problem Ricoh seeks to address. *Id.* So, the combination of Ricoh and Nagashima, to the extent it would or could be performed (a point Patent Owner does not concede), would not arrive at the independent claims.

3. Ground 2 – The Petitioner Fails To Show Claim 1, 2, 4, 9, 10, and 12 Are Obvious Over Takatsuka In View Of Chang.

- a. Chang Fails to Teach a “controlling by a computer the shapes of the droplets by controlling the shape of an electric waveform applied to the piezoelectric actuator, said shape being controlled by selecting at least a number of plateaus of the electric waveform, in response to... viscosity of the ink...”**

Chang fails to teach “controlling by a computer the shape of the droplets by controlling the shape of an electric waveform applied to the piezoelectric actuator... in response to... viscosity of the ink”, as recited in claim 1 (and similarly in challenged claim 9). Instead, the waveform elements of Chang that control droplet shapes remain static regardless of the ink’s viscosity. EX1007, col. 11, ll. 41–49, col. 12, ll. 38–47. The only waveform that considers ink viscosity is a waveform that specifically does *not* generate a droplet. EX1007, col. 9, ll. 38–41, col. 12, ll. 52–57. As such, the waveform of Chang that the Petition purports as teaching this claim limitation does not “control... the shapes of the droplets...in response to... viscosity” because it does not form or shape a droplet.

Chang differentiates between driving pulses and connection elements of the driving waveform. EX1007, at [57] (Abstract), col. 9, ll. 17–27, 38–41. Connection elements are “not used to generate the driving pulses for ejecting an ink droplet”. EX1007, at [57] (Abstract), col. 9, ll. 38–45. One connection element is the “minute vibration pulse”, which Petitioner relies upon to

demonstrate this claim limitation. However, the minute vibration pulse does not generate an ink droplet, and thus, cannot teach “controlling... the shapes of the droplets by controlling the shape of an electric waveform... in response to... viscosity of the ink.....” EX1007, at [57] (Abstract), col. 9, *ll.* 17–27. In other words, the shape of an ink droplet is not controlled by the minute vibration pulse because the minute vibration pulse does not generate any droplet. *Id.* Instead, the minute vibration pulse is applied to unformed ink stored in a pressure chamber 31 upstream of the nozzle opening 13, prior to any droplet shaping/forming. EX1007, col. 5, *ll.* 49–64, col. 6, *ll.* 4–8, FIG. 1. The minute vibration pulse solely controls viscosity of unshaped ink within a pressure chamber 31, but the minute vibration pulse does not form a droplet, and therefore cannot control the shapes of any unformed droplets.

Instead, only the “driving pulses” of Chang control the sizes of drops. However, the driving pulses of Chang remain the same regardless of whether the ink is “high viscosity” or “low viscosity”. EX1007, col. 12, *ll.* 17–21. Chang applies three static driving pulses that control droplet size regardless of ink viscosity. EX1007, col. 9, *ll.* 4–9. Chang teaches that a 20 pL dot is output by selecting waveform the second and fourth waveform elements (T2 and T4) shown in FIG. 4, an 8 pL dot is output by selecting the fourth waveform element (T4) shown in FIG. 4, a 4 pL dot is output by selecting the first and the third waveform

elements (T1 and T3) shown in FIG. 4. EX1007, col. 10, *ll.* 7–29. These driving pulse elements do not change in response to ink viscosity. Meanwhile, the minute vibration pulse comprises the first connection element, which again is not a waveform that results in droplet ejection. EX1007, col. 10, *ll.* 46–51. Chang specifically does not teach that the minute vibration pulse is selected to form any of the small, medium, or large droplets.

Chang teaches three embodiments of the driving signal generated by the driving signal generation circuit 83. EX1007, col. 5, *ll.* 25–35. The Petition only applies the second embodiment of the driving waveform in Ground 1. Paper 2 at 62–68. The only difference between the first embodiment of the driving signal and the second embodiment of the driving signal is that the second embodiment of the driving signal includes a “step-shaped part” formed in the first connection element (P330 and P331 within TS1), which again is a waveform element that does not eject an ink droplet. EX1007, col. 11, *ll.* 39–49. Otherwise, all other waveform elements remain the same, and even have the same reference numbers in both FIG. 4 and FIG. 5.

