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Duplo U.S.A. Corporation

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

MGI DIGITAL TECHNOLOGY S.A., Plaintiff, v. DUPLO U.S.A. CORPORATION, Defendant.	Case No. 8:22-cv-00979-DOC-KES **DEFENDANT DUPLO U.S.A. CORPORATION'S AMENDED INVALIDITY CONTENTIONS** **JURY TRIAL DEMANDED** District Judge: Hon. David O. Carter Magistrate Judge: Hon. Karen E. Scott

Defendant Duplo U.S.A. Corporation ("Duplo USA" or "Defendant") hereby provides the following Amended Invalidity Contentions ("Contentions") to Plaintiff MGI Digital Technology S.A. ("MGI" or "Plaintiff") for U.S. Patent Nos. 8,506,031 (the "'031 patent"); 8,783,806 (the "'806 patent"); RE45,067 (the "'067 patent"); and 9,422,449 (the "'449 patent").

I. PRELIMINARY STATEMENT AND RESERVATION OF RIGHTS

In its November 7, 2022 Infringement Contentions, MGI asserted the following claims:

- The ’031 patent: Claims 1, 7–9, 12, and 18–21 (2 independent, 7 dependent).
- The ’806 patent: 1–6, 8, 9–15, 17, 18–20, 22–24, 27–29, and 31–34 (4 independent, 24 dependent).
- The ’067 patent: Claims 1-4, 16–20, 32, and 34 (3 independent, 8 dependent).
- The ’449 patent: Claims 1, 2, 4, 7, 8, 10–11, 13–15, 21, 23, 26, and 28 (1 independent, 14 dependent).

Subsequently, on February 21, 2023, MGI reduced the number of asserted claims to the following elected claims (the “Asserted Claims”):

- The ’031 patent claims **1,** 7, **12,** 18 (**four** claims, 2 independent, 2 dependent).
- The ’806 patent claims **1,** 2, 4, 8, **9,** 10, 12, **18,** 19, 20, 22, **27,** 28, 31 (**fourteen** claims, 4 independent, 10 dependent)
- The ’067 patent claims **1,** 2, 4, **16,** 18, 20, **32** (**seven** claims, 3 independent, 4 dependent)
- The ’449 patent claims **1,** 2, 4, 7, 11, 26, 28 (**seven** claims, 1 independent, 6 dependent)

Defendant does not provide any Contentions directed to claims that MGI has not asserted for purposes of infringement. Further, Defendant’s Amended Invalidity Contentions are only amended as to those claims that are asserted subsequent to MGI’s Second Claim Election of February 21, 2023. To the extent MGI is permitted to assert additional claims in the future, Defendant reserves all rights to disclose new or supplemental invalidity contentions regarding such claims.

These Contentions are based on MGI's apparent theories set out in its Infringement Contentions. Defendant reserves all rights to disclose new or supplemental invalidity contentions, including to address any changed theories of infringement and any newly discovered evidence obtained through continued discovery, both formal and informal.

Subject to the rights reserved in these Contentions, Defendant contends that all of the Asserted Claims are invalid under at least one or more of 35 U.S.C. §§ 101, 102, 103, and/or 112. Defendant contends that the Asserted Claims are invalid because they are anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and 103. To the extent MGI contends that the limitations of the Asserted Claims are not disclosed in the prior art identified as anticipatory, Defendant reserves the right to assert obviousness based on the identified references and/or to identify other references that would have rendered obvious the allegedly missing limitation. Furthermore, the obviousness combinations of references provided below and in the accompanying claim charts under 35 U.S.C. § 103 are exemplary only and are not intended to be exhaustive. To the extent that MGI challenges the disclosure of any of these references with respect to particular limitations of the Asserted Claims, Defendant reserves the right to supplement these Contentions to assert additional or different bases for obviousness. Defendant reserves the right to use any combination of the references set forth in these contentions to render the Asserted Claims obvious. Additionally, Defendant contends that certain claims of the Asserted Patents are invalid for failure to comply with the written description, enablement, and definiteness requirements of 35 U.S.C. § 112.

Defendant expressly reserves the right to amend, correct, and/or supplement these Contentions in accordance with the Schedule governing these cases. (*See* Joint Schedule (Dkt. No. 46) (Oct. 28, 2022).)

* * *

These Contentions reflect Defendant's knowledge, investigation, and discovery as of the date of service. Defendant reserves the right to supplement these Contentions as appropriate and for any permissible reason. For example, pursuant to the Schedule, Defendant reserves the right to supplement these Contentions after subsequent case events, any disclosure by MGI of amended or supplemental infringement contentions, any ruling by the Court on claim construction, or in response to arguments made and positions taken by MGI during fact and expert discovery. Defendant also reserves the right to supplement these Contentions if it becomes aware of additional prior art, become aware of additional features of the prior art references cited below, inventorship issues, or become aware of any other relevant information gained through discovery, including non-party discovery, or otherwise. Defendant also reserves the right to modify or supplement its contentions based on the Court's construction of the claims. Defendant also incorporates by reference, as if expressly set forth in these contentions, all invalidity positions, prior art, and claim charts asserted against MGI in any MGI lawsuit (including litigation involving MGI Digital Technology S.A. in France on counterpart and related patents) or any IPR proceeding. Defendant also reserves the right to modify or supplement these contentions after receiving additional disclosures / discovery from MGI - for example, MGI's disclosures and discovery are deficient as to at least its document production requirements under the Joint Case Schedule (Dkt. No. 46), and MGI's interrogatory response about Duplo's invalidity contentions (e.g., Duplo Interrogatory No. 10).

Defendant reserves the right to rely on uncited portions of the prior art references and on other publications and expert testimony as aids in understanding and interpreting the cited portions, as providing context thereto, as additional

evidence that the prior art discloses a claim limitation or the alleged invention as a whole, as evidence of the state of the art at a particular time, as evidence of the obviousness factor of contemporaneous development by others, and as evidence of motivation to combine. Defendant also reserves the right to rely on uncited portions of the prior art references, other publications, and testimony, including expert testimony, to establish bases for combination of prior art references that render the charted claims obvious. Defendant also reserves the right to rely upon any documentary or testimonial evidence of the existence of any systems that embodied or practiced the disclosures found in the accompanying invalidity charts, for example as discussed in the prior art references cited herein, as such systems may qualify as prior art under 35 U.S.C. § 102(g).[1]

These Contentions are not intended to include or otherwise reflect Defendant's claim interpretations. Because the Court has not yet rendered a final construction of any of the claims in this litigation, Defendant bases these Contentions at least on their present understanding of MGI's view and application of the claim scope, to the extent that view can be inferred from MGI's actual and/or apparent application of those claims. But Defendant does not adopt any constructions or interpretations impliedly or expressly in these Contentions. Moreover, Defendant's Contentions may reflect alternative positions as to claim construction and scope. By providing these Contentions, Defendant is not waiving nor limiting their rights to make arguments in the future about the proper scope of the claims or to advance alternative constructions to those MGI advocates. (*See* Joint Schedule, Dkt. No. 46 (Oct. 28, 2022).) Defendant expressly reserves the right to argue for narrower claim constructions during this litigation and to supplement these Contentions after the Court has issued a final claim construction ruling.

[1] Citations herein refer to the pre-AIA version of Title 35 of the U.S. Code.

Defendant's factual investigations, including its investigation of prior art and grounds for invalidity, is ongoing. Further, Defendant's invalidity positions will be the subject of expert testimony. Defendant reserves the right to supplement these Contentions, including, without limitation, adding additional prior art and grounds of invalidity in accordance with the Federal Rules of Civil Procedure and Joint Schedule in this case, or otherwise.

II. IDENTIFICATION OF RELEVANT PRIOR ART

In addition to the prior art identified in the Asserted Patents' respective prosecution histories, Defendant identifies the following prior art references (the "Prior Art") that anticipate the Asserted Claims or render the Asserted Claims obvious (e.g., by themselves, in light of the knowledge of a skilled artisan, and/or in combination with other Prior Art).

As noted in Section I above, Defendant reserves the right to modify, amend, and/or supplement this list, including to the extent MGI is permitted to amend, modify, or advance new or additional theories with respect to its Infringement Contentions.

At least the Prior Art listed in Section II, individually or in combination, invalidates the Asserted Claims. In some instances, Defendant may have treated certain Prior Art as anticipatory where certain elements are expressly, implicitly, or inherently present in the Prior Art based on Plaintiff's apparent claim construction in its Infringement Contentions. Defendant reserves the right to contend that each of the anticipatory references renders the claims obvious in view of the reference, either alone, in light of the knowledge of a person skilled in the art, and/or in combination with other references.

The identification of any patent or patent application should be deemed an identification of any counterpart patent or application; the identification of any

article should be deemed a disclosure of any substantially similar article if published in some other form; and the identification of any patent or article should be deemed an identification of any product described therein.

Suggested obviousness combinations are provided in the alternative to Defendant's anticipation contentions and are not to be construed to suggest that any reference included in any combination is not by itself anticipatory. Also, the suggested obviousness combinations are provided as examples, and it should be understood that other combinations of the prior art disclosed and cited herein could be used in such combinations.

The claim charts, attached as exhibits hereto, show where each claim element of the Asserted Claims may be found in the references charted. The identification of Prior Art in the charts and below is not exclusive, and Defendant's document production may contain now or in the future additional references that render the Asserted Claims invalid. Defendant reserves the right to rely upon both the listed and unlisted references, as well as other art that may become known and/or relevant during the course of this or any related litigation, including because of any supplemental infringement contentions by MGI, or claim construction by the Court.

Defendant not only relies upon the Prior Art explicitly listed herein, but also relies on any commercial embodiments and accompanying literature of the various assignees that correspond to the respective disclosures found within the prior art disclosed herein. These various and respective commercial embodiments and/or corresponding literature anticipate and/or render obvious the Asserted Claims of the Asserted Patents for at least the reasons disclosed in these Invalidity Contentions and claim charts, as well as for other independent reasons found within the commercial embodiments and corresponding literature. Additionally, Defendant also relies on any systems related to the prior art disclosed below. Defendant will

diligently pursue discovery regarding these systems, commercial embodiments, and/or corresponding literature from Plaintiff and third-parties.

Defendant also reserves the right to rely on related patents, published applications, foreign patents or publications, and other patent documents as necessary to establish prior art status or clarify the disclosures cited. Defendant further reserves the right to rely on the earliest publication or priority dates to which each of the prior art references are entitled, including dates on which a claim of priority may be based for patent references that are any of a divisional, continuation, or continuation-in-part of an earlier filed patent application.

A. Priority Dates

1. The ’031 patent

According to MGI, the asserted claims of the ’031 patent are supposedly entitled to a priority date of no later than December 30, 2008. (*See* MGI’s Disclosure of Asserted Claims and Infringement Contentions at p. 13 (May 22, 2023).)

2. The ’806 patent

According to MGI, the asserted claims of the ’806 patent are supposedly entitled to a priority date of no later than December 30, 2008. (*See id.*)

3. The ’067 patent

According to MGI, the asserted claims of the ’067 patent are supposedly entitled to a priority date of no later than June 14, 2005. (*See id.*)

4. The ’449 patent

According to MGI, the asserted claims of the ’449 patent are supposedly entitled to a priority date of no later than April 24, 2012. (*See id.*)

B. Prior Art Patent Publications

Based on their investigation to date, Defendant has provided in the list below the prior art patent publications presently known to Defendant that it contends anticipates and/or renders obvious the Asserted Claims under at least MGI's actual and/or apparent application of those claims.

Prior-art patents or publications included in these contentions may be related (such as a divisional, continuation, continuation-in-part, parent, or child) to earlier or later-filed patents or publications, may have counterparts filed in other jurisdictions, or may incorporate (or be incorporated by) other patents or publications by reference. The listed patents or publications are intended to be representative of these other patents or publications to the extent they exist. Defendant accordingly reserves the right to modify, amend, or supplement these contentions with these related patents or publications, as well as other prior art references, upon further investigation. Additionally, any reference in these Contentions, including the appendices and exhibits thereto, to a specific subsection or subsections of 35 U.S.C. § 102, is merely exemplary, and Defendant expressly reserves the right to rely on additional or other sections of 35 U.S.C. § 102, as appropriate. If MGI asserts that one or more of these references or systems fails to disclose one or more elements of a claim, Defendant reserves the right to also use those references to invalidate the claim under 35 U.S.C. § 103.

1. The '031 patent

Application/Patent No.	Country of Origin	Date of Publication/Issue
0200457A1 ("Scardovı")	EP	Nov. 5, 1986
0152247B1 ("Howkins")	EP	June 2, 1993
0995599B1 ("Ishızakı '599")	EP	Feb. 8, 2006
1186410A2 ("Chang")	EP	Mar. 13, 2002
1621260A1 ("Ohtsu")	EP	Feb. 1, 2006
1749670A1 ("Abergel '670")	EP	Feb. 7, 2007
1743772 ("Furukawa")	EP	Jan. 17, 2007
2007-001027A ("Shinkawa")	JP	Jan. 11, 2007
H02111554A ("Ozakı")	JP	Apr. 24, 1990

Application/Patent No.	Country of Origin	Date of Publication/Issue
2000127458A ("Ito")	JP	May 9, 2000
2003-127417A ("Yokoyama")	JP	May 8, 2003
2003-341028A ("Tanno '028")	JP	Dec. 3, 2003
2006-334967A ("Maekawa")	JP	Dec. 14, 2006
2007021752A ("Furukawa")	JP	Feb. 1, 2007
2008044265A ("Tanno '265")	JP	Feb. 28, 2008
H09-156121A ("Takagi '121")	JP	June 17, 1997
2005280246A ("Kachi")	JP	Oct. 13, 2005
2003182062A ("Sumiya")	JP	July 3, 2003
2004/249686 ("Nishida")	JP	Sept. 9, 2004
2007076181A ("Katsuta")	JP	Mar. 29, 2007
2007076344A ("Yoshida '344")	JP	Mar. 29, 2007
2008119843 ("Aoyama")	JP	May 29, 2008
H03-108550A ("Takada")	JP	May 8, 1991
H07-101060 ("Wysocki '060")	JP	Apr. 18, 1995
H10-258504 ("Yoshimura")	JP	Sept. 29, 1998
S62-44455A ("Eguchi")	JP	Feb. 26, 1987
2003-279725A ("Usui '725")	JP	Oct. 2, 2003
2004-216758A ("Mori")	JP	Aug. 5, 2004
2004-114577A ("Minowa")	JP	Apr. 15, 2004
2004-299174A ("Tajima '174")	JP	Oct. 28, 2004
2004-299342A ("Tajima '342")	JP	Oct. 28, 2004
2004-299341A ("Tajima '341")	JP	Oct. 28, 2004
2004-082551A ("Takeshi")	JP	Mar. 18, 2004
2004-306529A ("Tajima '529")	JP	Nov. 4, 2004
2003019790A ("Usui '790")	JP	Jan. 21, 2003
H09104124A ("Ota")	JP	Apr. 22, 1997
H01-229639A ("Yasahura")	JP	Sept. 13, 1989
H6-956A ("Sakamoto")	JP	Jan. 11, 1994
2007-090642A ("Yokoyama")	JP	Apr. 12, 2007
H10-329313A ("Yanagawa")	JP	Dec. 15, 1998
2007-137034A ("Sasaki")	JP	June 7, 2007
2005-041011A ("Takahashi '011")	JP	Feb. 17 , 2005
2001-322265A ("Ishikawa '265")	JP	Nov. 20, 2001
5,223,853A ("Wysocki '853")	US	June 29, 1993
2002/0054311A1 ("Kubo")	US	May 9, 2002
2002/0186278A1 ("Nakamura")	US	Dec. 12, 2002
2005/068353A1 ("Nishiwaki")	US	Mar. 31, 2005
2002/0001015A1 ("Kojima")	US	Jan. 3, 2002
2007/0019041A1 ("Mataki")	US	Jan. 25, 2007
2002/0130940A1 ("Suzuki")	US	Sept. 19, 2002
2002/0167555A1 ("Miura")	US	Nov. 14, 2002
2004/0055508A1 ("Miyamoto")	US	Mar. 25, 2004
2005/0088468A1 ("Clark")	US	Apr. 28, 2005
2005/0157103A1 ("Silverbrook '103")	US	July 21, 2005
2006/0028497A1 ("Nakajima")	US	Feb. 9, 2006
2006/0164450A1 ("Hoisington")	US	July 27, 2006
2007/0057979A1 ("Gardner '979")	US	Mar. 15, 2007
2007/0101899A1 ("Taguchi")	US	May 10, 2007