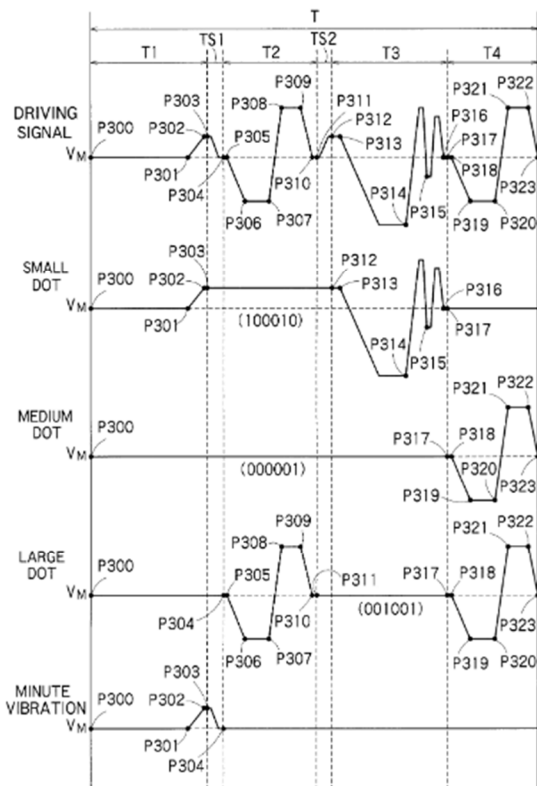


FIG. 4

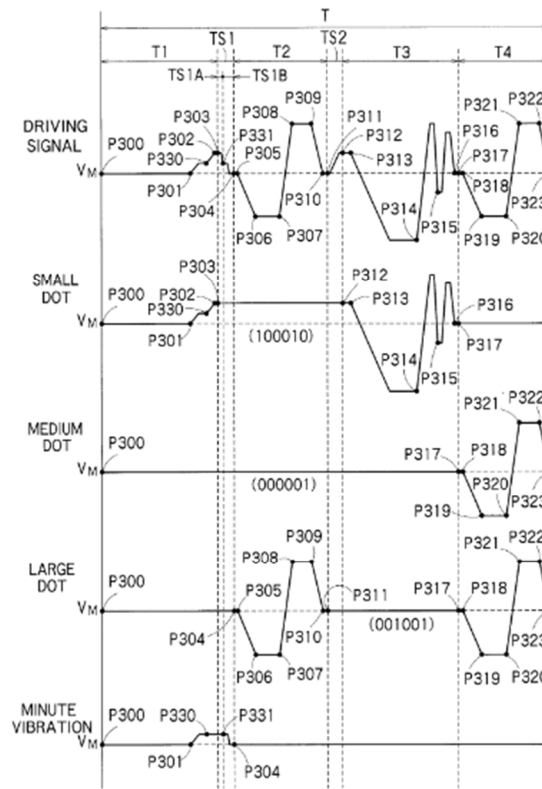


FIG. 5

Chang teaches that the only waveform element that considers viscosity is the minute vibration element. EX1007, col. 11, *ℓ.* 66-col. 12, *ℓ.* 3, col. 12, *ℓℓ.* 17–25. Notably, the waveform shape of the small dot waveform elements, the medium dot waveform element, and the large dot waveform element all remain identical in both FIG. 4 and FIG. 5 and are the same regardless of whether ejecting a “high viscosity ink” or a “low viscosity ink”. Indeed, the waveform shapes, modulations, and amplitudes all remain the same in both the first and second embodiments taught by Chang. Thus, no driving pulse that forms a droplet considers ink viscosity.

In contrast, the claims recite, “controlling... the shapes of droplets by controlling the shape of an electric waveform... in response to the viscosity of the ink.” In other words, the viscosity of the ink is considered when applying the waveform *that ejects and shapes an ink droplet*. The specification confirms this understanding. For example, the '806 Patent teaches that a memory stores data correlating waveform data, such as the number of plateaus, the amplitude of the ink, and/or duration of plateaus with viscosity. EX1001, col. 6, ¶¶. 13–16, col. 6, ¶¶. 29–32, col. 6, ¶¶. 50–61. In fact, in one embodiment, the machine measures ink viscosity as the ink flows to the nozzles so that the waveform applied accurately ejects a droplet having the correct size. EX1001, col. 6, ¶¶. 50–61.

Chang does not control the shape of the droplet by controlling the shape of the waveform in response to the viscosity of ink. Instead, Chang merely controls the shape of a preparatory pulse that specifically does not form an ink droplet. EX1007, col. 3, ¶¶. 25–29, col. 9, ¶¶. 46–50. Controlling the shape of a preparatory pulse is different than controlling the shape of a droplet by controlling the shape of a waveform that shapes the droplet. The minute vibration pulse is a waveform element specifically generated to combat a viscosity rise due to solvent evaporation. EX1007, col. 2, ¶¶. 20–26. It is a compensation tool to prevent printer errors. EX1007, col. 2, ¶¶. 11–18. However, the minute vibration pulse does not

control the shapes of droplets because the minute vibration pulse does not form any droplets at all.

Like the deficiencies of Nagashima discussed above, Chang merely teaches a compensation technique to ensure consistent droplet output. EX1007, col. 9, *ll.* 17–27. It is only this compensation technique that accounts for ink viscosity, not the waveforms that form and shape droplets. Chang fails to teach that any of the “driving pulses” that actually generate an ink drop consider or account for ink viscosity.

Apparently recognizing the deficiency of Chang, Petitioner argues:

The shape of the ejected droplet would have been affected by the viscosity of the droplet. DUPLO-1003, 82-88, 100. Accordingly, a POSITA would have recognized that selecting a minute vibration waveform based on the viscosity of the ink would have affected the shape of the resulting droplet. *Id.*

Paper 2 at 67. Firstly, the cited section to the Expert Declaration (§§ 82–88, 100) discusses the Nagashima Ground and is irrelevant. Even so, Petitioner specifically calls out a “resulting drop”. However, no drop results from the minute vibration waveform at all. EX1007, col. 9, *ll.* 38–41. The minute vibration pulse only prevents solvent evaporation; it does not result in a droplet. EX1007, col. 2, *ll.* 11–25. Like Nagashima, this compensation technique, this “preparatory pulse”, simply keeps ink in a preferred, pre-ejection condition. EX1007, col. 9, *ll.* 46–50,

col. 2, *ll.* 11–25. Still, there is simply nothing about the minute vibration pulse — the only pulse that considers ink viscosity in Chang — that controls the shapes of droplets, as required by claim 1.

Therefore, Chang fails to teach “controlling by a computer the shapes of the droplets by controlling the shape of an electric waveform applied to the piezoelectric actuator, said shape being controlled by selecting at least a number of plateaus of the electric waveform, in response to at least one of the following parameters: viscosity of the ink...” Chang teaches two different types of waveforms: 1) driving waveforms that control the shapes of droplets, but do not consider ink viscosity, and 2) a minute vibration pulse that considers ink viscosity, but does not control the shapes of droplets. Thus, Chang fails to teach the limitations of claims 1 and 9.

b. Takatsuka’s Silence Regarding Driving Waveform Specifics is not a Motivation to Modify Takatsuka with Chang

Petitioner rightly acknowledges that Takatsuka alone does not teach the challenged claims because Takatsuka “is silent on the specifics of the electrical waveform used to drive the piezo”. Paper 2 at 50. Petitioner then presents this silence as its primary motivation to combine Chang. Petitioner argues, “A POSITA seeking to implement Takatsuka would have sought examples of electrical waveforms, and would have been motivated to implement Chang, because Chang’s

waveforms provide both ejection and non-ejection shapes, such as described in Takatsuka”. *Id.* Petitioner then uses the presumption of enablement in Takatsuka as a reason why Chang’s teachings are necessary to implement Takatsuka. *Id.*

Petitioner’s argument is internally inconsistent. On one hand, Petitioner argues that Takatsuka’s silence regarding waveform shape is evidence of how easily a POSITA could apply ejection or non-ejection waveforms. EX1003, ¶ 188. Conversely, Petitioner argues that Takatsuka’s silence requires a POSITA to look to the prior art for waveform shape examples to make Takatsuka’s machine function. It cannot be both. Either Takatsuka functions unmodified, or Takatsuka is unenabled due to its silence regarding the ejection and non-ejection waveforms. Either way, Ground 2 fails.

Moreover, if Takatsuka is presumed enabled, as Petitioner argues, then Chang’s waveforms are unnecessary to enable or “implement” Takatsuka. Takatsuka alone teaches and enables both ejection and non-ejection waveforms. EX1006, col. 11, ll. 46–51, col. 20, ll. 52–57. Indeed, Petitioner’s expert, Dr. Reinholtz, says “adjusting the amplitude and duration of the waveforms to achieve ejection and non-ejection were well within the skill of a POSITA, for one reason, because doing so was common place [sic] at the time”. EX1003, ¶ 188. Patent disclosures “preferably omit that which is well-known to those skilled and already available to the public.” *In re Buchner*, 929 F.2d 660, 661 (Fed. Cir. 1991).

Following Dr. Reinholtz's logic, Takatsuka omitted these purported basic, conventional waveforms⁴ because they were unnecessary to inform a POSITA how to "implement" Takatsuka. As such, the silence of Takatsuka shows why Takatsuka would not be modified in view of Chang: modification would not be necessary to "implement" Takatsuka.

Even if this silence was a reason to select a waveform from the prior art or common knowledge, Petitioner failed to provide a reason why a POSITA would select Chang, rather than any other known waveforms, to use in Takatsuka's machine. Petitioner argues that simple waveforms for adjusting amplitude and duration to achieve ejection and non-ejection were supposedly well known (EX1003, ¶ 188), but Petitioner fails to explain why a POSITA would choose Chang's waveforms over other common knowledge waveforms.

Instead, hindsight alone drove the selection of Chang for Ground 2. Petitioner realized that Takatsuka alone did not teach the claim language because "Takatsuka is silent on the specific waveforms used to control the piezo for ink ejection" (Paper 2 at 61). Petitioner then selected Chang over all other waveform options, including the supposed common knowledge mentioned by Dr. Reinholtz, not because Chang represented the best modification to Takatsuka, but because

⁴ Moreover, these conventional waveforms are not the waveforms claimed by the '806 Patent, nor does the Petition suggest as much.

Petitioner viewed Chang as providing what was missing from the Takatsuka to allegedly teach the remaining claim limitations.⁵ That is unequivocally hindsight. The Petition says a POSITA would have looked to Chang because Chang also teaches non-ejection and ejection waveforms. But these non-ejection and ejection waveforms were supposedly “commonplace”, and already disclosed by Takatsuka. EX1003, ¶ 188, EX1006, col. 11, ll. 46–51, col. 20, ll. 52–57. Petitioner provides no reason to pick Chang over any other reference or supposed common knowledge to “fill in the gaps” of Takatsuka. The true reason Petitioner selected Chang is because Petitioner relied upon hindsight in an attempt to invalidate the non-obvious claims of the ’806 Patent.