Application/Patent No.	Country of Origin	Date of Publication/Issue
2007/0279444A1 ("Hayashi")	US	Dec. 6, 2007
2008/0174627A1 ("Kamiyama")	US	July 24, 2008
2009/000240A1 ("Smalley")	US	Jan. 1, 2009
3,108,673A ("Green")	US	Oct. 29, 1963
3,950,760A ("Rauch")	US	April 13, 1976
4,336,544A ("Donald")	US	June 22, 1982
4,972,211A ("Aoki")	US	Nov. 20, 1990
5,361,084A ("Paton")	US	Nov. 1, 1994
5,461,403A ("Wallace")	US	Oct. 24, 1995
5,495,270A ("Burr")	US	Feb. 27, 1996
5,901,425A ("Bibl")	US	May 11, 2009
6,164,850A ("Speakman '850")	US	Dec. 26, 2000
6,270,180B1 ("Arakawa")	US	Aug. 7, 2001
6,460,980B1 ("Hegedus")	US	Oct. 8, 2002
2004/051817A1 ("Takahashi '817")	US	Mar. 18, 2004
2005/083359A1 ("Tamura")	US	Apr. 21, 2005
2001/0026294A1 ("Takahashi '294")	US	Oct. 4, 2001
2004/0189732 ("Usuda")	US	Sept. 30, 2004
2004/0239727A1 ("Koyama")	US	Dec. 2, 2004
2005/0193911A1 ("Schneider")	US	Sept. 8, 2005
2005/0212835A1 ("Konno '835")	US	Sept. 29, 2005
2005/0249895A1 ("Sisler")	US	Nov. 10, 2005
2007/0064030 ("Abergel '030")	US	Mar. 22, 2007
2007/0139468A1 ("Schulmeister")	US	June 21, 2007
4,743,924A ("Scardovi")	US	May 10, 1988
5,502,467 ("Hoisington")	US	Mar. 26, 1996
5,623,001 ("Figov")	US	Apr. 22, 1997
6,450,602 ("Lubinsky")	US	Sept. 17, 2002
6,454,377 ("Ishizaki '377")	US	Sept. 24, 2002
6,695,437 ("Nakamura")	US	Feb. 24, 2004
7,018,459B2 ("Doi")	US	Mar. 28, 2006
7,226,141B2 ("Asano")	US	June 5, 2007
7,279,506B2 ("Sisler")	US	Oct. 9, 2007
7,451,698B2 ("Schneider")	US	Nov. 18, 2008
7,543,899B2 ("Konno '899")	US	June 9, 2009
7,614,725B2 ("Schulmeister")	US	Nov. 10, 2009
RE45,067E1 ("Abergel '067")	US	Aug. 12, 2014
6,123,405 ("Temple")	US	Sept. 26, 2000
2005/0068353A1 ("Nishiwaki")	US	March 31, 2005
2004/0046849A1 ("Onishi")	US	Mar. 11, 2004
2005/0116974A1 ("Suzuki")	US	June 2, 2005
2005/219282A1 ("Kachi '282")	US	Oct. 6, 2005
6102507A ("Yoshida '507")	US	Aug. 15, 2000
2007/0206055 ("Zapka")	US	Sept. 6, 2007
2007/0135957 ("Ogawa")	US	June 14, 2007
4,125,845 ("Stevenson")	US	Nov. 14, 1978
5,914,733 ("Sato '733")	US	June 22, 1999
3,946,398 ("Kyser")	US	March 23, 1976
98/08687A1 ("Ottosson")	WO	Mar. 5, 1998

Application/Patent No.	Country of Origin	Date of Publication/Issue
2006/029164A2 ("Laaspere")	WO	Mar. 16, 2006
2008/095077 ("Gardner '077")	WO	Aug. 7, 2008

Duplo USA also incorporates any and all prior art references disclosed in the French litigation on related patents, to the extent not identified on the above list and the accompanying Claim Chart. (*See* Exhibit A.)

Application/Patent No.	Country of Origin	Date of Publication/Issue
0200457A1 ("Scardovi")	EP	Nov. 5, 1986
0152247B1 ("Howkins")	EP	June 2, 1993
0995599B1 ("Ishizaki '599")	EP	Feb. 8, 2006
1186410A2 ("Chang")	EP	Mar. 13, 2002
1621260A1 ("Ohtsu")	EP	Feb. 1, 2006
1749670A1 ("Abergel '670")	EP	Feb. 7, 2007
1743772 ("Furukawa")	EP	Jan. 17, 2007
2007-001027A ("Shinkawa")	JP	Jan. 11, 2007
H02111554A ("Ozaki")	JP	Apr. 24, 1990
2000127458A ("Ito")	JP	May 9, 2000
2003-127417A ("Yokoyama")	JP	May 8, 2003
2003-341028A ("Tanno '028")	JP	Dec. 3, 2003
2006-334967A ("Maekawa")	JP	Dec. 14, 2006
2007021752A ("Furukawa")	JP	Feb. 1, 2007
2008044265A ("Tanno '265")	JP	Feb. 28, 2008
H09-156121A ("Takagi '121")	JP	June 17, 1997
2005280246A ("Kachi")	JP	Oct. 13, 2005
2003182062A ("Sumiya")	JP	July 3, 2003
2004/249686 ("Nishida")	JP	Sept. 9, 2004
2007076181A ("Katsuta")	JP	Mar. 29, 2007
2007076344A ("Yoshida '344")	JP	Mar. 29, 2007
2008119843 ("Aoyama")	JP	May 29, 2008
H03-108550A ("Takada")	JP	May 8, 1991
H07-101060 ("Wysocki '060")	JP	Apr. 18, 1995
H10-258504 ("Yoshimura")	JP	Sept. 29, 1998
S62-44455A ("Eguchi")	JP	Feb. 26, 1987
2003-279725A ("Usui '725")	JP	Oct. 2, 2003
2004-216758A ("Mori")	JP	Aug. 5, 2004
2004-114577A ("Minowa")	JP	Apr. 15, 2004
2004-299174A ("Tajima '174")	JP	Oct. 28, 2004
2004-299342A ("Tajima '342")	JP	Oct. 28, 2004
2004-299341A ("Tajima '341")	JP	Oct. 28, 2004
2004-082551A ("Takeshi")	JP	Mar. 18, 2004
2004-306529A ("Tajima '529")	JP	Nov. 4, 2004
2003019790A ("Usui '790")	JP	Jan. 21, 2003
H09104124A ("Ota")	JP	Apr. 22, 1997
H01-229639A ("Yasahura")	JP	Sept. 13, 1989

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H6-956A ("Sakamoto")	JP	Jan. 11, 1994
2007-090642A ("Yokoyama")	JP	Apr. 12, 2007
H10-329313A ("Yanagawa")	JP	Dec. 15, 1998
2007-137034A ("Sasaki")	JP	June 7, 2007
2005-041011A ("Takahashi '011")	JP	Feb. 17 , 2005
2001-322265A ("Ishikawa '265")	JP	Nov. 20, 2001
5,223,853A ("Wysocki '853")	US	June 29, 1993
2002/0054311A1 ("Kubo")	US	May 9, 2002
2002/0186278A1 ("Nakamura")	US	Dec. 12, 2002
2005/068353A1 ("Nishiwaki")	US	Mar. 31, 2005
2002/0001015A1 ("Kojima")	US	Jan. 3, 2002
2007/0019041A1 ("Mataki")	US	Jan. 25, 2007
2002/0130940A1 ("Suzuki")	US	Sept. 19, 2002
2002/0167555A1 ("Miura")	US	Nov. 14, 2002
2004/0055508A1 ("Miyamoto")	US	Mar. 25, 2004
2005/0088468A1 ("Clark")	US	Apr. 28, 2005
2005/0157103A1 ("Silverbrook '103")	US	July 21, 2005
2006/0028497A1 ("Nakajima")	US	Feb. 9, 2006
2006/0164450A1 ("Hoisington")	US	July 27, 2006
2007/0057979A1 ("Gardner '979")	US	Mar. 15, 2007
2007/0101899A1 ("Taguchi")	US	May 10, 2007
2007/0279444A1 ("Hayashi")	US	Dec. 6, 2007
2008/0174627A1 ("Kamiyama")	US	July 24, 2008
2009/000240A1 ("Smalley")	US	Jan. 1, 2009
3,108,673A ("Green")	US	Oct. 29, 1963
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4,972,211A ("Aoki")	US	Nov. 20, 1990
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5,461,403A ("Wallace")	US	Oct. 24, 1995
5,495,270A ("Burr")	US	Feb. 27, 1996
5,901,425A ("Bibl")	US	May 11, 2009
6,164,850A ("Speakman '850")	US	Dec. 26, 2000
6,270,180B1 ("Arakawa")	US	Aug. 7, 2001
6,460,980B1 ("Hegedus")	US	Oct. 8, 2002
2004/051817A1 ("Takahashi '817")	US	Mar. 18, 2004
2005/083359A1 ("Tamura")	US	Apr. 21, 2005
2001/0026294A1 ("Takahashi '294")	US	Oct. 4, 2001
2004/0189732 ("Usuda")	US	Sept. 30, 2004
2004/0239727A1 ("Koyama")	US	Dec. 2, 2004
2005/0193911A1 ("Schneider")	US	Sept. 8, 2005
2005/0212835A1 ("Konno '835")	US	Sept. 29, 2005
2005/0249895A1 ("Sisler")	US	Nov. 10, 2005
2007/0064030 ("Abergel '030")	US	Mar. 22, 2007
2007/0139468A1 ("Schulmeister")	US	June 21, 2007
4,743,924A ("Scardovi")	US	May 10, 1988
5,502,467 ("Hoisington")	US	Mar. 26, 1996
5,623,001 ("Figov")	US	Apr. 22, 1997
6,450,602 ("Lubinsky")	US	Sept. 17, 2002

Application/Patent No.	Country of Origin	Date of Publication/Issue
6,454,377 ("Ishizaki '377")	US	Sept. 24, 2002
6,695,437 ("Nakamura")	US	Feb. 24, 2004
7,018,459B2 ("Doi")	US	Mar. 28, 2006
7,226,141B2 ("Asano")	US	June 5, 2007
7,279,506B2 ("Sisler")	US	Oct. 9, 2007
7,451,698B2 ("Schneider")	US	Nov. 18, 2008
7,543,899B2 ("Konno '899")	US	June 9, 2009
7,614,725B2 ("Schulmeister")	US	Nov. 10, 2009
RE45,067E1 ("Abergel '067")	US	Aug. 12, 2014
6,123,405 ("Temple")	US	Sept. 26, 2000
2005/0068353A1 ("Nishiwaki")	US	March 31, 2005
2004/0046849A1 ("Onishi")	US	Mar. 11, 2004
2005/0116974A1 ("Suzuki")	US	June 2, 2005
2005/219282A1 ("Kachi '282")	US	Oct. 6, 2005
6102507A ("Yoshida '507")	US	Aug. 15, 2000
2007/0206055 ("Zapka")	US	Sept. 6, 2007
2007/0135957 ("Ogawa")	US	June 14, 2007
4,125,845 ("Stevenson")	US	Nov. 14, 1978
5,914,733 ("Sato '733")	US	June 22, 1999
3,946,398 ("Kyser")	US	March 23, 1976
98/08687A1 ("Ottosson")	WO	Mar. 5, 1998
2006/029164A2 ("Laaspere")	WO	Mar. 16, 2006
2008/095077 ("Gardner '077")	WO	Aug. 7, 2008

Duplo USA also incorporates any and all prior art references disclosed in the French litigation on related patents, to the extent not identified on the above list and the accompanying Claim Chart. (*See* Exhibit B.)

2. The '067 patent

Patent No.	Country of Origin	Date of Publication/Issue
634241B2 ("Roch")	AU	Feb. 18, 1993
0193678A1 ("Bava")	EP	Sept. 10, 1986
0729846A2 ("Piatt")	EP	Sept. 4, 1996
0842784A1 ("Dunand")	EP	May 20, 1998
0976567A2 ("Moghadam")	EP	Feb. 2, 2000
0995604A1 ("Wen '604")	EP	Apr. 26, 2000
1048466 ("Lubinsky '466")	EP	Nov. 2, 2000
1063096A2 ("Freund")	EP	Dec. 27, 2000
1099563 ("Onishi")	EP	May 16, 2001
1442892A1 ("Nakazawa")	EP	Aug. 4, 2004
1466741B1 ("Matsuzaki")	EP	Aug. 22, 2007
1466754A2 ("Yoshida '754")	EP	Oct. 13, 2004
1462266 ("Koguchi")	EP	Sept. 29, 2004
2041831 ("Stacey")	GB	Feb. 14, 1979
2000-141708A ("Matsunaga")	JP	May 23, 2000
2000-310651A ("Yamagata")	JP	Nov. 7, 2000

Patent No.	Country of Origin	Date of Publication/Issue
2000-326583A ("Shimizu")	JP	Nov. 28, 2000
2001-277642A ("Aizawa")	JP	Oct. 9, 2001
2001-301267A ("Takayanagi")	JP	Oct. 30, 2001
2001-500214A ("Bosch")	JP	Jan. 9, 2001
2002-103595A ("Sawano '595")	JP	Apr. 9, 2002
2002122728A ("Akahira")	JP	Apr. 26, 2002
2002-205370A ("Hiroyuki '370")	JP	Nov. 4, 2004
2002-347238A ("Yamamoto")	JP	Dec. 4, 2002
2003-066219A ("Okabe")	JP	Mar. 5, 2003
2003-075795A ("Sakuruda")	JP	Mar. 12, 2003
2003-118184A ("Kosaka")	JP	Apr. 23, 2003
2003133691A ("Hashimoto '691")	JP	May 9, 2003
2003152313A ("Kawahara")	JP	May 23, 2003
2003-220698A ("Arai")	JP	Aug. 5, 2003
2003-265996A ("Kato")	JP	Sept. 24, 2003
2003290686A ("Araya")	JP	Oct. 14, 2003
2003-311204A ("Hirai")	JP	Nov. 5, 2003
2003-311915A ("Hiroyuki '915")	JP	Nov. 6, 2003
2004-114377A ("Nakajima")	JP	Apr. 15, 2004
2004-121966A ("Takahashi '966")	JP	Apr. 26, 2004
2004-195722A ("Yamazaki")	JP	July 15, 2004
2005-119243A ("Kasahara")	JP	May 12, 2005
2005280246A ("Kachi")	JP	Oct. 13, 2005
2006212997A ("Tsuchiya")	JP	Aug. 17, 2006
4668044B2	JP	Apr. 13, 2011
H01275051A ("Moriyama")	JP	Nov. 2, 1989
H02-127048A ("Kyoko")	JP	May 15, 1990
H04-19149A ("Fujii")	JP	Jan. 23, 1992
H06106734A ("Yamada")	JP	Apr. 19, 1994
H07101060A ("Wysocki '060")	JP	Apr. 18, 1995
H08-257458A ("Ikushima")	JP	Oct. 8, 1996
H09-169111A ("Yoshida '111")	JP	June 30, 1997
H10035021A ("Nishio")	JP	Feb. 10, 1998
H10-146988A ("Watanabe '988")	JP	June 2, 1998
H11235833A ("Tsuboi)	JP	Aug. 31, 1999
H11-277724A ("Yamazaki")	JP	Oct. 12, 1999
H11342631A ("Tamura '631")	JP	Dec. 14, 1999
H11-59003A ("Shibata")	JP	Mar. 2, 1999
H1191127A ("Shiida")	JP	Apr. 6, 1999
H6-956A ("Sakamoto")	JP	Jan. 11, 1994
S53-85119A ("Kitagishi")	JP	July 27, 1978
S62-169655A ("Arufuretsudo")	JP	July 25, 1987
2001/0036424 ("Takahashi '424")	US	Nov. 1, 2001
2002/002943A1 ("Yamakawa")	US	Jan. 10, 2002
2002/0036678A1 ("Ito")	US	Mar. 28, 2002
2002/0130940A1 ("Suzuki")	US	Sept. 19, 2002
2002/0167555A1 ("Miura")	US	Nov. 14, 2002
2002/025260A1 ("Maruyama '260")	US	Feb. 28, 2002
2003/0083203A1 ("Hashimoto '203")	US	May 1, 2003