Alternatively, Petitioner may be arguing that Takatsuka’s silence regarding waveform specifics means that Takatsuka can function with any waveform taught in the prior art. There is no case law whatsoever to support this position, nor any support in the references themselves. Silence in a reference is not permission to insert any teaching from the prior art as an obvious motivation. *Zup v. Nash Mfg.*, 896 F.3d 1365, 1371 (Fed. Cir. 2018). Instead, every allegedly obvious modification requires the full analysis under *Graham*. *Graham v. John Deere*, 383 U.S. 1 (1966).

⁵ As mentioned above in Section VI.C.1, the combination of Takatsuka and Chang still fails to teach all the claim limitations.

Alternatively, Petitioner's arguments presume that Takatsuka's silence regarding waveform shape *necessarily* means Takatsuka's ejection and non-ejection waveforms look like Chang's. That is simply untrue. There is no evidence cited by the Petition that supports the notion that Chang's waveforms were some sort of default waveform that Takatsuka used for its ejection and non-ejection waveforms. Instead, the opposite is true because Takatsuka ejects uniform droplets and Chang ejects varying droplet sizes. EX1006, col. 11, *ll.* 27–37, col. 7, *ll.* 26–31; EX1007, col. 9, *ll.* 4–9. Thus, even in silence, a POSITA would recognize that Takatsuka's driving waveforms were different from those proposed by Chang.

Petitioner's argument here is transparently tainted by hindsight. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) (“A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.”). Here, Takatsuka's teachings lacked several limitations of the '806 Patent. So, Petitioner argued that the failure to teach those claim limitations, and the difference between the claims and the primary reference, is a reason why a POSITA would modify Takatsuka with Chang. Petitioner used the claim language as a motivation to combine, not a motivation from the references, not any common sense by a POSITA, or any other motivation consistent with *KSR*'s instruction to look to the “need or problem known in the field of endeavor at the time of invention and addressed by the patent.” *Id.* at 420.

“Any judgement on obviousness is in a sense necessarily a reconstruction based on hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill in the art at the time the claimed invention was made and does not include knowledge gleaned only from applicant’s disclosure, such a reconstruction is proper”. MPEP 2145(X)(A), quoting *In re McLaughlin*, 443 F.2d 1392, 1395 (C.C.P.A. 1971). Here, Petitioner uses knowledge only present in the ’806 Patent as a motivation to combine Takatsuka with Chang. This hindsight taints the entire Ground, but particularly this motivation to combine.

c. A POSITA Would not Have Been Motivated to Implement Chang’s Varying Dot Waveforms into the Inkjet Recording Apparatus of Takatsuka Because Takatsuka Would Prevent Varying Dot Sizes

Petitioner next argues that a POSITA would have been motivated to modify Takatsuka with Chang so that the printheads of Takatsuka “produce droplets of different shapes (*i.e.*, volume)”. However, a POSITA would not have seen this feature as desirable in the system of Takatsuka for multiple reasons and would not have wanted Takatsuka’s system to produce ink droplets of different shapes.

Like Nagashima, Takatsuka teaches a system seeking to ensure uniform droplet sizes are output by the nozzles taught by Takatsuka. First, Takatsuka teaches a printhead having nozzles arranged in a matrix to maximize dot density. EX1006, col. 8, *ℓℓ.* 18–20. Dot density is important for a high-resolution image,

and a uniform droplet size is required to increase dot density for the same reasons as discussed above for Nagashima. *See also* EX1007, col. 1, *ll.* 41–47. As further evidence of uniform droplet formation, Takatsuka includes a “feedback control system” specifically included to maintain “uniform driving conditions in the heads”. EX1006, col. 11, *ll.* 27–31. A POSITA would understand that uniform driving conditions in a printhead form uniform droplets. *Id.*; EX1006, col. 8, *ll.* 18–20. Finally, Takatsuka teaches a print determination unit 22 that “reads in the printed image, performs prescribed signal processing, and then determines the printing status, such as ejection failures, variations in droplet ejection, and the like, for each nozzle.” EX1006, col. 11, *ll.* 32–37. A droplet ejection that is too small, too large, or otherwise different from the expected, uniform droplet size would be a “variation in droplet ejection” and read by the print determination unit 22 as an error. *Id.*; EX1006, col. 7, *ll.* 26–31.

If a POSITA modified Takatsuka to include the ejection and non-ejection waveforms of Chang, as proposed by Petitioner, the system of Takatsuka would no longer output uniform droplet sizes, which would decrease dot density and defeat one of Takatsuka’s primary purposes. EX1006, col. 8, *ll.* 18–20; EX1007, col. 1, *ll.* 41–47. If Takatsuka’s printhead output small, medium, and large dots, then the small dots may leave white marks in between the dots, thereby hurting image

resolution, or the large dots may bleed over into other dots or smear because the added ink may not dry quickly enough under Takatsuka's drying fan.

More importantly, Takatsuka's own error prevention systems would prevent the varying dot sizes taught by Chang. First, the feedback control system of Takatsuka would not allow varying droplet sizes because varying droplet sizes would not be "uniform driving conditions". EX1006, col. 11, *ll.* 27–31. Instead, the modified head of Takatsuka would have, by definition, *varying* driving conditions. The feedback control system would prevent any such varying driving conditions or register the variations as an error in printing. *Id.*

Moreover, even if the feedback control system did not outright prevent varying droplet sizes, the print determination unit 22 would read the varying dot sizes as an error. EX1006, col. 7, *ll.* 26–31. As Takatsuka teaches, the print determination unit 22 reads the printed image and looks for "variations in droplet ejection". The print determination unit 22 would register variable dot sizes as variations in droplet ejections and would report an error to the print controller 208. *Id.* The result of this error feedback would be a rejected print job on the substrate and also adjustments by the print controller to override the varying droplet waveforms. *Id.* As such, Takatsuka's own print quality ensuring components would prevent the proposed modification with Chang. Indeed, modifying Takatsuka with Chang as proposed would render Takatsuka a worse printer in

terms of quality, or the proposed modifications would be outright prevented or overruled by Takatsuka own components, meaning that a POSITA would not have expected success in modifying Takatsuka with Chang as proposed in the Petition.

Petitioner did not suggest modifying Takatsuka in any way other than incorporating Chang's waveforms into the printing system of Takatsuka. Particularly, Petitioner did not propose modifying Takatsuka to remove the print determination unit 22, and so, these components must be considered as part of the proposed modification with Chang in Ground 2, and these components would mean that a POSITA would not have been motivated to modify Takatsuka with Chang to output variable droplet sizes.

d. A POSITA Would not Have Been Motivated to Implement Chang's Varying Dot Waveforms into the Inkjet Recording Apparatus of Takatsuka Because of Takatsuka's Printhead Structure

Petitioner asserts that Chang's varying droplet sizes "facilitates the balance between 'conflicting requests of improvement in image quality and improvement of the recording speed'", quoting Chang at col. 1, ll. 44–56. However, Takatsuka and Chang are directed to dramatically different printer types, and the improvements by Chang to recording speed would be unnecessary to Takatsuka for the reasons discussed below.

Takatsuka teaches a printhead having nozzles spanning at least as wide as one side of the recording medium, if not wider. EX1006, col. 6, ℓ. 58–col. 7, ℓ. 2. Chang, in contrast, describes a carriage mechanism for moving the recording head in a scanning direction across the paper during printing. EX1007, col. 1, ℓℓ. 12–18, col. 11, ℓℓ. 14–36. The system of Takatsuka can print an entire line of a page without moving the printhead, whereas Chang requires the printhead to move across the full width of the recording medium, and back, before reaching the next printing line. EX1006, col. 6, ℓ. 58–col. 7, ℓ. 2; EX1007, col. 1, ℓℓ. 12–18, col. 11, ℓℓ. 14–36. Due to the back-and-forth movement of the carriage, there is no doubt that Chang describes an objectively slower method of printing using a much smaller printhead.

Chang creates different sized dots to compensate for this objectively slow printing method. Chang teaches:

Further, in the aforementioned driving signal, the large dot ejection waveform elements are arranged before and after the small dot ejection waveform element, so that, in two-way printing like printing in both forth motion and back motion of the recording head 1 (that is, the carriage), large ink drops are positioned on the basis of the ejection position of small inks drop ejected by the small dot driving pulse, so that the ejection positions of small ink drops and large ink drops can be aligned with each other.

Further, the former large dot ejection waveform element and the latter large dot ejection waveform element are formed in the same waveform and the volume of an ink drop ejected by the former large dot ejection waveform element can be made equal to the volume of an ink drop ejected by the latter large dot ejection waveform element.

Furthermore, since a large dot ejection waveform element is generated every fixed period in the driving period T, in a case of two-way printing, the same recording condition can be realized in both forth motion and back motion.

EX1007, col. 11, *ll.* 14–36. Chang makes use of the back-and-forth nature of a printing carriage to align droplets of different sizes as the carriage moves in the scanning direction and the sub-scanning direction. *Id.*; *see also* EX1007, col. 1, *ll.* 12–18 and col. 1, *ll.* 28–37. This droplet alignment achieves Chang’s goal to “represent the immediate gradation by representing one pixel by a plurality of dots such as 4x4 and 8x8...” EX1007, col. 1, *ll.* 41–56. In other words, multiple “dots” are required to make one printed pixel. Chang offsets some of the need for printing as many as 64 dots (i.e., “8x8”) to represent one pixel by printing bigger and smaller drops together. EX1007, col. 11, *ll.* 14–36. Still, multiple dots are required to represent each pixel, and so Chang aligns big and small dots as the carriage moves backwards and forwards. EX1007, col. 11, *ll.* 14–36; col. 1, *ll.* 12–56.