Patent No.	Country of Origin	Date of Publication/Issue
2003/0193540A1 ("King")	US	Oct. 16, 2003
2003/0201244A1 ("Ogawa")	US	Oct. 30, 2003
2004/0046849A1 ("Onishi")	US	Mar. 11, 2004
2004/0055508A1 ("Miyamoto")	US	Mar. 25, 2004
2004/0109989 ("Konno '989")	US	June 10, 2004
2004/0189768 ("Konno '768")	US	Sept. 30, 2004
2004/0202794 ("Yoshida '794")	US	Oct. 14, 2004
2004/118865A1 ("Maruyama '865")	US	June 24, 2004
2004/239705 ("Arikita")	US	Dec. 2, 2004
2005/0024445A1 ("Watanabe '445")	US	Feb. 3, 2005
2005/0088468A1 ("Clark")	US	Apr. 28, 2005
2005/0116974A1 ("Suzuki")	US	June 2, 2005
2005/0157103A1 ("Silverbrook '103")	US	July 21, 2005
2006/0001726A1 ("Kodas")	US	Jan. 5, 2006
2006/0028497A1 ("Nakajima")	US	Feb. 9, 2006
2006/0164450A1 ("Hoisington")	US	July 27, 2006
2006/255249A1 ("Liu")	US	Nov. 16, 2006
2007/0056598A1 ("Bray")	US	Mar. 15, 2007
2007/0057979A1 ("Gardner")	US	Mar. 15, 2007
2007/0101899A1 ("Taguchi")	US	May 10, 2007
2007/0279444A1 ("Hayashi")	US	Dec. 6, 2007
2008/0174627A1 ("Kamiyama")	US	July 24, 2008
2009/000240A1 ("Smalley")	US	Jan. 1, 2009
20100026750A1 ("Endo '750")	US	Feb. 4, 2010
3,108,673A ("Green")	US	Oct. 29, 1963
3,466,659A ("Ascoli")	US	Sept. 9, 1969
3,683,212 ("Zoltan")	US	Aug. 8, 1972
3,832,579 ("Arndt")	US	Aug. 27, 1984
3,950,760A ("Rauch")	US	April 13, 1976
4,198,642A ("Gamblin")	US	Apr. 15, 1980
4,220,115A ("Brossman")	US	Sept. 2, 1980
4,336,544A ("Donald")	US	June 22, 1982
4,667,878 ("Behr")	US	May 26, 1987
4,743,469A ("Lehmann")	US	May 10, 1988
4,972,211A ("Aoki")	US	Nov. 20, 1990
5,361,084A ("Paton")	US	Nov. 1, 1994
5,394,223 ("Hart")	US	Feb. 28, 1995
5,461,403A ("Wallace")	US	Oct. 24, 1995
5,495,270A ("Burr")	US	Feb. 27, 1996
5,812,162A ("Silverbrook '162")	US	Sept. 22, 1998
5,880,747A ("Bartenwerfer")	US	Mar. 9, 1999
5,901,425A ("Bibl")	US	May 11, 2009
5,992,973 ("Wen '973")	US	Nov. 30, 1999
5,993,551A ("Hahn")	US	Nov. 30, 1999
5502468A ("Knierim")	US	June 26, 1996
6,057,628A ("Voljoen")	US	May 2, 2000
6,089,693 ("Drake")	US	July 18, 2000
6,089,695 ("Takagi '695")	US	July 18, 2000
6,164,850A ("Speakman '850")	US	Dec. 26, 2000

Patent No.	Country of Origin	Date of Publication/Issue
6,193,361 ("Wen '361")	US	Feb. 27, 2001
6,270,180B1 ("Arakawa")	US	Aug. 7, 2001
6,280,799B1 ("Okabe")	US	Aug. 28, 2001
6,290,340B1 ("Kitahara")	US	Sept. 18, 2001
6,325,480 ("Moghadam")	US	Dec. 4, 2001
6,361,155B1 ("Kanda")	US	Mar. 26, 2002
6,375,293B1 ("Endo '293")	US	Apr. 23, 2002
6,460,980B1 ("Hegedus")	US	Oct. 8, 2002
6,503,831B2 ("Speakman '831")	US	Jan. 7, 2003
6,508,552 ("Steinfield")	US	Jan. 21, 2003
6,547,361 ("Suzuki")	US	Apr. 15, 2003
6,735,050B2 ("Takagi '050")	US	May 11, 2004
6,986,739B2 ("Warren")	US	Jan. 17, 2006
6102507A ("Yoshida '507")	US	Aug. 15, 2000
7,021,732 ("Folkins")	US	Apr. 4, 2006
7,168,167B2 ("Silverbrook '167")	US	Jan. 30, 2007
7,575,293 ("Snyder")	US	Aug. 18, 2009
Re35737E ("Sourlis")	US	Feb 24, 1998
7,927,669 ("Schlatterbeck '669")	US	Apr. 19, 2011
2005/0255249A1 ("Schlatterbeck '249")	US	Nov. 17, 2005
6,523,948 ("Matsumoto")	US	Feb. 25, 2003
5,917,521 ("Haga")	US	June 29, 1999
7,207,269B2 ("Yoshida '269")	US	Apr. 24, 2007
3,946,398 ("Kyser")	US	March 23, 1976
01/017780A1 ("Codos '780")	WO	Mar. 15, 2001
02/018148A1 ("Codos '148")	WO	Mar. 7, 2002
03/099456A1 ("Schlatterbeck '456")	WO	Dec. 4, 2003
97/48557A2 ("Speakman '557")	WO	Dec. 24, 1997
98/008687A1 ("Ottosson")	WO	Mar. 5, 1998

Duplo USA also incorporates any and all prior art references disclosed in the French litigation on related patents, to the extent not identified on the above list and the accompanying Claim Chart. (*See* Exhibit C.)

3. The '449 patent

Patent No.	Country of Origin	Date of Publication/Issue
1321497A1 ("Kondo")	EP	June 25, 2003
1364804A2 ("Confalone")	EP	Jan. 4, 1921
1589080A1 ("Munoz")	EP	Oct. 26, 2005
1593521 ("Sisler")	EP	Nov. 9, 2005
1749670A1 ("Abergel '670")	EP	Feb. 7, 2007
2,204,401A1 ("Abergel '401")	EP	July 7, 2010
2005293823A ("Isonaka")	JP	Oct. 20, 2005
2007031667A ("Saito")	JP	Feb. 8, 2007

Patent No.	Country of Origin	Date of Publication/Issue
2007-283732A ("Nakazawa")	JP	Nov. 1, 2007
2010065193 ("Senda")	JP	Mar. 25, 2010
H05214299A ("Nakamu")	JP	Aug. 24, 1993
20070039742	KR	Apr. 13, 2007
2004/0024078A1 ("Itoh")	US	Feb. 5, 2004
2004/0189774 ("Uejima")	US	Seot. 30, 2004
2005/0176841A1 ("Krohn")	US	Aug. 11, 2005
2005/0193911A1 ("Schneider")	US	Sept. 8, 2005
2005/0249895A ("Sisler")	US	Nov. 10, 2005
2005/0255249A1 ("Schlatterbeck '249")	US	Nov. 17, 2005
2005/261391A1 ("Narayan-Sarathi")	US	Nov. 24, 2005
2006/0155002A1 ("Odell")	US	July 13, 2006
2007/0014933A1 ("Sun")	US	Jan. 18, 2007
2007/0071953A1 ("Nakamura")	US	Mar. 29, 2007
2007/0078195A1 ("Kobayashi")	US	Apr. 5, 2007
2007/0139468A1 ("Schulmeister")	US	June 21, 2007
2008/0090929A1 ("Wilson")	US	Apr. 17, 2008
2008/0138531A1 ("Laginess")	US	June 12, 2008
2008/0255264A1 ("Hong")	US	Oct. 16, 2008
2009/0099277A1 ("Nagvekar")	US	Apr. 16, 2009
2010/0092736A1 ("Nishikawa")	US	Apr. 15, 2010
2010/166975A1 ("Abergel '975")	US	July 1, 2010
2011/0045199A1 ("Cong")	US	Feb. 24, 2011
2011/0288198A1 ("Menon")	US	Nov. 24, 2011
2015/0073066A1 ("Abergel '066")	US	Oct. 25, 2013
6,114,406A ("Kaiger")	US	Sept. 5, 2000
2008/0106002A1 ("Feldman")	US	May 8, 2008
RE24906E ("Ulrich")	US	Dec. 13, 1960
4,248,748 ("McGrath")	US	Feb. 3, 1981
2007/0120922A1 ("Belelie")	US	May 31, 2007
02/38688A2 ("Lee")	WO	May 16, 2002
2002/061002A2 ("Carlson")	WO	Aug. 8, 2002
2002/46323A2 ("Zohar")	WO	June 13, 2002
2008/043692 ("Claes")	WO	Apr. 17, 2008
2008/139188A1 ("Morgan")	WO	Nov. 20, 2008
99/18134A1 ("Hoffman")	WO	Apr. 15, 1999

Duplo USA also incorporates any and all prior art references disclosed in the French litigation on related patents, to the extent not identified on the above list and the accompanying Claim Chart. (*See* Exhibit D.)

C. Prior Art Non-Patent Publications

1. The '031 patent

Title	Date of publication	Author/Publisher
Power Amplifier Drives Multiple Inkjet Heads	Jan. 2005	Eddlemon & Robinson/MicroTechonlogy Corp.
Opportunity at the Must See'ems at Graph Expo	2006	Alexander/WhatTheyThink
GraphExpo and Converting Expo 2006	2006	PrintingImpressions

Duplo USA also incorporates any and all prior art references disclosed in the French litigation on related patents, to the extent not identified on the above list and the accompanying Claim Chart. (*See* Exhibit A.)

2. The '806 patent

Title	Date of publication	Author/Publisher
Power Amplifier Drives Multiple Inkjet Heads	Jan. 2005	Eddlemon & Robinson/MicroTechonlogy Corp.
Opportunity at the Must See'ems at Graph Expo	2006	Alexander/WhatTheyThink
GraphExpo and Converting Expo 2006	2006	PrintingImpressions

Duplo USA also incorporates any and all prior art references disclosed in the French litigation on related patents, to the extent not identified on the above list and the accompanying Claim Chart. (*See* Exhibit B.)

3. The '067 patent

Title	Date of publication	Author/Publisher
PCL 5 Printer Language Technical Reference Manual - Part I	1992	Hewlett-Packard Co.
Technologies and materials of inkjet printers	1998	Amari
Post-Script Language Reference Manual	1999	Adobe Systems Inc./Addision Wesley Publishing Company
PCL 5 Printer Language Technical Reference Manual - Part II	1999	Hewlett-Packard Co.
Recent Progress in Inkjet Technologis II	1999	Hanson (Editor)/IS&T
Function and Performance of a Shear mode Piezo Printhead	1999	Beurer et al/ IS&T

Title	Date of publication	Author/Publisher
Scaling of Piezoelectric Drop-on-Demand Jets for High Resolution Applications	1999	McDonald et al/IS&T
Dynamics of Piezoelectric Inkjet Printing Systems	2000	Sakai/IS&T
Printer Job Language Technical Reference Manual	2003	Hewlett-Packard Development Company
Present Status of High Resolution Ink Jet Printing	1988	Yasumasa Matsuda
Technical Trends in Inkjet Printheads for Industrial Applications	2004	Chiaki Tanuma
Features of Shear Mode Piezo Inkjet Head	2004	Yoshio Takeuchi et al.

Duplo USA also incorporates any and all prior art references disclosed in the French litigation on related patents, to the extent not identified on the above list and the accompanying Claim Chart. (*See* Exhibit C.)

4. The '449 patent

Title	Date of publication	Author/Publisher
Japanese Industrial Standard JIS X 6305 ("JIS X 6305")	2010	Japanese Standards Association
International Standard ISO/IEC 7810	Nov. 1, 2003	American National Standards Institute
Japanese Construction Mechanization Association Standard ("JCMAS")	1997	Japan Construction Mechanization Association Standardization Conference
Applied Technology of Plastic Hard Coat	2008	CMC Publishing
Cytec Catalog	2009	Cytec Industries, Inc.
Product Bulletin: CN-104	1999	Sartomer
Exhibit 41 in EP 401 French Litigation	2019	Koichi Yamaguchi

Duplo USA also incorporates any and all prior art references disclosed in the French litigation on related patents, to the extent not identified on the above list and the accompanying Claim Chart. (*See* Exhibit D.)

D. Prior Art Products and/or Knowledge

Defendant contends that the Asserted Claims are invalid under 35 U.S.C. §§ 102 and/or 103 based on prior art items embodying any alleged inventions or structures described in, and/or any knowledge disclosed by or referred to in, any of

the prior art patents or prior art publications identified in the above sections. Because Defendant has not yet completed discovery in this case, Defendant reserves the right to supplement this disclosure with facts, documents, or other information learned at a later point through third-party discovery or further investigation. For example, Defendants expect to discover documents from additional third parties through discovery methods from parties that are believed to have knowledge, documentation, and/or corroborating evidence concerning some of the prior art listed above and below and/or additional prior art.

Table 1: Products[2]

Entity that Maded/ Used / Offered / Known	Item Offered for Sale / Publically Used / Known	Date of Use / Sale / Offer / Public Disclosure	Identity of Person Receiving Offer / To Whom Made Known
Heidelberger Druckmaschinen AG	The Speedmaster CD 74	At least 2004	Heidelberger Actual/Potential Customers
Pat Technologies	VarStar	At least 2006	Pat Technologies Actual/Potential Customers
Pat Technologies	Rotoworx	At least 2006	Pat Technologies Actual/Potential Customers
Kodak Nexpress	Kodak Nexpress 2100 Plus	At least 2007	Kodak Nexpress Actual/Potential Customers
Roland DG Corporation	VersaUV LEC-300	At least 2008	Roland Actual/Potential Customers
Komfi	Spotmatic 54	At least 2008	Komfi Actual/Potential Customers
FFEI	FFEI Emblaze	At least 2007	FFEI Actual/Potential Customers

[2] Any discussion of a physical product (such as those listed in Table 1) herein shall also apply with equal force to the corresponding product-related documents such as brochures, manuals, specifications, or patents that are known, as well as those corresponding product-related documents produced at later points during discovery. In other words, both the product-related documents and the underlying products themselves qualify as prior art in the context that they are used herein.

Entity that Maded/ Used / Offered / Known	Item Offered for Sale / Publically Used / Known	Date of Use / Sale / Offer / Public Disclosure	Identity of Person Receiving Offer / To Whom Made Known
Scodix	Scodix 1200	At least 2010	Scodix Actual/Potential Customers
AGFA	Anapurna Mv	At least 2008	AGFA Actual/Potential Customers

All of the products listed in Table 1 above qualify as prior art to each of the Asserted Patents under 35 U.S.C. §102(b) because they were each in "public use" or "on sale" prior to the earliest U.S. application filing date corresponding to each of the Asserted Patents.

The Federal Circuit has held that "[t]he proper test for the public use prong of the [pre-AIA] § 102(b) statutory bar is whether the purported use: (1) was accessible to the public; or (2) was commercially exploited." *See Invitrogen Corp. v. Biocrest Mfg. L.P.*, 424 F.3d 1374, 1380 (Fed. Cir. 2005). Additionally, the on-sale bar of § 102(b) is triggered when the invention is both (1) the subject of a commercial offer for sale not primarily for experimental purposes and (2) ready for patenting. *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 67 (1998). Each of the products listed in Table 1 above meets these criteria.

The publications cited in MGI_009190 – MGI_009275 indicate that at least by the year indicated in the above table for each system prior art, such product was being commercially exploited and was ready for patenting. For example, the VarStar machine of PAT Technologies was introduced in the fall of 2006, as "the world's first digital UV varnishing machine" and was making use of the "*piezo jet technology.*" (*See e.g.*, https://whattheythink.com/articles/29711-opportunity-must-see-ems-graph-expo/ and https://www.piworld.com/article/graph-expo-converting-expo-2006-and-8212-pre-show-preview-36664/19/). The machine allowed for (i) depositing selective varnish ("*spot coating*"), (ii) the creation of various patterns (iii)

using a graphic configuration file, and (iv) the adjustment of the intensity of the UV curing lamp to the amount of coating applied." (*See id.*; *see also* MGI_009190 – MGI_009275.)

As another example, the FFEI Emblaze is a digital system for spot coating using UV single pass inkjet technology. (*See, e.g.*, https://kta.fi/doc/fuji/fuji_newsline_nov_2008.pdf; *see also* MGI_009190 – MGI_009275.) Its printhead incorporates long-life piezoelectric element arrays and uses single-pass inkjet technology. (*Id.*) Its printhead can produce variable sized dots as opposed to traditional fixed droplets. (*Id.*)

The above discussion is not exclusive. Defendant reserves the right to rely on both the listed products as well as other products that may become known and/or relevant during the course of this matter.

Any citation to one or more of these prior art references, or other prior art references regarding any method or system, should be construed to constitute not only a citation to the prior art reference itself but also a reference to the system itself. Discovery is ongoing in this case, and Defendant will supplement these contentions if and when more information becomes available.