None of these features are necessary in a printhead with nozzles spanning the entire width of a paper, like Takatsuka. There is no need to move Takatsuka’s

head side-to-side like a carriage because the printhead is wide enough to reach all the printing areas on the substrate without any movement. As such, the benefits of Chang's variable dot sizes do not apply to Takatsuka's printhead. There would be no alignment of small and large droplets because Takatsuka's printhead does not move side-to-side as a carriage. As such, modifying Takatsuka with Chang would not align dots properly, and the nozzles of Takatsuka would only generate a portion of each pixel printed. The result would also increase printing time for any print job because Takatsuka would receive the entire driving waveform (T1-T4) of Chang when only a portion of the driving waveform would be necessary for each nozzle (e.g., just T3). EX1007, col. 10, *ll.* 7–29. A POSITA would not be motivated to simultaneously worsen image quality *and* increase print speed. EX1007, col. 1, *ll.* 48–51.

The reason that Chang's waveform aligns different sized dots in this way is because the full driving waveform is generated each driving period. EX1007, col. 10, *ll.* 52–60. That is, Chang's waveform connects multiple waveform elements together *in series* to form the full waveform. *Id.*; EX1007, col. 2, *ll.* 1–10. However, there is no reason for Takatsuka to apply the full driving waveform taught by Chang when the printhead does not move side-to-side.

To the extent Petitioner is arguing that the individual waveform elements can be broken apart and individually applied to the nozzles of Takatsuka, such a

modification would not function properly. As taught by Chang, the small and medium dots can be formed using only waveform section T3 and T4 respectively. However, the large dot requires both T2 and T4, making it a waveform that takes twice as long to generate the large dots than the waveform for forming the medium dots. EX1007, col. 10, *ll.* 7–29. Because Takatsuka teaches a printhead with a line of nozzles extending across the page, the droplets ejected by each nozzle in the line must be ejected at the same time for optimum printing. EX1006, col. 9, *ll.* 4–22. If Takatsuka used Chang’s specific waveforms, the system would need to wait for a second period just to produce any large dots that may or may not be created. Such a modification would double printing time, which would not be an acceptable result for a POSITA. For all these reasons, a POSITA would not have been motivated to combine Takatsuka with Chang.

e. Claims 2, 4, 10 and 12 are Not Obvious

Because Takatsuka in view of Chang fails to render obvious claims 1 and 9 of the ’806 Patent, the combination necessarily fails to teach dependent claims 2, 4, 10, and 12 which depend upon claim 1 or claim 9 respectively. As such, Petitioner has failed to demonstrate a reasonable likelihood of success on any claim in Ground 2.

4. Ground 3 — The Petition Fails To Show Claims 1 and 4 are Obvious Over Dainippon In View Of Chang.

a. Petitioner’s Grounds fail to teach an “Ink Jet Nozzle Arrangement

Petitioner’s grounds rely upon Dainippon to teach the claim limitation “an ink jet nozzle arrangement”, as taught in the preamble and recited throughout the independent claims. Petitioner relies upon Dainippon’s teaching of a “droplet spray nozzle head 50” as allegedly teaching an ink jet nozzle arrangement. However, a droplet spray nozzle head 50 is not an ink jet nozzle arrangement. Indeed, spray nozzles and ink jet nozzles are two different technologies.

Dainippon recognizes that these are two different technologies. EX1008, col. 12, *ll.* 52–57. Spray nozzles apply varnish using a flood coating method and use thinner coatings. EX1008, col. 1, *ll.* 12–16. Spray nozzles apply varnish as a mist and are not particularly good at coating fine details. Dainippon understands as much, saying that the spray method applies varnish in a “rough way” and does not provide “absolute accuracy”. EX1008, col. 12, *ll.* 1–3. When accuracy is not important for fine details, then a spray method for applying a coating is perfectly acceptable. *Id.* Therefore, a spray nozzle head is not an “ink jet nozzle arrangement”, as claimed. EX1001, col. 5, *ll.* 16–22.

Dainippon notes that the spray nozzle head 50 could be replaced with “an ink jet printing machine”. EX1008, col. 12, *ll.* 52–57. In the same breath,

Dainippon recognizes that using ink jet nozzles, as opposed to the spray nozzle head 50 taught by the primary embodiment, would be less “advantageous”.

EX1008, col. 12, ¶¶ 52–60. Ground 3 does not rely upon this alternative, ink jet embodiment taught by Dainippon. Instead, Ground 3 relies exclusively on the primary, spray nozzle embodiment. Paper 2 at 79. Because Ground 3 relies solely upon Dainippon’s spray nozzle embodiment, Ground 3 is deficient and fails to teach an *ink jet* nozzle arrangement.

Despite relying exclusively on the spray nozzle embodiment of Dainippon, which relies upon a different technology than ink jet nozzle technology, Petitioner uses a statement in Dainippon, which compares the way spray nozzles spray varnish to the way that ink jet nozzles spray ink. EX1008, col. 10, ¶¶ 25–32; Paper 2 at 79. However, this statement in Dainippon is not a statement equating spray nozzle technology to ink jet nozzle technology. Instead, the statement merely states that the spray nozzles 54 of Dainippon selectively cover portions of printing paper like how ink jet nozzles selectively cover portions of the printing paper. *Id.*

(“*Selected nozzles 54 among the numerous droplet spray nozzles 54 spray the ultraviolet-curable varnish toward a particular portion of the printing paper S to be coated with the varnish, in the same way as the ink jet nozzles of an ink jet printer spray ink.*”) (emphasis added). Thus, this section of Dainippon does not teach an ink jet nozzle arrangement, as claimed, it simply teaches that varnish can

be selectively sprayed “toward a particular portion of the printing paper” even using spray nozzles. So, despite this comparative statement in Dainippon, Ground 3 does not teach an ink jet nozzle arrangement.

While it is true that Dainippon teaches that the spray nozzle head 50 could be replaced with ink jet, Petitioner’s Ground 3 does not rely on this alternative embodiment of Dainippon, and Petitioner cannot now rely upon Dainippon’s alternative embodiment. Even if Petitioner could rely upon these teachings in Dainippon, Petitioner provides no reason to modify Dainippon to use an ink jet nozzle arrangement rather than the spray nozzle head 50 of the primary embodiment. Indeed, Dainippon is quick to criticize ink jet technology as less “advantageous” than the spray nozzle head 50. EX1008, col. 10, ll. 57–60. Petitioner provides no motivation to modify Dainippon to use ink jet rather than spray nozzle technology in Ground 3, even though such a motivation would be necessary to modify Dainippon’s primary embodiment because modifying a primary embodiment of a reference with a secondary embodiment still requires a full obviousness analysis, including a motivation to combine and a reasonable expectation of success. *In re Stepan Co.*, 868 F.3d 1342, 1346 n.1 (Fed. Cir. 2017). Moreover, any motivation to modify Dainippon would need to overcome Dainippon’s strong criticism of ink jet technology for these purposes. EX1008, col. 12, ll. 57–60. Additionally, modifying from spray nozzle technology to ink jet

would, according to Dainippon, require additional modifications, such as using a different image data file than the one used to generate the printing plates to “reliably” determine the particular area E where varnish is to be applied. EX1008, col. 11, ¶¶. 35–39, col. 12, ¶¶. 57–60. The Petition never proposes such modifications or even discusses these problems with the modification.

While Chang teaches ink jet technology, the Grounds again do not rely on any teaching other than Dainippon’s primary reference to teach an ink jet nozzle arrangement. Again, if Petitioner wanted to use Chang’s ink jet teachings, Petitioner would have had to provide a motivation to modify Dainippon to substitute the spray nozzle head with ink jet technology, but no such arguments were presented in Ground 3, and again, such a proposed modification would not have been obvious because Dainippon criticizes any modification that replaces the spray nozzles with ink jet technology. MPEP 2143.

b. Dainippon’s Silence Regarding Driving Waveform Specifics is not a Motivation to Modify Dainippon with Chang

Just like Ground 2, Petitioner argues that a primary reference’s silence is a motivation to combine Dainippon with Chang. Paper 2 at 78 (“Dainippon is silent as to the waveforms that drive the piezoelectric actuators. A POSITA would have sought example waveforms, and would have been motivated to implement the waveforms of Chang”). For all the reasons discussed above in Section III.B.3.b,

silence in a primary reference is not a motivation to modify the primary reference. More is needed than “filling in the gaps” of the primary reference. However, as discussed below in Section III.B.4.c, Dainippon is not silent about controlling droplet size, and Chang is unnecessary.

Nevertheless, using silence in a primary reference as a motivation to modify the primary reference is hindsight. Petitioner again failed to explain why a POSITA would choose Chang of all the known methods of controlling droplet size, including the known method taught by Dainippon itself. Petitioner cannot explain why a POSITA would combine Dainippon with Chang because the combination is purely hindsight guided by the teachings of the '806 Patent, not anything in the prior art references themselves.

c. No Motivation to Substitute the Waveforms taught by Dainippon with the Waveforms of Chang

Petitioner provides only a sole reason to substitute the driving waveforms taught by Dainippon with the driving waveform taught by Chang. More specifically, Petitioner argues, “[a] POSITA would have been motivated to use waveforms to drive the piezoelectric elements of Dainippon to control the quantity (droplet size) sprayed from the nozzles to control the thickness of the varnish”. Paper 2 at 78. However, there are two problems with Petitioner’s proposed motivation: 1) Dainippon’s spray nozzle head 50 does not use piezoelectric

actuators, and, more importantly, 2) Dainippon already knows how to control the quantity (droplet size) sprayed from the nozzles, and so, modification with Chang is unnecessary to perform a function Dainippon already performs alone.