E. Prior Art Under 35 U.S.C. §§ 102(f) and 102(g)

Because Defendant has not yet completed discovery in this case, including but not limited to taking depositions of the named inventors of the Asserted Patents, reviewing MGI's productions, and seeking discovery of prior inventions by third parties, Defendant reserves the right to supplement this disclosure with facts, documents, or other information learned at a later point through discovery or further investigation. Defendant contends, upon information and belief, that Mr. Edmund Abergel did not invent the subject matter of the '449 patent, and, thus, the patent is not valid.

F. Defendant's Identification of Prior Art References

Pursuant to the Special Master Order No. SM-7, Dkt. No. 92 (May 15, 2023), Defendant identified a collective total of forty (40) prior art references. (*See* 06/04/2023 Email from Mok to Carnahan et al.

- US 5,901,425A (Bibl)
- US 6,450,602 (Lubinsky)
- Applied Technology of Plastic Hard Coat (Applied Technology)
- Declaration of Koichi Yamaguchi (2/5/2019) (Duplo's Exhibit No. 41 from French Proceedings)
- JPH01-275051 (Moriyama)
- FFEI Emblaze
- WO 02/38688 (Lee)
- Japanese Construction Mechanization Association Standard (JCMAS)
- Japanese Industrial Standard JIS X 6305 (JIS X 6305)
- JP 2003182062A (Sumiya)
- JP 2003220698A (Arai)
- JP 2004-249686 (Nishida)
- JP 2006-240262 (Nagashima)
- JP 2007031667A (Saito)
- JP 2007-76344 (Ricoh)
- JP S62-44455A (Eguchi)
- JP2005293823 (Isonaka)
- JPH 05-214299 (Nakamu)
- Manroland (US 7,451,698 / US 2005/0193911 including related product art)
- PAT Varstar

- Silverbrook (US 5,812,162)
- US 2001/0026294 (Takahashi)
- US 2002/0054311 (Kubo)
- US 2004/0189732 (Usuda)
- US 2004/0239727 (Koyama)
- US 2005/0024445 (Watanabe)
- US 2007/0064030 (Abergel)
- US 2008/0106002 (Feldman)
- US 6,361,155 (Kanda)
- US 6,375,293 (Endo)
- US 6,454,377 (Ishizaki 377)
- US 6,523,948 (Matsumoto)
- US 6,619,777 (Chang)
- US 6,695,437 (Nakamura)
- US 7, 207,269 (Yoshida 269)
- US 7,090,323 (Takatsuka)
- US 7,520,579 (Yoshida 579)
- WO 03/099456 / US 2005/0255249 (Schlatterbeck)
- Wen (US 5,992,973)
- WO 98/08687A1 (Topaz)

Defendant's identification of the above 40 prior art references and products is based on the information known to Defendant to date. Consistent with the Special Master's Order, Defendant reserves the right to modify its prior art references for good cause shown, including in light of information learned in ongoing discovery. Defendant makes this identification without having received sufficient disclosure of discovery from MGI - for example, MGI's deficiencies include MGI's

failure to meet its document production requirements under the Joint Case Schedule (Dkt. No. 46), and MGI's deficient interrogatory response about Duplo's invalidity contentions (e.g., Duplo Interrogatory No. 10). Defendant also notes that both parties are filing objections to the Special Master's report and recommendation on claim construction (Dkt. No. 86-1) and accordingly no final claim constructions are currently known. Defendant reserves its rights to revise this identification in view of whatever action the Court takes concerning the parties' objections to the Special Master's report and recommendation on claim construction.

III. ANTICIPATION AND OBVIOUSNESS (35 U.S.C. §§ 102 AND 103)

The Scheduling Order in this action, states, that Duplo USA's Invalidity Contentions must contain, "Whether each item of prior art anticipates each asserted claim or renders it obvious. If obviousness is alleged, an explanation of why the prior art renders the asserted claim obvious, including an identification of any combinations of prior art showing obviousness." (*See* Joint Schedule, at p. 8 (Dkt. No. 46) (Oct. 28, 2022)).

The Asserted Claims are anticipated by and/or rendered obvious in view of one or more items of prior art identified in these contentions, alone and/or in combination. Based on their investigation to date, Defendant has provided in the lists above the prior art presently known to Defendant that it contends anticipates and/or renders obvious the Asserted Claims under at least MGI's actual and/or apparent application of those claims. The prior art identified in these contentions discloses the elements of the Asserted Claims either explicitly or inherently.

Prior art patents or publications included in these contentions may be related (such as a divisional, continuation, continuation-in-part, parent, or child) to earlier or later-filed patents or publications, may have counterparts filed in other jurisdictions, or may incorporate (or be incorporated by) other patents or

publications by reference. The listed patents or publications are intended to be representative of these other patents or publications to the extent they exist. Defendant accordingly reserves the right to modify, amend, or supplement these contentions with these related patents or publications, as well as other prior art references, upon further investigation. Additionally, any reference in these Contentions, including the appendices and/or exhibits thereto, to a specific subsection or subsections of 35 U.S.C. § 102, is merely exemplary, and Defendant expressly reserves the right to rely on additional or other sections of 35 U.S.C. § 102, as appropriate.

Although Defendant's investigation is ongoing, information available to date indicates that each prior art system disclosed above was at least (1) known or used in this country before the alleged invention of the claimed subject matter of the Asserted Patents; (2) in public use, on sale, or offered for sale in this country more than one year before the effective filing date for the Asserted Patents; or (3) invented and not abandoned, suppressed, or concealed prior to the alleged invention of the Asserted Patents.

Much of the art identified in these contentions reflects common knowledge and the state of the art prior to the filing or asserted priority dates of the Asserted Patents. As such, the obviousness combinations in these contentions are intended to be exemplary. There are many possible combinations of the disclosed prior art, and the inclusion of certain exemplary combinations does not exclude other combinations. For example, where a particular contention calls for combining references, any of a number of references can be combined.

Citations to particular excerpts from the prior art are likewise exemplary and not exhaustive of the evidentiary support for the invalidity of the Asserted Patents contained in and/or concerning a particular piece of prior art. Defendant may rely

on uncited portions of the prior art references, other documents or operational systems, the "Background of the Invention" and other relevant portions of the Asserted Patents, the prosecution histories of the Asserted Patents (including all cited references), and forthcoming fact and expert testimony to provide context to aid in understanding the prior art reference and/or the cited portions of the references. Where Defendant cites to a particular figure in a reference, the citation encompasses the caption and description of the figure and any text relating to or discussing the figure. Likewise, where Defendant cites text referring to a figure, the citation includes the figure as well.

In light of the statements and reservation of rights set forth in these Contentions, Defendant contends that, at least under MGI's actual and/or apparent application of the claims, the references and systems in the tables above anticipate and/or render obvious the Asserted Claims under 35 U.S.C. §§ 102(a), (b), (e), (f) and/or (g), as set forth in the charts attached as:

- Exhibit A for the asserted claims of the '031 patent;
- Exhibit B for the asserted claims of the '806 patent;
- Exhibit C for the asserted claims of the '067 patent;
- Exhibit D for the asserted claims of the '449 patent.

All asserted claims of the '031 patent are rendered obvious by combinations of at least the references cited in Exhibit A and/or listed above. Claim 1 of the '806 patent is anticipated by at least Takahashi '294, Topaz, and Koyama, and all asserted claims are rendered obvious by combinations of at least the references cited in Exhibit B and/or listed above. All asserted claims of the '067 patent are anticipated by at least Yoshida '754, Yoshida '269, Schlatterbeck '669 (and US

2005/0255249 and WO 03/099456A1)[3], Wen, and Matsumoto, and rendered obvious by combinations of at least the references cited in Exhibit C and/or listed above. Claims 1, 2, 4, 7, 8, 10, 11, 13-15, 21, 26, and 28 of the '449 patent are anticipated by at least JP667, and all asserted claims are rendered obvious by combinations of at least the references cited in Exhibit D and/or listed above.

These charts, however, are exemplary. The claimed features are similarly described and suggested in other places (including in all of the documents cited during prosecution of each piece of prior art), and also were present when prior-art systems practicing the described prior art were used before the application that ultimately led to the Asserted Patents. Thus, where patents or other printed materials are disclosed, Defendant reserves the right to also rely on those materials as descriptions of systems, devices, or methods referenced therein, publicly used, and/or on sale or known in the United States. Further, Defendant reserves the right to rely on other evidence of the prior art beyond merely the exemplary references cited in the Exhibits. For the references cited in the Exhibits, each listed document or item became prior art at least as early as the dates given therein. For any prior art references not included in the Exhibits, Defendant may not be charting these additional references, either because they are cited in conjunction with primary references that are already cited therein, and/or because these references have similar disclosures to the charted prior art references and/or may be used to show the state of the art or reasons why a person of ordinary skill in the art would modify or combine prior art references. Further, discovery has not yet been completed in this

[3] WO 03/099456 is the WIPO publication of international application PCT/EP03/05711, and US 2005/0255249 is the publication of the US national stage application of the same international application. Therefore, US 2005/0255249 serves as an English translation of WO 03/099456. Further, Schlatterbeck '669 contains the same disclosures as US 2005/0255249. Therefore, the same motivations to combine that apply to Schlatterbeck '669 apply to US 2005/0255249 and WO 03/099456 throughout this document.

case, and Defendant reserves the right to supplement the Exhibits with information about prior art products and/or knowledge, including facts, documents, or other information learned at a later point through third-party discovery or further investigation, about prior art products and/or knowledge.

If MGI asserts that one or more of these references or systems fails to disclose one or more elements of a claim, Defendant reserves the right to also use those references to invalidate the claim under 35 U.S.C. § 103.

Defendant's assertion that any combinations render the asserted claims obvious under 35 U.S.C. § 103 is in no way an admission or suggestion that each reference does not independently anticipate the Asserted Claims under 35 U.S.C. § 102. *See Connell v. Sears, Roebuck & Co*., 722 F.2d 1542, 1548 (Fed. Cir. 1983) ("'[A]nticipation is the epitome of obviousness.'") (quoting *In re Fracalossi*, 681 F.2d 792, 794 (CCPA 1982)). Nor does the inclusion of the exemplary combinations in the attached Exhibits exclude other combinations of prior art disclosed in this or previous sections.

Each prior art reference or system may be combined with (1) information known to persons skilled in the art at the time of the alleged invention; (2) any other anticipatory prior art references or systems; and (3) any of the additional prior art identified above or in the prosecution of the Asserted Patents and related applications.

All discussion of obviousness in these Contentions follows well-established precedent. In *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417–18, 420–21 (2007), the Supreme Court rejected the Federal Circuit's rigid "teaching, suggestion, or motivation" requirement in favor of a flexible, functional approach in which an explicit motivation to combine prior art references is not required to establish obviousness. The Court further held that patents based on new combinations of

elements or components already known in a technical field may be obvious. Specifically, the Court in *KSR* rejected a rigid application of the "teaching, suggestion, or motivation [to combine]" test. *Id*. at 418-419. "In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim." *Id*. at 419. "Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *Id*. at 420. In particular, the Supreme Court emphasized the principle that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *Id*. at 416. A key inquiry is whether the "improvement is more than the predictable use of prior art elements according to its established function." *Id*. at 417.

Although a teaching, suggestion, or motivation to combine references is not required, a motivation to modify a particular reference or system or to combine any two or more references or systems comes from (1) the nature of the problem being solved; (2) the teachings of the prior art; (3) the knowledge and common sense of persons of ordinary skill in the art; (4) the fact that all of the references teach systems and methods related to the subject matter of the Asserted Patents; (5) the fact that many of the authors of the references were part of the same academic or research community and presented at many of the same conferences; (6) the existence of similar improvements in similar applications; (7) the number of identified, predictable solutions to the problem addressed by the Asserted Patents; and (8) considerations of efficiency, effectiveness, convenience, cost-savings, and accessibility.

The rationale to combine or modify prior art references is significantly stronger when the references seek to solve the same problem, come from the same field, and correspond well. *In re Inland Steel Co.*, 265 F.3d 1354, 1362 (Fed. Cir. 2001) (allowing two references to be combined as invalidating art under similar circumstances where the art "focus[ed] on the same problem . . . c[a]me from the same field of art [and] . . . the identified problem found in the two references correspond[ed] well").

In view of the Supreme Court's *KSR* decision, the PTO issued a set of new Examination Guidelines. *See* Examination Guidelines for Determining Obviousness Under 35 U.S.C. § 103 in view of the Supreme Court Decision in *KSR International Co. v. Teleflex, Inc.*, 72 Fed. Reg. 57526 (October 10, 2007). Those Guidelines summarized the *KSR* decision, and identified various rationales for finding a claim obvious, including those based on other precedents. Those rationales include: (1) combining prior art elements according to known methods to yield predictable results; (2) simple substitution of one known element for another to obtain predictable results; (3) use of a known technique to improve similar devices (methods, or products) in the same way; (4) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; (5) "obvious to try" — choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; (6) known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art; (7) some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the

claimed invention. *Id*. at 57529. Defendant contends that one or more of these or other rationales apply in considering the obviousness of the Asserted Claims.

Indeed, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field or endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. The combination of prior art references identified in these contentions would have been obvious because the claimed combinations represent the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance, would motivate the addition of features to systems as they become available, become less expensive, become more commonly used, provide better performance, reduce costs, size or weight, or predictably achieve other clearly desirable results.

A. Additional Motivations to Combine Also Applicable to the ′031 and ′806 patents

Defendant incorporates herein the disclosures of the Prior Art provided in Exhibits A and B, which can be combined to invalidate each of the Asserted Claims of the ’031 and ’806 patents. Additionally, exemplary combinations are listed below for purposes of explaining and exemplifying possible combinations. These combinations are not intended to be limiting but rather intended to provide notice of the reasoning behind particular motivations to combine. In many instances, multiple different motivations would apply to a particular combination (for example, if

multiple references were both authored by the same person and referred to the same product/system, then both of those motivations would apply) and the specific combinations were not duplicated.

Should any prior art be deemed not to disclose, explicitly or inherently, any limitation of a claim, Defendant reserves the right to argue that any such difference between that prior art and the corresponding claim would have been obvious to one of ordinary skill in the art. To the extent that such an argument is deemed a "combination" analysis for purposes of obviousness, Defendant discloses its present intention to rely on the separate combination of the knowledge of a person of ordinary skill in the art with each item of prior art identified above. The knowledge of a person of ordinary skill in the art is demonstrated by, for example, the full list of references above, the prior art produced in this litigation, and forthcoming expert reports.

Example motivations to combine the Prior Art to the '031 and '806 patents (including but not limited to motivations to combine the references in Exhibits A and B with the other Prior Art to the '031 and '806 patents) are provided below. In addition to being combinations taught directly by these references, such combinations would have been (a) the combination of prior art elements according to known methods to yield predictable results, (b) the simple substitution of one known element for another to obtain predictable results, (c) the use of a known technique to improve similar devices in the same way, (d) applying a known technique to a known device ready for improvement to yield predictable results, and (e) obvious to try with a reasonable expectation of success.

- The '031 and '806 patents Prior Art is analogous art and the goals of the references complement one another. They are all directed, e.g., towards ink jet devices for ejecting ink on a print medium. A person of ordinary skill in the art

would understand the teachings of the references to be applicable to one another. A person of ordinary skill in the art would also understand that the teachings of the '031 and '806 patents Prior Art references related to ink jet devices are generally applicable to other references directed to ink jet devices, including references discussing or disclosing these similar devices.

- In the event it is determined that any of the '031 and '806 patents Prior Art, *e.g.*, Topaz, Takahashi, Abergel, Kubo, Koyama, Nagashima, Takatsuka, Bibl, Lubinsky, or Manroland does not disclose "detected as the ink flows from the ink container to the nozzle by at least one detector upstream from a heater included in the nozzle arrangement" ('031 Patent claim 1; '806 Patent claims 2 and 20); "a computer controlling a heater included in the nozzle arrangement"; ('031 Patent claim 12; '806 Patent claims 9 and 27); and "at least one detector upstream from the heater for detecting the viscosity of the ink and/or a detector for detecting temperature of the ink droplets as the ink flows from the ink container to the nozzle" ('031 patent claim 12; '806 Patent claims 10 and 29); "the parameter includes viscosity of the covering ink measured by a probe upstream from the piezoelectric actuator and/or from a heater heating the covering ink" ('806 patent, claims 8, 17), "a temperature detector for the ink flowing to the ink jet nozzle arrangement, and a temperature controller responsive to the temperature detector, the temperature controller being arranged for controlling the temperature of the ink flowing in the ink jet nozzle arrangement, wherein the computer controls the heater via the temperature controller" ('806 patent, claims 13 and 32), it would have been obvious to modify any such prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Eguchi discloses a heating device in a nozzle arrangement driven by a temperature control unit such as a CPU or ROM based on a temperature detecting device and an

ink viscosity detecting device upstream of the heater and for detecting temperature and viscosity of the ink as it flows from the ink container to the nozzle. (Eguchi, paragraph [0001], ll. 28-38; Fig. 1); Takahashi discloses a temperature sensor for measuring the temperature of the ink (paragraph 26); and Topaz discloses, e.g., viscosity and/or temperature as parameters for controlling the shape of the waveform applied to the piezoelectric actuator (Topaz, p. 21, ll. 12-17; p. 23, ll. 16-24), and thus viscosity and/or temperature detection must occur;

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, *e.g.*, Eguchi, Takahashi, or Topaz, or their own knowledge, into any other prior art of the '031 and '806 patents, *e.g.*, to provide precise control of the temperature and viscosity of the ink (*see, e.g.*, Eguchi, paragraph [0001], ll. 5-11 and 28-39; Fig. 1); or to control the viscosity of the ink within a predetermined range so that the ejection waveform can be controlled based on the measured ink viscosity while the ink viscosity is within the predetermined range (*see, e.g.*, Koyama, paragraphs 8, 13, 64-72; Fig. 8). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '031 and '806 patents Prior Art, *e.g.*, Topaz, Takahashi, Abergel, Kubo, Koyama, Nagashima, Takatsuka, Bibl, Lubinsky, or Manroland does not disclose controlling the shape of an electric waveform "in response to at least one of the viscosity and/or the temperature of the ink" ('031 patent claim 1); "in response to the viscosity and/or temperature of the ink" ('806 patent, claim 2); "in response to at least one of the following parameters: viscosity of the ink, composition of the covering ink, temperature of the covering

ink, temperature of the substrate, desired thickness of the layer, type of substrate to which the droplets are applied, and relative speed of the substrate and the ink jet nozzle arrangement" ('806 patent claims 1 and 9), it would have been obvious to modify any such prior art, to include these claim elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Usuda discloses that drive waveforms are determined on the basis of viscosity and mass of a droplet ejected from the ejecting head (e.g., Usuda, paragraphs 8 and 63); Takahashi discloses controlling the waveform which controls the shapes of the droplets in response to temperature and viscosity (e.g. Takahashi, paragraph 26); Topaz discloses that manipulation of electric waveform parameters such as the amplitude of the electrical waveform is dependent on several factors including the type, and viscosity of the ink used, and temperature (e.g., Topaz, p. 2, ll. 12-22; p. 9, ll.9-16; p. 25, ll. 13-17); Koyama discloses controlling the ejection waveform based on the measured ink viscosity (e.g., paragraphs 8, 13, 64-72; Fig. 8); and Manroland discloses controlling the shapes of droplets in response to desired thickness (e.g., Manroland, paragraphs 33-34; Figs. 8 and 9).

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, *e.g.*, Usuda, Takahashi, or Topaz, or their own knowledge, into any other prior art of the '031 and '806 patents, *e.g.*, to obtain ejection of droplets of a constant mass regardless of temperature changes (*see, e.g.*, Usuda, paragraphs 3 and 8); or to provide an appropriate drive waveform signal according to the viscosity of the ink even during quick changes in viscosity before the temperature and viscosity can be stabilized by a heater (*see, e.g.*, Koyama, paragraphs 6-7 and 84). A person of ordinary skill in the art would

have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '031 and '806 patents Prior Art, *e.g.*, Topaz, Takahashi, Abergel, Kubo, Koyama, Nagashima, or Takatsuka, Bibl, Lubinsky, or Manroland does not disclose "said electric waveform having a shape determined by at least one of the viscosity and/or the temperature of the covering ink" ('031 patent, claim 12), it would have been obvious to modify any such prior art, to include these claim elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Usuda discloses that drive waveforms are determined on the basis of viscosity and mass of a droplet ejected from the ejecting head (e.g., Usuda, paragraphs 8 and 63); Takahashi discloses controlling the waveform which controls the shapes of the droplets in response to temperature and viscosity (e.g. Takahashi, paragraph 26); Topaz discloses that manipulation of electric waveform parameters such as the amplitude of the electrical waveform is dependent on several factors including the type, and viscosity of the ink used, and temperature (e.g., Topaz, p. 2, ll. 12-22; p. 9, ll.9-16; p. 25, ll. 13-17); and Koyama discloses controlling the ejection waveform based on the measured ink viscosity (e.g., paragraphs 8, 13, 64-72; Fig. 8).

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, *e.g.*, Usuda, Takahashi, or Topaz, or their own knowledge, into any other prior art of the '031 and '806 patents, *e.g.*, to obtain ejection of droplets of a constant mass regardless of temperature changes (*see, e.g.*, Usuda, paragraphs 3 and 8) or to provide an appropriate drive waveform signal according to the viscosity of the ink even during quick changes in viscosity before the temperature and viscosity can be stabilized by a heater (*see,*

e.g., Koyama, paragraphs 6-7 and 84). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '031 and '806 patents Prior Art, *e.g.*, Topaz, Takahashi, Abergel, Kubo, Koyama, Nagashima, Takatsuka, Bibl, Lubinsky, or Manroland does not disclose "said shape being controlled by selecting at least a number of plateaus of the electric waveform" ('806 patent, claim 1); and "a command device controlling the shape of the electric waveform by selecting at least a number of plateaus of the electric waveform" ('806 patent, claim 9), it would have been obvious to modify any such prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Ishizaki '377 discloses generating actuator driving waveforms having varying numbers of plateaus in response to temperature to provide ink ejection in stable manner irrespective of changes in viscosity (e.g., paragraphs 22, 134, 136; Figs. 3A-3C); Takahashi discloses varying the number of ejection pulses, each of which has a plateau, in response to temperature and viscosity (e.g., paragraphs 26, 41, 62); Topaz discloses controlling, e.g., the number of pulses within a burst series in response to, e.g., temperature and viscosity of the ink (p. 21, ll. 12-17; p. 23, ll. 16-24; p. 24, ll. 19-28; p. 25, ll. 13-17; p. 23 l. 33 to p. 24, l. 10; Figs. 6 and 7); Kubo discloses selecting various waveforms having a different number of plateaus (paragraphs 41, 56-59; Fig. 6).

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, *e.g.*, Ishizaki '599, Takahashi, Topaz or Kubo, or their own knowledge, into any other prior art of the '031 and '806 patents, *e.g.*, to provide stable ink ejection irrespective of changes in viscosity

of the ink (e.g., Ishizaki '599, paragraph 136). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '031 and '806 patents Prior Art, *e.g.*, Topaz, Takahashi, Abergel, Kubo, Koyama, Nagashima, Takatsuka, Bibl, Lubinsky, or Manroland does not disclose "said shape being controlled by a preprogrammed command device with at least a memory correlating the composition of the varnish with the viscosity of the varnish and determining the temperature required by a heating resistance mounted in the nozzle, so that the varnish has a desired viscosity" ('806 patent, claim 18) and "said electric waveform having a shape determined by a preprogrammed command device with at least a memory correlating the composition of the varnish with the viscosity of the varnish and determining the temperature required by a heating resistance mounted in the nozzle, so that the varnish has a desired viscosity" ('806 patent, claim 27), it would have been obvious to modify any such prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Eguchi discloses a temperature control unit such as a CPU or ROM, drives a heating and cooling device based on values measured by the ink temperature detecting device; and the temperature control unit drives the heater based on a calculation result from a temperature-viscosity table to heat the ink to obtain the appropriate viscosity (e.g. paragraph [0001], ll. 5-11, 28-38; Figs. 1 and 2).

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, *e.g.*, Eguchi or their own

knowledge, into any other prior art of the '031 and '806 patents, *e.g.*, to maintain viscosity of the ink at an appropriate value (e.g., Eguchi, paragraph [0001], ll. 5-11). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

In the event it is determined that any of the '031 and '806 patents Prior Art, *e.g.*, Topaz, Takahashi, Abergel, Kubo, Koyama, Nagashima, Takatsuka, Chang, Bibl, Lubinsky, or Manroland does not disclose "wherein the waveform has (a) neutral value associated with the nozzle arrangement being at rest, (b) a first polarity relative to the neutral value for causing the nozzle arrangement to have a volume greater than the neutral value, and (c) a second polarity relative to the neutral value for causing the nozzle arrangement to have a volume less than the neutral value; the waveform first polarity having an intermediate substantially constant amplitude between the neutral value and a peak value, each peak value causing a droplet to be expelled from the nozzle arrangement, the intermediate value having an amplitude and/or duration to dependent on the viscosity of the ink droplet" ('031 patent, claims 7, 18; '806 patent, claims 4, 12, 22, 31), it would have been obvious to modify any such prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Yoshida '344 discloses a drop ejection signal including a portion for expanding the liquid chamber and a portion for contracting the liquid chamber causing drop ejection, and a preliminary drive signal that causes ink to remain unfired that precedes a drive signal for causing drop ejection, and Yoshida '344 further discloses that the amplitude of the preliminary drive signal may be varied depending on temperature conditions affecting ink viscosity (e.g., paragraphs 9-10, 14, 21, 68, 81-85; Figs. 7, 12); and JP '686 discloses an electric waveform has a positive polarity (maximum

potential VH), a negative polarity (minimum potential VL), and an intermediate potential VM applied before the ejection pulse to increase the ejection volume by meniscus control (e.g., Figs. 6-8, paragraphs [0047]-[0051]). Specifically, A POSITA would have been motivated to include, in Nagashima's waveform, waveform elements, like Yoshida '344's, having a preliminary drive signal and discharge drive signal to facilitate consistent, stable high-frequency ink ejection. Yoshida '344 teaches an ejection drive signal P5 that can eject consistent ink droplet sizes, even during high-frequency ejection. Yoshida '344 [0069], [0072], [0072]. Yoshida '344 does so, in part, by "increasing the pushing [of the droplet ejection drive signal] as much as possible" with a contraction waveform (f). *Id.* [0072], FIGS. 8. In addition, Yoshida '344 further compensates for high-frequency ejection by including a preliminary drive signal P4. Preliminary drive signal P4 used together with drive signal P5 facilitates a desired droplet ejection speed from the ejection drive signal P5. *Id.* [0072]. Accordingly, a POSITA would have been motivated to modify the ejection drive waveform of Nagashima to include the preliminary drive waveform P4 and the ejection drive waveform P5 described in Yoshida '344 to achieve a consistent, stable ejection of ink during high-frequency ejection. Such high-frequency ejection would enable faster coating speeds, thicker coating layers, and/or higher quality coating. *Id.* Thus, a POSITA would have found it obvious to incorporate a preliminary drive signal and discharge drive signal, like Yoshida '344's, into Nagashima's waveform. In addition, or in the alternative, a POSITA would have been motivated to include waveform elements, like Yoshida '344's, having a preliminary drive signal and discharge drive signal to suppress residual pressure vibration in the nozzle assembly after ejection, which leads to further ejection stability. *See* Yoshida '344, [0071]. As Yoshida '344 explains, because the ejection waveform P5 traverses the intermediate potential VM, it allows

the waveform to drive "expans[ion of] so as to have an antiphase to the residual vibration of the pressure after the droplet ejection," and resultantly "the residual vibration of the pressure is quickly suppressed, and the stability of the droplet ejection during highfrequency driving is further improved." Yoshida '344, [0071]. Nagashima, likewise, appreciates that vibration frequency in the pressure chamber affects discharge stability. *See* Nagashima, [0087]. A POSITA would have been motivated to increase ink ejection stability by utilizing a waveform, like Yoshida '344 P4 and P5 waveform elements, to expand the pressure generating chamber in a phase opposite the residual pressure vibration. Thus, a POSITA would have found it obvious to incorporate a preliminary drive signal and discharge drive signal, like Yoshida '344, into Nagashima's waveform. A POSITA would have had a reasonable expectation of success in using the waveform signals of Yoshida '344 with Nagashima. Yoshida '344's waveform elements offered well-known and predictable solutions for performing stable high-frequency ink ejection. Even Yoshida '344 contemplated use of its P4 and P5 waveforms together with ejection waveforms, such as waveform element P3, resembling Nagashima's ejection waveforms. Yoshida '344, FIG. 7 (P3 ejection waveform), [0061]-[0062]; Nagashima, FIG. 5 (showing similar ejection waveforms). Yoshida '344 also teaches that the P4 and P5 waveform elements can be used together with multiple other waveform elements that, themselves, lack the a preliminary drive signal and the opposite polarity of the discharge drive signal. *See*, Yoshida '344, FIG. 7, [0061]-[0062]. Thus, a POSITA would understand that the P4 and P5 waveform elements could be used together with the other drive waveform elements of Nagashima. A POSITA would have recognized that the waveforms described by Yoshida '344 would have provided waveforms compatible with the structure described in Nagashima to control the size of the droplets. *Id.* The piezoelectric

body of Nagashima includes a piezo, and "changes the volume of the pressure chamber 52 via the diaphragm plate 56." Nagashima [0064]. The piezoelectric body of Nagashima is a "pressure generation unit that generates a pressure for ejecting ink from the nozzles." Likewise, Yoshida '344 describes "piezoelectric elements 121 as electromechanical transducer elements, which are pressure generation units (actuator units) for deforming the vibrating plate 102 and pressurizing the ink in the liquid chamber 106." Yoshida '344, [0040]. Additionally, Nagashima contemplates that the ejection drive waveform can include different shapes. For example, Nagashima teaches that the "while the ejection drive waveform has a shape that pulls and pushes the meniscus surface" or "a shape for **pulling, pushing and pulling**)." Nagashima [0122] (emphasis added). A POSITA would have recognized that the "pull" of the meniscus is associated with an expansion of the volume of the pressure chamber and the "push" of the meniscus is associated with a contraction of the volume of pressure chamber, which ejects the ink from the nozzle. *See* Ricoh [0063] (discussing pulling and pushing) & [0072] (minimize pull and maximize push). Since Nagashima already contemplates a design that uses a shape of a waveform consistent with a pull, push, and pull operation, a POSITA would have had a reasonable expectation of success applying the elements of a waveform that accomplished the pull, push, and pull operation, such as that described in Yoshida '344. Thus a POSITA would have had a reasonable expectation of success using the waveforms of Yoshida '344 with the design of Nagashima.

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, *e.g.*, Yoshida '344, JP '686, or their own knowledge, into any other prior art of the '031 and '806 patents, *e.g.*, to reduce variations in drop discharge due to ink viscosity varying with temperature,

which allows for stable ink discharge performance and high image quality at high printing speed (e.g., Yoshida '344, paragraph 0021), or to increase the ejection volume by meniscus control (e.g., JP '686, paragraph 51). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '031 and '806 patents Prior Art, *e.g.*, Topaz, Takahashi, Abergel, Kubo, Koyama, Nagashima, Takatsuka, Bibl, Lubinsky, or Manroland does not disclose "maintaining the temperature of the covering ink at a predetermined temperature within the ink jet nozzle arrangement by said heater" ('031 patent claim 8; '806 patent, claims 5, 23), it would have been obvious to modify any such prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Eguchi, teaches an inkjet recording apparatus as seen in Fig. 1 wherein a heating/cooling device 8 serves to "control the ink temperature at the head portion" depending on ink viscosity and temperature detected by respective sensors 5 and 6 (*e.g.*, paragraph [0001], ll. 5-11, 28-38; Figs. 1 and 2); and Aoyama discloses an inkjet head arrangement as seen in Fig. 1, in which a heating medium 1 such as an electrified metal wire is disposed inside a nozzle 2, so as to "directly heat the ink" therein to a specific temperature (e.g., paragraphs 0022, 0033, 0044, 0046, 0050).

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, *e.g.*, Eguchi and Aoyama, or their own knowledge, into any other prior art of the '031 and '806 patents, *e.g.*, to obtain a desired viscosity and/or stable ink discharge performance regardless of ink type (see, e.g., Aoyama, paragraphs 48-50; Eguchi, paragraph 1, ll. 5-11). A person

of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '031 and '806 patents Prior Art, *e.g.*, Topaz, Takahashi, Abergel, Kubo, Koyama, Nagashima, Takatsuka, Bibl, Lubinsky, or Manroland does not disclose "the ink includes a photoinitiator and further including irradiating the covering ink applied to the substrate with radiation that activates the photoinitiator" ('031 patent, claim 9; '806 patent, claims 6, 24), it would have been obvious to modify any such prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Sumiya discloses an inkjet printing method that performs printing by ejecting from an inkjet device a photocurable ink onto a recording medium, followed by irradiating with an ultraviolet ray so as to cure the ink (e.g., paragraphs [0007], [0012]); and Figov discloses an UV curable ink containing a photoinitiator that is irradiated with UV light upon delivering the ink to a printing substrate to cure the ink (e.g., Abstract; 2:65-3:6).