Beginning with problem 1) from above, the spray nozzle head 50 of Dainippon relies upon resistors, not piezoelectric actuators, to spray varnish. EX1008, col. 11, 43–53, col. 12, ¶¶. 12–15. Yet, Ground 3 relies upon an alternative embodiment in Dainippon using “piezoelectric elements”. EX1008, col. 10, ¶¶. 40–41. Similar to the above, Ground 3 does not provide a motivation to substitute the resistors in the spray nozzle head 50 with “piezoelectric elements”. Ground 3 provides no reason why a POSITA would choose the alternative piezoelectric elements over the preferred, resistor embodiment. Thus, the Petition is deficient for failing to perform proper obviousness analysis between two embodiments in the same reference. *Stepan*, 868 F.3d at 1346 n.1

To the extent the Petition suggests that piezoelectric elements and resistors are interchangeable, and thus no motivation to combine is necessary (*Abiomed, Inc. v. Maquet Cardiovascular, LLC*, No. IPR2017-01204, -01205, slip op. at 8–12 (P.T.A.B. Oct. 23, 2017), Paper 8), then the Petition still remains deficient because Dainippon alone teaches the waveforms necessary to control the quantity of ink ejected, and, modification with Chang is unnecessary to achieve the motivation proposed by Petitioner.

Dainippon alone specifically teaches how to control the quantity of varnish to control coating thickness. EX1008, col. 12, *ll.* 12–19. Dainippon explains that controlling the quantity of varnish is performed by controlling the “amount of energization of the resistors”. *Id.* Dainippon further teaches,

selected resistors are energized, bubbles are formed in the corresponding droplet spray nozzles 54 to pressurize the varnish in these droplet spray nozzles 54. Consequently, the selected droplet spray nozzles 54 spray droplets of the varnish onto the printing paper S.

EX1008, col. 10, *ll.* 35–39. Thus, Dainippon already knows how to control the quantity of varnish applied, and there is no reason to modify Dainippon with Chang to perform a function Dainippon already performs alone.

It is only through blatant hindsight that Petitioner’s proposed modification would occur. Dainippon controls the quantity of varnish ejected without modification by any reference, let alone Chang, by “controlling energization of the resistors”. A POSITA would understand that the heat generated by a resistor of resistance R is based on Joule’s First Law, which states that $\text{heat} = \text{current}^2 * \text{resistance} * \text{time}$. A POSITA would also know that power or “energization” of a resistor becomes heat that is dissipated by the resistor. So, energizing a resistor generates heat, which in turn forms the bubbles to pressurize the varnish in the spray nozzles 54. EX1008, col. 10, *ll.* 35–39. Moreover, based on Watt’s Law, controlling the energization of a resistor means controlling either the current

applied to the resistor, the amount of voltage applied to the resistor, or both. A POSITA would recognize that similar principals apply to piezoelectric actuators. EX1001, col. 4, *ll.* 12–17; EX1010, col. 2, *ll.* 18–21; EX1006, ¶¶ [0211]. Even Dr. Reinholtz agrees. EX1003, ¶ 188. So, Dainippon is not “silent” as to how its nozzle spray head controls the quantity of varnish applied, as the Petition suggests. Paper 2 at 78, 80. Instead, Dainippon teaches exactly how to control the quantity of varnish applied regardless of using resistors or piezoelectric elements. Dainippon just doesn’t teach the claimed method of controlling the quantity of varnish, which is Petitioner’s true reason for combination.

More specifically, controlling the amount of energization applied to resistors is not “controlling the number of plateaus”, as recited by claim 1. Using the claim language as a guide, Petitioner invents a motivation to modify Dainippon to perform a function it already performs. This is classic hindsight – using the claim language as a guide to modify one reference with another.

There is no motivation to modify a machine taught by a reference to cause it to perform a function it already performs. Indeed, the opposite is true. Because Dainippon already controls the quantity of varnish applied, so there is no motivation to change Dainippon. Modifying Dainippon with Chang to control the sizes of droplets according to Chang’s method would needlessly complicate a device that is already capable of controlling the sizes of droplets without

modification. Moreover, as discussed above, such a modification would not result in success.

Moreover, if these resistors and piezoelectric elements are truly “interchangeable”, as Petitioner appears to assert, then Dainippon’s quantity control method is equally interchangeable. Petitioner cannot have it both ways. EX1003, ¶ 188. Petitioner cannot argue that the piezoelectric elements embodiment is interchangeable with the resistors embodiment, but the quantity control method for the piezoelectric elements embodiment is completely different than resistors embodiment. Such hindsight-driven cherry picking is unsupported by the record and the prior art.

IV. CONCLUSION

For the above reasons, Petitioner fails to meet its burden of demonstrating a reasonable likelihood of prevailing as to any ground against any claim. Indeed, each of Petitioner’s proposed Grounds for rejection suffers from multiple defects. Accordingly, Patent Owner respectfully requests the Petition for *Inter Partes* Review be denied.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that, pursuant to 37 C.F.R. § 42.6(e) on this 7th day of September, 2023, the foregoing Patent Owner Preliminary Response and all Exhibits and other documents filed were served via electronic mail upon the following:

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), Counsel for Patent Owner hereby certifies that this document complies with the type-volume limitation of 37 C.F.R.

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