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, *e.g.*, Sumiya, Figov, or their own knowledge, into any other prior art of the '031 and '806 patents, *e.g.*, to increase versatility of the inkjet printing operation (see, e.g., Sumiya, paragraphs 7-8; Figov, 1:55-60). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '031 and '806 patents Prior Art, *e.g.*, Topaz, Takahashi, Abergel, Kubo, Koyama, Bibl, Lubinsky, or Manroland

does not disclose "a memory storing information associated with the shapes of a plurality of the waveforms, an interface for controlling readout of said information in the memory in response to at least one of the parameters being entered into the interface, and a controller arranged to be responsive to the information readout of said memory for controlling the electric source for causing the electric source to derive a waveform having a shape determined by the readout information" ('031 patent, claim 20; '806 patent, claims 14, 33), it would have been obvious to modify any such prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Ishizaki '377 discloses waveform control circuits which read information stored in a ROM according to the shape of the corresponding driving waveform signal and output the information as driving waveform data (e.g., 3:57-4:1, 5:52-58; Fig. 1); and Nakamura discloses causing an electric source to derive a waveform having a shape determined by readout information (e.g., 25:44-27:19; Figs. 40A-C).

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, *e.g.*, Ishizaki '377 or Nakamura, or their own knowledge, into any other prior art of the '031 and '806 patents, *e.g.*, to provide an easily configured and reliable driving circuit to drive piezoelectric actuators for ink jet printing heads with inexpensive elements (e.g., 2:50-55). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '031 and '806 patents Prior Art, *e.g.*, Topaz, Takahashi, Abergel, Kubo, Koyama, Bibl, Lubinsky, or Manroland does not disclose "the interface includes a detector machine interface for enabling a

detector arrangement for at least one of the following parameters to enter at least one of the following parameters into the interface; viscosity of the covering ink, temperature of the covering ink, temperature of the substrate, and relative speed of the substrate and the ink jet nozzle arrangement" ('031 patent, claim 21), it would have been obvious to modify any such prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Katsuta discloses a drive control device 110 including, *inter alia*, a data transfer unit 110A that receives a measurement result from a temperature/humidity sensor 60; an analysis control unit 110B that selects drive condition data corresponding to the received measurement result; and a waveform formation unit 110C that generates a drive waveform based on the selected drive condition data (e.g., paragraph 67; Fig. 2).

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, *e.g.*, Katsuta, or their own knowledge, into any other prior art of the '031 and '806 patents, *e.g.*, to provide reliable and high quality imaging even when conditions such as temperature, viscosity and humidity change (see, e.g., paragraphs 3-4). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '031 and '806 patents Prior Art, *e.g.*, Topaz, Takahashi, Abergel, Kubo, Koyama, Bibl, Lubinsky, or Manroland does not disclose "the substrate surface type parameter includes chemical composition of the substrate and/or stiffness of the substrate" ('806 patent, claims, 3, 11), it would have been obvious to modify any such prior art to include these

elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Sumiya discloses waveform signal control depending on the type of recording medium 10 used, including ordinary paper, cardboard paper, and synthetic resins such as plastic films (e.g., paragraphs 12, 20, 22, 28-30).

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, *e.g.*, Sumiya, or their own knowledge, into any other prior art of the '031 and '806 patents, *e.g.*, to provide an ink jet recording device that does not nary in dot diameter depending on the recording medium and to minimize variation in dot thickness (e.g., paragraph 11). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '031 and '806 patents Prior Art, *e.g.*, Topaz, Takahashi, Abergel, Kubo, Koyama, Bibl, Lubinsky, or Manroland does not disclose "the interface includes an operator memory interface for enabling an operator to enter at least one of the parameters into the interface" ('806 patent, claims 15, 34), it would have been obvious to modify any such prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Sumiya discloses control circuitry including a selection switch 32 that allows an operator to select a specific type of recording medium 10 on which printing is performed, wherein the selection data from the selection switch 32 is used by a head control unit 33 to determine a drive waveform accordingly (e.g., paragraph 33).

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, *e.g.*, Sumiya, or their own knowledge, into any other prior art of the '031 and '806 patents, *e.g.*, to manually enter parameters for determining the electric drive waveform (*see, e.g.*, paragraph 33). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

As another non-limiting example, it would have been obvious to a POSITA to use one of the drive pulse patterns of Chang to control the piezo element of Takatsuka. Takatsuka describes driving a piezo for ejecting ink and driving the piezo so as to not eject the ink. Takatsuka at 11:46-51 (ejection) and 20:52-57 (nonejection). A POSITA seeking to implement Takatsuka would have sought examples of electrical waveforms, and would have been motivated to implement the waveforms in Chang, because Chang's waveforms provide both ejection and non-ejection shapes, such as described in Takatsuka. *Id.*. A POSITA would have found it obvious to implement Chang's waveforms in Takatsuka as a suitable waveform with both ejection and nonejection elements. In addition, or in the alternative, a POSITA would have motivated to implement the waveforms in Chang, because they offer other features useful in driving Takatsuka's inkjet printer. For example, Chang's electrical waveforms are configured to produce ink droplets of different shape and size (i.e., volume). Chang teaches a "plurality of driving pulses for generating a plurality of kinds of ink drops different in the ink volume," including small droplets (4 pL), medium droplets (8 pL), and large droplets (20 pL). Chang at 14:37-40 (drive pulses) & 9:4-9 (example volume). Such different sizes of ink droplets facilitate a balance between "conflicting requests of improvement in image

quality and improvement of the recording speed." *Id.* at 1:44-56. Thus, a POSITA would have found it obvious to apply Chang's waveform to benefit from the drop shape and size control it offers. In addition, or in the alternative, the structural and functional features described in Takatsuka are applicable to "a droplet ejecting step for coating a processing liquid, a functional liquid, or other type of liquid other than ink onto a medium." Takatsuka at 21:3-17. A POSITA would have been motivated, therefore, to control the shape of the droplets ejected by Takatsuka using waveforms, such as those described by Chang, to control the thickness of the coating onto the medium. It was known at the time that the thickness of the coating of liquid onto the medium could be controlled by controlling the shape of the droplet from the inkjet nozzle. For example, Yoshida '269 teaches that "the quantity (droplet size) of the varnish" can be varied, so that "a coating thickness of the varnish applied to the printing paper S may be controlled." Yoshida '269 at 12:13-19; *see also id.*, 12:20-23 (thickness controlled by varying number of droplets). As described above, Chang teaches controlling the droplet shape by selecting one or more pulse drive patterns. Chang at 10:7-14 (driving pulse selected for small droplet), 10:16-19 (driving pulse selected for medium droplet), & 10:20-29 (driving pulse for large droplet). Thus, a POSITA would have found it obvious to apply Chang's waveform to control the size (i.e., shape) of the droplet to control the thickness of the "coating a processing liquid, a functional liquid, or other type of liquid" of Takatsuka. In addition, or in the alternative, Takatsuka also recognizes that evaporation of solvents from the ink can result in an increase in the viscosity of the ink that affects the consistency of the ink ejection. *See* Takatsuka, 10:2-3, 20:35-44. Takatsuka acknowledges that "ink inside the nozzle in contact with the air (namely the 'meniscus')" can dry, which can result in the "increase of the viscosity of the ink." Takatsuka, 20:35-44. A POSITA would have been motivated

to mitigate this increase in viscosity of the ink at the meniscus, and its corresponding impact on ejection consistency. Chang's waveform incorporates "minute vibration" non-ejection waveforms that drive the piezo to mitigate this increase in viscosity of the ink at the meniscus, and a POSITA would have been motivated to incorporate Chang's waveform with "minute vibration" to mitigate an increase in viscosity from, evaporation of ink solvent in the vicinity of the nozzle. Chang at 2:19-21 (minute vibration stirs meniscus to prevent increase in ink viscosity) & 2:11-18 (evaporation of ink solvent causes increase in ink viscosity); *accord* Takatsuka at 10:1-3 (evaporation of ink solvent causes increase in ink viscosity). Thus, a POSITA would have found it obvious to apply the "minute vibration" non-ejection waveform of Chang to mitigate drying of the ink near the nozzle opening and to prevent an increase in viscosity of the meniscus. Chang, 2:11-21. Furthermore, the piezo and nozzle structure in Chang and Takatsuka are similar. Takatsuka describes that the piezo element "is formed by a lower electrode layer 120b" bonded "to a vibration plate 4." Takatsuka at 11:42-44. The piezo element also includes "a piezo thin plate 8, and an upper electrode 120a." *Id.*, 11:45-46. Chang describes two different piezo structures, but states that the driving pulses are similar for both. Specifically, Chang teaches a piezo-electric that uses deflection mode, as well as a piezo-electric that uses a longitudinal mode. Chang at 13:19-22, FIG.1., 13:22-25, FIG.7. To drive one or the other, driving signals and driving waveforms are interchanged in positive and negative of voltage with respect to the boundary of the intermediate voltage. *See id.*, 14:19-34. A POSITA would have known that the piezoelectric element of Takatsuka could have been driven using a waveform voltage schema as described in Chang, and if needed to adjust the waveform for particulars of Takatsuka, with predictably similar results because of

the similarity of the piezo structures described by Chang and Takatsuka and the disclosure of Chang.

As another non-limiting example, 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. Dainippon is silent as to the waveforms to drive the piezoelectric elements. A POSITA would have sought examples of waveforms, and would have been motivated to implement the waveforms in Chang, because Chang's waveforms provide control over the droplet size. Chang, 9:4-9, FIGS. 4-6. A POSITA would have had a reasonable expectation of success driving the piezoelectric elements of Dainippon with the waveforms described in Chang. Both Dainippon and Chang describe ink jet printers that use piezoelectric elements to eject ink. Additionally, Chang teaches waveform generation for handling inks of different viscosities, which a POSITA would have recognized include the viscosity of a varnish. '806 Patent, describing ideal viscosities of varnish in the range of 4 to 100 mPa•s. Chang, 12:17-21 (waveforms for high and low viscosities); '806 Patent, 6:44-45 (ideal viscosity range).

B. Additional Motivations to Combine Also Applicable to the ′067 patent

Defendant incorporates herein the disclosures of the Prior Art provided in Exhibit C, which can be combined to invalidate each of the Asserted Claims of the '067 patent. Additionally, exemplary combinations are listed below for purposes of explaining and exemplifying possible combinations. These combinations are not intended to be limiting but rather intended to provide notice of the reasoning behind particular motivations to combine. In many instances, multiple different motivations would apply to a particular combination (for example, if multiple references were

both authored by the same person and referred to the same product/system, then both of those motivations would apply) and the specific combinations were not duplicated.

Should any prior art be deemed not to disclose, explicitly or inherently, any limitation of a claim, Defendant reserves the right to argue that any such difference between that prior art and the corresponding claim would have been obvious to one of ordinary skill in the art. To the extent that such an argument is deemed a "combination" analysis for purposes of obviousness, Defendant discloses its present intention to rely on the separate combination of the knowledge of a person of ordinary skill in the art with each item of prior art identified above. The knowledge of a person of ordinary skill in the art is demonstrated by, for example, the full list of references above, the prior art produced in this litigation, and forthcoming expert reports.

Example motivations to combine the Prior Art to the '067 patent (including but not limited to motivations to combine the references in Exhibit C with the other Prior Art to the '067 patent) are provided below. In addition to being combinations taught directly by these references, such combinations would have been (a) the combination of prior art elements according to known methods to yield predictable results, (b) the simple substitution of one known element for another to obtain predictable results, (c) the use of a known technique to improve similar devices in the same way, (d) applying a known technique to a known device ready for improvement to yield predictable results, and (e) obvious to try with a reasonable expectation of success.

- The '067 patent Prior Art is analogous art and the goals of the references complement one another. They are all directed, e.g., towards ink jet devices for ejecting ink on a print medium. A person of ordinary skill in the art

would understand the teachings of the references to be applicable to one another. A person of ordinary skill in the art would also understand that the teachings of the ’067 patent Prior Art references related to ink jet devices are generally applicable to other references directed to ink jet devices, including references discussing or disclosing these similar devices.

- In the event it is determined that any of the ’067 patent Prior Art does not disclose “a reservoir configured for including a viscous product having viscosity between 100 and 1000 centipoises” (claims 1, 16) or “a reservoir including a varnish having viscosity between 10 and 1000 centipoises”) (claim 32), it would have been obvious to modify the prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Yoshida ’754 discloses a “varnish tank,” (Yoshida ’754 at [0074]); Schlatterbeck ’669 discloses a “reservoir” containing “coating material” where the coating material has viscosity “from 8 to 100 mPa·s,” (Schlatterbeck ’669 at 14:24-26; 14:29-33); Arai discloses an “ink supply tank” and ink viscosity “5 to 1000 m mPa·s” (Arai at [0044]; [0077]); *see also* example disclosures at Exhibit D, at [1a], [16a], and [32a].

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, *e.g.*, Yoshida ’754. Schlatterbeck ’669, or Arai, or their own knowledge, into any other prior art of the ’067 patent, *e.g.*, to include in a machine a reservoir for viscous product that is to be applied. A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the ’067 patent Prior Art does not disclose “an input magazine and an output magazine” (claims 1, 16, 32) it would have been obvious to modify the prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Yoshida ’754 discloses a “paper storage,” and “paper discharge mechanism” (Yoshida ’754 at [0020]); Schlatterbeck ’669 discloses a base can be wound up onto a reel and bases can be stacked by a removal device, and also a “feed device,” and “removal device,” (Schlatterbeck ’669 at 7:46-57; 13:30-32; Fig. 2); Tamura ’631 discloses a “sheet feeding unit” and a “tray member” that sequentially stacks and stores sheets (Tamura ’631 at [0017]; [0023]; Figs. 2, 3); *see also* example disclosures at Exhibit D, claims [1b], [16b], and [32b].

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, e.g., Yoshida ’754. Schlatterbeck ’669, or Tamura ’631, or their own knowledge, into any other prior art of the ’067 patent, e.g., to include in a machine storage for a substrate before and after application. A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the ’067 patent Prior Art does not disclose “work stations and a computer device to manage the operations on each of the work stations” (claim 1) or “one or more work stations and a computer device to manage the operations on each of the work stations” (claim 16) or “one or more work stations and a computer device to manage the operations on each of the work stations” (claim 32) it would have been obvious to modify the prior art to include these elements based either on the knowledge of a person of skill in the art and/or

the teaching of other references. For example, Yoshida ’754 discloses a “controller” and work stations in e,g., FIGS. 1, 6, 10(Yoshida ’754 at [0079]); Schlatterbeck ’669 discloses a “computer” and work stations in e.g., Figs. 1, 2. (Schlatterbeck ’669 at 12:31-48); Tamura ’631 discloses a “controller” (Tamura ’631 at [0024]; Figs. 2, 3; [0023]); *see also* example disclosures at Exhibit D, claims [1c], [16c], and [32c].

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, e.g., Yoshida ’754. Schlatterbeck ’669, or Tamura ’631, or their own knowledge, into any other prior art of the ’067 patent, e.g., to include application computer device to manage the operations on each of the work stations. Computers have long been used in print machines, well before the time of the ’067 patent. A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the ’067 patent Prior Art does not disclose “a movement device for moving the substrate between the different work stations” (claims 1, 16, 32) (and that this means-plus-function term has corresponding structure disclosed in the patent specification) it would have been obvious to modify the prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. *See* example disclosures at Exhibit D, claims [1d], [16d], and [32d]. A person of ordinary skill in the art would have been motivated to include a movement device for moving the substrate between different work stations, so that the substrate can be moved through the machine and application can be achieved. This is basic to

achieving the purpose of the machine. A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the ’067 patent Prior Art does not disclose “a device for grasping and transferring the substrate from the input magazine to the movement device and from the movement device to the output magazine” (claims 1, 16, and 32) (and that this means-plus-function term has corresponding structure disclosed in the patent specification) it would have been obvious to modify the prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. *See* example disclosures at Exhibit D, claims [1e], [16e], and [32e].

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to include a device for grasping and transferring the substrate from the input magazine to the movement device and from the movement device to the output magazine in order to transfer the substrate from the input magazine to the movement device, and from the movement device to the output magazine. A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the ’067 patent Prior Art does not disclose “a read station for reading and determining at least one position of the substrate and/or of markers placed on the substrate” (claims 1, 16, 32) it would have been obvious to modify the prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Yoshida ’754 discloses “an optical sensor” and “an encoder” (Yoshida

’754 at [0084]; [0085]); Schlatterbeck ’669 discloses a “device for measuring the position of the base” (Schlatterbeck ’669 at 11:26-37); Arikita discloses a “CCD camera moving with the printer head” (Arikita at [0030]; Figs. 2, 3; [0023]); *see also* example disclosures at Exhibit D, claims [1f-1], [16f-1], and [32f-2].

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, e.g., Yoshida ’754. Schlatterbeck ’669, or Arikita, or their own knowledge, into any other prior art of the ’067 patent, e.g., to include a read station for reading and determining at least one position of the substrate and/or of markers placed on the substrate. Reading and determining positional data of a substrate during application has long been known, well before the time of the ’067 patent. For example, a person of ordinary skill would know to include a read station for reading and determining positional data of a substrate to avoid a problem of printing in the wrong area on a substrate. For example, Schlatterbeck ’669 describes that it is advantageous to know the point on a surface which lies opposite a nozzle (Schlatterbeck ’669 at 6:61-64). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the ’067 patent Prior Art does not disclose “an application station including a series of plural nozzles arranged in a ramp, each of the nozzles including a hollow needle, a piezoelectric actuator affixed to a resonator formed by an assembly included in each hollow needle” (claim 1) or “an application station comprising a series of nozzles arranged in a ramp, each nozzle being: separately controllable by the computer device, actuable by a piezoelectric actuator,” (claims 16, 32) it would have been obvious to modify the

prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Yoshida '754 discloses a "droplet spray nozzle head," "using piezoelectric elements," and arranged for example as shown in Figs. 9 and 10 of Yoshida (Yoshida '754 at [0051]; [0075]); Schlatterbeck '669 discloses a "an ink-jet or piezo-jet nozzle," and that "[t]he angle and spacing may be selected in such a way that if there are more than two nozzles the nozzles of two adjacent heads intersect one another, producing a combination of a herringbone arrangement and a staggered arrangement" (Schlatterbeck '669 at 3:47-54; 18:1-16; Fig. 10C); Arai discloses a "piezo ink jet nozzle" arranged for example as shown in Figs. 1, 2, 3 of Arai (Arai at [0077]); *see also* example disclosures at Exhibit D, claims [1f-2], [16f-3 to 16f-5], and [32f-4.1 to 32f-4.3].

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, e.g., Yoshida '754. Schlatterbeck '669, or Arai, or their own knowledge, into any other prior art of the '067 patent, e.g., to include an application station comprising a series of nozzles arranged in a ramp, each nozzle being: separately controllable by the computer device, actuable by a piezoelectric actuator. It would be inherent and obvious for a jet machine for viscous product for application of a coating to have an application station, to achieve the application. Further, a person of ordinary skill in the art would know that application stations may be modular or interchangeable, and a matter of simple substitution with predictable results. For example, Yoshida '754 explains that its varnish coating operation "may be implemented with various printing machines other than the printing machine" according to Yoshida '754, such as an "ink jet printing machine" (Yoshida '754 at [0093]). Yoshida '754 also

describes that a "different droplet spraying mode may be employed" (Yoshida '754 at [0075). Also, Schlatterbeck '669 describes, for example, "[a] suitable modification of the metering head, for example a modification of the nozzles and/or chambers of an ink-jet print head to match the coating material, may also be suitable to allow the processing of coating materials of this type" (Schlatterbeck '669 at 2:61-64). Matsumoto describes, for example, "other types of structures for ejecting ink may be used as ink jet printing" (Matsumoto at 15:24-26). A person of ordinary skill in the art would also be motivated to modify a machine to use different application stations, e.g., print heads, because of, for example, reduced power consumption, improved formation of ink droplets (*see e.g.*, Kitahara at 1:46-56), and the shape or structure of the print head may be modified to account for, for example, ease of cleaning (Tamura '631 at [0042]), or reducing disturbance in air (Sawano at [0026]), or improving ink flow (Watanabe at [0007]). Further, hollow needles, nozzles, actuable by a piezoelectric actuator have long been known in the art, well before the time of the '067 patent. *See e.g.*, Kyser (U.S. 3,946,398). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '067 patent Prior Art does not disclose "a drying station" (claims 1, 16, 32) it would have been obvious to modify the prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Yoshida '754 discloses an "ultraviolet light emitting device," (Yoshida '754 at [0065]); Schlatterbeck '669 discloses a "radiation curing unit," (Schlatterbeck '669 at 12:60-63); see also example disclosures at Exhibit D, claims [1f-3], [16f-2], and [32f-3].

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, e.g., Yoshida '754. Schlatterbeck '669, or their own knowledge, into any other prior art of the '067 patent, e.g., to include a drying station. It would be inherent and obvious for a jet machine for viscous product for application of a coating to have an application station, to dry the coating or viscous product. For example, Yoshida '754 explains "varnish is applied to the printing paper S in order to protect and give luster to the surface of printing paper S." (Yoshida '754 at [0051]). A person of ordinary skill in the art would understand that to achieve the purpose of applying varnish, the varnish should be and is typically dried. A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '067 patent Prior Art does not disclose "each hollow needle is piloted separately by the computer device, and is arranged to be fed from said reservoir configured for including said viscous product to be applied onto the substrate during relative movement between the substrate and the application station, to apply the product in a given zone on the substrate" (claim 1), "separately controllable by the computer device" (claims 16, 32), or "arranged to be fed from the reservoir configured for including said viscous product to be applied onto the substrate during relative movement between the substrate and the application station, to apply the product in a given application zone on the substrate" (Claim 16), or "arranged to be fed from the reservoir including said viscous product to be applied onto the substrate during relative movement between the substrate and the application station, to apply the product in a given application zone on the substrate" (claim 32), it would have been obvious to modify the prior art to include

these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Yoshida '754 discloses "[s]elected 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." (Yoshida '754 at [0074]); Schlatterbeck '669 discloses "[t]he at least one nozzle may also include a plurality of nozzles in a grid or array which produces a pattern by targeted response of individual nozzles," and "The nozzles may, for example, be bubble-jet nozzles or ink-jet or piezo-jet nozzles. The control signals transmitted via the interface are transformed into corresponding supply line signals. The nozzles 16 are connected to a reservoir 20 containing the coating material 22." (Schlatterbeck '669 at 1:65-67; 14:13-26). *See also* example disclosures at Exhibit D, claim [1f-4]. In the event it is determined that any of the '067 patent Prior Art does not disclose "each hollow needle is piloted separately by the computer device, and is arranged to be fed from said reservoir configured for including said viscous product to be applied onto the substrate during relative movement between the substrate and the application station, to apply the product in a given zone on the substrate" (claim 1), "separately controllable by the computer device" (claims 16, 32), or "arranged to be fed from the reservoir configured for including said viscous product to be applied onto the substrate during relative movement between the substrate and the application station, to apply the product in a given application zone on the substrate" (Claim 16), or "arranged to be fed from the reservoir including said viscous product to be applied onto the substrate during relative movement between the substrate and the application station, to apply the product in a given application zone on the substrate" (claim 32), it would have been obvious to modify the prior art to include these elements based either on the knowledge of a person of skill in the art and/or

the teaching of other references. For example, Yoshida ’754 discloses “[s]elected 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.” (Yoshida ’754 at [0074]); Schlatterbeck ’669 discloses “[t]he at least one nozzle may also include a plurality of nozzles in a grid or array which produces a pattern by targeted response of individual nozzles,” and “The nozzles may, for example, be bubble-jet nozzles or ink-jet or piezo-jet nozzles. The control signals transmitted via the interface are transformed into corresponding supply line signals. The nozzles 16 are connected to a reservoir 20 containing the coating material 22.” (Schlatterbeck ’669 at 1:65-67; 14:13-26). *See also* example disclosures at Exhibit D, claim [1f-4].

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, e.g., Yoshida ’754, or Schlatterbeck ’669, or their own knowledge, into any other prior art of the ’067 patent, e.g., to modify a machine to such that each hollow needle is piloted separately by the computer device, and is arranged to be fed from said reservoir configured for including said viscous product to be applied onto the substrate during relative movement between the substrate and the application station, to apply the product in a given zone on the substrate. For example, a person of ordinary skill in the art would recognize that a “[p]articularly accurate metering or patterning can be achieved.” (Schlatterbeck ’669 at 4:47-63). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the ’067 patent Prior Art does not disclose “each hollow needle is arranged to be vibrated by its associated piezoelectric actuator, with the excitation of the actuator, in duration and power, determining the dimensions and the shape of the drop of viscous product, to apply the product in a given application zone on the substrate” (claim 1), or “actuable by a piezoelectric actuator” (claims 16, 32); “the computer device is arranged to control the excitation of the actuator, in duration and power, to determine the dimensions and the shape of a viscous product drop in accordance with an average viscosity of the product”; “the computer device is arranged to control the excitation of the actuator, in duration and power, to determine the dimensions and the shape of a viscous product drop in accordance with an average viscosity of the product” (claim 18), it would have been obvious to modify the prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Yoshida ’754 discloses “using piezoelectric elements” (Yoshida ’754 at [0075]); Schlatterbeck ’669 discloses “at least one nozzle may particularly advantageously comprise a bubble-jet nozzle and/or an ink-jet or piezo-jet nozzle. These types of nozzles, as well as the corresponding metering heads, are used in large numbers in printers, making these nozzles correspondingly inexpensive.” (Schlatterbeck ’669 at 10:55-67); Okabe discloses “Fig. 6 illustrates an example of a setting screen (R) for discharge amount information in a drawing information file. In this example, with four heads, preheat pulse width (Pp) setting, intervals (intervals) between the preheat pulses and the main heat pulses, the main heat pulse width (Pm), and a drive voltage value can be set for each head. ” (Okabe at [0057]). *See also* example disclosures at Exhibit D, claim [1f-5].

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have

been motivated to incorporate these elements from, e.g., Yoshida ’754, or Schlatterbeck ’669, or their own knowledge, into any other prior art of the ’067 patent, e.g., to modify a machine such that each hollow needle is arranged to be vibrated by its associated piezoelectric actuator, with the excitation of the actuator, in duration and power, determining the dimensions and the shape of the drop of viscous product, to apply the product in a given application zone on the substrate. In jetting, vibration of an associated piezoelectric actuator, with the excitation of the actuator, in duration and power, determining the dimensions and the shape of the drop of viscous product is well known and basic knowledge on operation of piezo-jet nozzles. *See e.g.*, Power Amplifier Drives Multiple Inkjet Heads, MicroTechnology Grp. (Jan. 2005).) A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the ’067 patent Prior Art does not disclose “said application zone being defined for each substrate by a configuration file concerning the zone shape, the zone position on the substrate in relation to the position determined by the read station, the quantity of product to be applied” and “the computer device is arranged to be responsive to said configuration file to translate the information into parameters of relative movement of the substrate, and of the nozzles, and selective control of each actuator of each nozzle” (claim 1); or “said application zone being defined for each substrate by a configuration file concerning the zone shape, the zone position on the substrate in relation to the position determined by the read station, the quantity of product to be applied, the computer device arranged to be responsive to the configuration file to translate the information into parameters of relative movement of the substrate and of the nozzles, and selective control of each actuator of each nozzle” (claims 16,

32); it would have been obvious to modify the prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Yoshida ’754 discloses “image data here is image data itself used for recording on the printing plates by the image recorder 25, or raw image data such as PPF (Print Production Format) data according to the CIP3 (International Cooperation for Integration of Prepress, Press and Postpress) standard.,” (Yoshida ’754 at [0075]]); Schlatterbeck ’669 discloses “[i]t is advantageous for this advancing movement also to be computer-controlled or to be recorded with computer assistance, so that the coating position, i.e. the point on the surface which lies opposite the nozzle, is known during the computer-assisted actuation..” (Schlatterbeck ’669 at 6:60-65]. *See also* example disclosures at Exhibit D, claim [1f-5, 1f-6].

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, e.g., Yoshida ’754, or Schlatterbeck ’669, or their own knowledge, into any other prior art of the ’067 patent, e.g., to modify a machine such that said application zone being defined for each substrate by a configuration file concerning the zone shape, the zone position on the substrate in relation to the position determined by the read station, the quantity of product to be applied and the computer device is arranged to be responsive to said configuration file to translate the information into parameters of relative movement of the substrate, and of the nozzles, and selective control of each actuator of each nozzle. Computers have been used for jet machines well before the ’067 patent. It is inherent and obvious that computers used for jet machines use files, e.g., configuration files. A person of ordinary skill would have many options for such files at the time of the ’067 patent, for example, Silverbrook ’162 describes:

"[t]ypical image sources are image scanners, digitally stored images, images encoded in a page description language (PDL) such as Adobe Postscript, Adobe Postscript level 2, or Hewlett-Packard PCL 5, page images generated by a procedure-call based rasterizer, such as Apple QuickDraw, Apple Quickdraw GX, or Microsoft GDI, or text in an electronic form such as ASCII." Silverbrook '162 at 30:8-33. A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '067 patent Prior Art does not disclose "the application zone is specified for each substrate by a configuration file concerning the shape of the zone, the position of the zone on the substrate in relation to position determined by the read station, the quantity of product to be applied, with a machine control program arranged to use this information for translating the information into parameters of relative movement of the substrate and of the nozzles, for selective control of the nozzles and for reiteration of the offset passage of the substrate in front of the nozzles to produce joined-up lines if necessary" (claim 2), or "said application zone being defined for each substrate by a configuration file concerning the zone shape, the zone position on the substrate in relation to the position determined by the read station, the quantity of product to be applied, the computer device arranged to be responsive to the configuration file to translate the information into parameters of relative movement of the substrate and of the nozzles, and selective control of each actuator of each nozzle," (claims 16, 32) or "the computer device is arranged to control a reiterated driving of the same substrate in front of the nozzles to produce jointed lines" (claim 17), it would have been obvious to modify the prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For

example, Yoshida ’754 discloses “image data here is image data itself used for recording on the printing plates by the image recorder 25, or raw image data such as PPF (Print Production Format) data according to the CIP3 (International Cooperation for Integration of Prepress, Press and Postpress) standard.,” (Yoshida ’754 at [0075]]); Schlatterbeck ’669 discloses “It is advantageous for this advancing movement also to be computer-controlled or to be recorded with computer assistance, so that the coating position, i.e. the point on the surface which lies opposite the nozzle, is known during the computer-assisted actuation..” (Schlatterbeck ’669 at 6:60-65); *see also* example disclosures at Exhibit D, claim [2], [16f-8], [32f-6].

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, e.g., Yoshida ’754, or Schlatterbeck ’669, or their own knowledge, into any other prior art of the ’067 patent. A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the ’067 patent Prior Art does not disclose “the ramp in which the nozzles are arranged is equipped with a movement resource in relation to the substrate defining said relative movement between the substrate and the application station” (claim 3), or “the ramp is provided with a movement device in relation to the substrate defining said relative movement between the substrate and the application station” (claim 19), it would have been obvious to modify the prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, Yoshida ’754 discloses”[w]hen 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," (Yoshida '754 at [0093]); Schlatterbeck '669 discloses a "Ultimately, however, there are no limits imposed on the movement of the metering head, which means that it is possible to use the metering head in multi-axis systems ." (Schlatterbeck '699 at 7:21-45); *see also* example disclosures at Exhibit D, claim [3], [19].

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, e.g., Yoshida '754, or Schlatterbeck '669, or their own knowledge, into any other prior art of the '067 patent. Various configurations for the relative movement of a nozzle head and substrate are well known. *See e.g.*, Sawano at [0006]. A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

- In the event it is determined that any of the '067 patent Prior Art does not disclose "said application zone on the substrate is specified by the relative movement of the substrate in relation to the ramp on which the nozzles are arranged" (claim 4), or "the application zone on the substrate is defined by the relative movement of the substrate in relation to the ramp" (claim 20), it would have been obvious to modify the prior art to include these elements based either on the knowledge of a person of skill in the art and/or the teaching of other references. For example, see Yoshida '754 at Fig. 12; Schlatterbeck '669 discloses " [m]ovement of the base in the direction 54, as well as the instant at which a control signal or a supply conductor signal is applied to the nozzle, therefore defines the position of a

drop 24 of coating material in the direction 54 along the surface 3." (Schlatterbeck '669 at 14:42-52); *see also* example disclosures at Exhibit D, claim [4], [20].

Furthermore, the above limitations are obvious based on the knowledge of a person of ordinary skill in the art. A person of ordinary skill in the art would have been motivated to incorporate these elements from, e.g., Yoshida '754, or Schlatterbeck '669, or their own knowledge, into any other prior art of the '067 patent. It is inherent and obvious that an application zone on the substrate is defined by the relative movement of the substrate in relation to nozzles (including nozzles mounted on a ramp). A person of ordinary skill in the art would have a reasonable expectation of success in incorporating these limitations, at least in view of the disclosures regarding implementation in the references themselves.

C. Additional Motivations to Combine Also Applicable to the ′449 patent

Additional exemplary motivations to combine also applicable to the '449 patent are set forth in Exhibit D.

IV. INVALIDITY UNDER 35 U.S.C. § 112

Defendant contends that, at least under MGI's actual and/or apparent application of the claims, the Asserted Claims are invalid based on inadequate written description and/or a lack of enablement under 35 U.S.C. § 112 ¶ 1, and/or based on indefiniteness under 35 U.S.C. § 112 ¶ 2. Defendant further contends that a person of ordinary skill in the art would not understand what is encompassed by certain limitations in the Asserted Claims because certain terms are means-plus-function terms under 35 U.S.C. § 112, ¶ 6 without sufficient disclosure of supporting structure in the specification and are therefore indefinite. *See, e.g., Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1349 (Fed. Cir. 2015).

Defendant's aforementioned identification of prior art that anticipates and/or renders obvious particular claim elements, including the attached claim charts,

should not be deemed as an admission that any claim element satisfies the requirements of 35 U.S.C. § 112. While Defendant asserts below that a claim is invalid under 35 U.S.C. § 112 (such as because of a failure to particularly point out and distinctly claim the alleged invention, failure to provide written description support in the specification, and/or failure to enable one of ordinary skill in the art to make and use the alleged invention), Defendant has nonetheless provided prior art disclosures that anticipate or render obvious the claim on the assumption that MGI will contend those claims are definite, are supported by an adequate written description, and are adequately enabled.

A. Lack of Written Description and Enablement Under 35 U.S.C. § 112 ¶ 1

Certain claims in the Asserted Patents are invalid for lack of written description. Section 112 requires that a patent specification "contain a written description . . . of the manner and process of making and using [the invention] in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same." 35 U.S.C. § 112 ¶ 1. A patent's written description "must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). The disclosure must "convey to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* The level of detail required to satisfy the written description requirement varies depending on the nature and scope of the claims and on the complexity and predictability of the relevant technology, but a "mere wish or plan" for obtaining the alleged invention does not satisfy the written description requirement. *Novozymes A/S v. DuPont Nutrition Biosciences APS*, 723 F.3d 1336, 1344 (Fed. Cir. 2013). Put another way, "a description that merely renders the invention obvious does not

satisfy the requirement." *Ariad*, 598 F.3d at 1351. Instead, "all the limitations must appear in the specification." *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997). Defendant contends that, at least under MGI's actual and/or apparent application of the claims, the specifications of at least one or more of the Asserted Patents do not include a sufficient written description supporting the claims.

Section 112 likewise requires that the specification "enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the" alleged invention. 35 U.S.C. § 112 ¶ 1. A claim is not enabled if, "at the effective filing date of the patent, one of ordinary skill in the art could not practice their full scope without undue experimentation." *Wyeth and Cordis Corp. v. Abbott Labs.*, 720 F.3d 1380, 1384 (Fed. Cir. 2013). "This important doctrine prevents both inadequate disclosure of an invention and overbroad claiming that might otherwise attempt to cover more than was actually invented." *MagSil Corp. v. Hitachi Global Storage Techs., Inc.*, 687 F.3d 1377, 1381 (Fed. Cir. 2012). Defendant contends that, at least under MGI's actual and/or apparent application of the claims, the specifications of at least one or more of the Asserted Patents do not enable any person skilled in the relevant art to make and use the alleged inventions of the Asserted Claims without undue experimentation.

Furthermore, under MGI's actual and/or apparent application of the claims, the specifications of at least one or more of the Asserted Patents do not enable the broad scope of the Asserted Claims as MGI asserts. Defendant contends that MGI's actual and/or apparent application of the Asserted Claims covers a broader scope than is justified, and certainly broader than is enabled in the specifications. As explained in detail below, the specifications of at least one or more of the Asserted

Patents have not enabled a person of ordinary skill in the art at the time of the alleged invention to perform the full scope of all Asserted Claims.

Defendant's investigation of grounds of invalidity based upon failure to meet the written description and/or enablement requirements is ongoing, and Defendant reserves the right to supplement these Contentions.

1. The '031 patent

The asserted claims of the '031 patent, at least under MGI's actual and/or apparent application of the claims, are invalid under 35 U.S.C. § 112 ¶ 1 because the specification lacks an adequate written description of the alleged invention and fails to enable the full scope of the alleged invention.

Independent claim 12 requires an "Apparatus for applying a coating of covering ink to a substrate, comprising a transport mechanism for causing relative movement between the substrate and an ink jet nozzle arrangement … ." ('031 patent, at cl. 12). The '031 patent does not disclose, describe, or teach "an apparatus … comprising a transport mechanism." *Id.*. Nor does the specification enable a person of ordinary skill in the art to achieve the claimed "apparatus … comprising a transport mechanism … ." *Id.* Therefore, this claim, and those dependent from it, are invalid.

Independent claim 12 also requires "a detector for detecting temperature of the ink droplets as the ink flows from the ink container to the nozzle." ('031 patent, at cl. 12). The '031 patent does not disclose, describe, or teach "a detector for detecting temperature of the ink droplets as the ink flows from the ink container to the nozzle." *Id*. Nor does the specification enable a person of ordinary skill in the art to achieve the claimed "detector for detecting temperature of the ink droplets as the ink flows from the ink container to the nozzle." *Id*. Therefore, this claim, and those dependent from it, are invalid.

Dependent claim 8 requires "[m]aintaining the temperature of the covering ink at a predetermined temperature within the ink jet nozzle arrangement by said heater." ('031 patent, at cl. 8). The '031 patent does not disclose, describe, or teach this limitation. It also does not enable a person of ordinary skill in the art to achieve the claimed limitation. Therefore, this claim is invalid.

Dependent claims 7 and 18 require "[t]he waveform first polarity having an intermediate substantially constant amplitude between the neutral value and a peak value." ('031 patent, at cl. 7, 18). The specification does not enable a person of ordinary skill in the art to achieve the claimed "intermediate substantially constant amplitude." These two claims also require "each peak value causing a droplet to be expelled from the nozzle arrangement." ('031 patent at cls. 7, 18). The specification does not enable a person of ordinary skill in the art to achieve the claimed limitation. At least for those reasons, these claims are invalid.

Claims 7 and 18 also requires "(a) neutral value associated with the nozzle arrangement being at rest, (b) a first polarity relative to the neutral value for causing the nozzle arrangement to have a volume *greater* than the neutral value, and (c) a second polarity relative to the neutral value for causing the nozzle arrangement to have a volume *less* than the neutral value; the waveform first polarity having an intermediate substantially constant amplitude between the neutral value and a peak value, each peak value causing a droplet to be expelled from the nozzle arrangement, the intermediate value having an amplitude and/or duration to dependent on the viscosity of the ink droplet." ('031 patent at cls. 7, 18) (emphasis added). The '031 patent specification fails to enable a person of ordinary skill in the art to achieve a first polarity, at which point the "nozzle arrangement [has] a volume greater than the neutral value," that can cause "a droplet to be expelled from the nozzle arrangement." *Id.* At least for that reason, these claims are invalid.

2. The ’806 patent

The asserted claims of the ’806 patent, at least under MGI's actual and/or apparent application of the claims, are invalid under 35 U.S.C. § 112 ¶ 1 because the specification lacks an adequate written description of the alleged invention and fails to enable the full scope of the alleged invention.

Independent claims 1 and 9 require “selecting at least a number of plateaus of the electric waveform.” (’806 patent, at cls. 1, 9). The specification does not enable a person of ordinary skill in the art to achieve the claimed selection of "at least a number of plateaus … .” *Id.* Therefore, this claim, and those dependent from it, are invalid.

Dependent claims 10 and 20 also require “[s]elect[ing] said number of plateaus in response to the viscosity and/or temperature of the covering ink measured by said detector.” (’806 patent, at cls. 10, 20). These dependent claims are invalid at least because the specification does not enable a person of ordinary skill in the art to achieve the claimed selection of “at least a number of plateaus … .”

Independent claims 1 and 18 require “a substrate moving relative to an ink jet nozzle arrangement.” (’806 patent, at cls. 1, 18). The specification does not disclose, describe, or teach “a substrate moving relative to an ink jet nozzle arrangement.” Nor does it enable a person of ordinary skill in the art to achieve the claimed setting whereby a substrate moves in relation to an ink jet nozzle arrangement. Therefore, these claims, and those dependent therefrom, are invalid.

Independent claims 9 and 27 require an “Apparatus for applying a coating of covering ink to a substrate, comprising a transport mechanism for causing relative movement between the substrate and an ink jet nozzle arrangement … .” (’806 patent, at cl. 12). The ’806 patent does not disclose, describe, or teach “an apparatus … comprising a transport mechanism.” *Id.* Nor does the specification enable a person of ordinary skill in the art to achieve the claimed “apparatus … comprising a

transport mechanism … ." *Id.* Therefore, this claim, and those dependent from it, are invalid.

Claims 4, 12, 22, and 31 also require "(a) neutral value associated with the nozzle arrangement being at rest, (b) a first polarity relative to the neutral value for causing the nozzle arrangement to have a volume *greater* than the neutral value, and (c) a second polarity relative to the neutral value for causing the nozzle arrangement to have a volume *less* than the neutral value; the waveform first polarity having an intermediate substantially constant amplitude between the neutral value and a peak value, each peak value causing a droplet to be expelled from the nozzle arrangement, the intermediate value having an amplitude and/or duration to dependent on the viscosity of the ink droplet." ('806 patent at cls. 4, 12, 22, and 31). The '806 patent specification fails to enable a person of ordinary skill in the art to achieve a first polarity, at which point the "nozzle arrangement [has] a volume greater than the neutral value," that can cause "a droplet to be expelled from the nozzle arrangement." *Id.* At least for that reason, these claims are invalid.

Several dependent claims require "[t]he waveform first polarity having an intermediate substantially constant amplitude between the neutral value and a peak value." ('806 patent, at cls. 4, 12, 22, 31). The specification does not enable a person of ordinary skill in the art to achieve the claimed "intermediate substantially constant amplitude." These two claims also require "each peak value causing a droplet to be expelled from the nozzle arrangement." '(806 patent, at cls. 4, 12, 22, 31). The specification does not enable a person of ordinary skill in the art to achieve the claimed limitation. At least for those reasons, these claims are invalid.

Dependent claims 5 and 23 require "[m]aintaining the temperature of the covering ink at a predetermined temperature within the ink jet nozzle arrangement by said heater." ('806 patent at cls. 5, 23). The '806 patent does not disclose,

describe, or teach this limitation. It also does not enable a person of ordinary skill in the art to achieve the claimed limitation. Therefore, this claim is invalid. Claims 15 and 34, which require "an operator memory interface," are invalid at least because the '806 patent does not disclose, describe, or teach an operator memory interface.

3. The '067 patent

The asserted claims of the '067 patent, at least under MGI's actual and/or apparent application of the claims, are invalid under 35 U.S.C. § 112 ¶ 1 because the specification lacks an adequate written description of the alleged invention and fails to enable the full scope of the alleged invention.

Independent claims 1, 16, and 32 require "a series of nozzles arranged in a ramp." ('067 patent, at cls. 1, 9). The specification does not enable a person of ordinary skill in the art to achieve the claimed arrangement of nozzles in "a ramp." *Id.* The '067 patent also does not disclose, describe, or teach this limitation. Therefore, this claim, and those dependent from it, are invalid.

Dependent claims 2 requires "reiteration of the offset passage of the substrate." '067 patent at cl. 2. The specification does not enable a person of ordinary skill in the art to have "reiteration of the offset passage of the substrate," at least because there is no reasonably certain meaning to "offset passage." The '067 patent also does not disclose, describe, or teach this limitation. Therefore, this claim, and those dependent from it, are invalid.

Independent claims 1 and 16 require "a reservoir configured for including a viscous product having viscosity between 100 and 1000 centipoises." ('067 patent, at cls. 1, 16). The '067 patent does not enable a person of ordinary skill the art to achieve a machine that includes a reservoir that is configured for including a viscous product having viscosity between 100 and 1000 centipoises. The '067 patent's claim 1 further requires "said viscous product to be applied onto the substrate" and

refers to "the drop of viscous product" that is ejected from the nozzles. As the Special Master found in the Report & Recommendation on Claim Construction, Dkt. No. 86, the antecedent basis for "the drop of viscous product" is a "viscous product having viscosity between 100 and 1000 centipoises." (R&R at 27.) The '067 patent does not enable a person of ordinary skill the art to achieve a machine that can operate with products having a viscosity within the 100 to 1000 centipoises range. For the foregoing reasons, claims 1 and 16, and those dependent therefrom, are invalid.

Independent claim 1 also requires "wherein each hollow needle is piloted separately by the computer device, and is arranged to be fed from said reservoir configured for including said viscous product to be applied onto the substrate during relative movement between the substrate and the application station, to apply the product in a given zone on the substrate." ('067 patent, at cl. 1). The '067 patent does not enable a person of ordinary skill in the art to achieve this limitation not least because it does not enable a person of ordinary skill in the art to achieve a machine to apply a viscous product having viscosity between 100 and 1000 centipoises. For at least this reason, this claim and those dependent therefrom are invalid.

Dependent claim 18 requires "the computer device is arranged to control the excitation of the actuator, in duration and power, to determine the dimensions and the shape of a viscous product drop in accordance with an average viscosity of the product." ('067 patent, at cl. 18). The '067 patent does not disclose, describe, or teach this limitation, and it was improperly added in the reissue proceedings. Nor does it enable a person of ordinary skill in the art to achieve a computer device arranged to control the excitation of an actuator, in duration and power, to determine

the dimensions and the shape of a viscous product drop in accordance with an average viscosity of the product. Therefore, this claim is invalid.

Furthermore, independent claim 32 requires "a reservoir including a varnish having viscosity between 10 and 1000 centipoises." ('067 patent, at cl. 32). The '067 patent does not enable a person of ordinary skill the art to achieve a machine comprising a reservoir that is configured for including a varnish having viscosity between 10 and 1000 centipoises. Therefore, this claim, and those dependent therefrom, are invalid.

Also, independent claim 32 requires "each nozzle being: separately controllable by the computer device … and arranged to be fed from the reservoir including said viscous product to be applied onto the substrate during relative movement between the substrate and the application station, to apply the product in a given application zone on the substrate." ('067 patent, at cl. 32). The '067 patent does not enable a person of ordinary skill in the art to achieve this limitation not least because it does not enable a person of ordinary skill in the art to achieve a machine to apply a varnish having viscosity between 10 and 1000 centipoises. For at least this reason, this claim and those dependent therefrom are invalid.

4. The '449 patent

The asserted claims of the '449 patent, at least under MGI's actual and/or apparent application of the claims, are invalid under 35 U.S.C. § 112 ¶ 1 because the specification lacks an adequate written description of the alleged invention and fails to enable the full scope of the alleged invention.

Independent claim 1 recites "the varnish has a weight ratio between total hardenable oligomer and total hardenable monomer higher than 1:6 and lower than 1:2." ('449 patent, at cl. 1). The '449 patent discloses "the weight ratio between hardenable oligomer and hardenable monomer is higher than 1:6 and lower than

1:2" ('449 patent at column 2, lines 18-20 and column 4, lines 24-30, and original claim 1). But the '449 patent fails to disclose the above ratio is between "total hardenable oligomer and total hardenable monomer," as recited in claim 1. Thus, the '449 patent does not provide adequate written description of the varnish recited in claim 1. As a result, independent claim 1, and claims 2-35 dependent therefrom, are invalid at least for failing to comply with the written description requirement.

Claim 2 recites a varnish "having a resistance to delamination between 4 and 20 N/cm, the resistance being measured as per standard ISO/IEC 10373-1." However, the '449 patent does not demonstrate that a claimed varnish has the resistance of delamination recited in claim 2. Nor does the '449 patent teach a person of ordinary skill in the art how to achieve the resistance of delamination recited in claim 2. Claim 2 depends from claim 1, which is directed to a varnish to be deposited by inkjet. The varnish of claim 2 is a liquid and therefore cannot have the resistance to delamination recited in claim 2. As a result, claim 2 is invalid for failing to comply with the written description requirement and the enablement requirement.

Claim 7 recites that "the di-acrylate and tri-acrylate monomers are selected from among hexanediol di-acrylate (HDDA), dipropyleneglycol diacrylate, tripropylene glycol diacrylate, polyethylene glycol diacrylate, propoxylated neopentylglycol diacrylate, esterdiol diacrylate (EDDA), triethylene glycol diacrylate (TIEGDA), trimethylol propane tri-acrylate, propoxylated glycerol tri-acrylate, propoxylated (3) trimethylolpropane triacrylate (TMP3POTA), ethoxylated (6) trimethylolpropane triacrylate (TMP6EOTA), or a mixture of two or more of these monomers." However, the '449 patent does not demonstrate that a varnish containing each and every monomer recited in claim 7 in any amount can achieve the relevant functional features recited in claim 1 (e.g., the varnish has a surface

tension between 19 and 35 mN/m at 25°C. and the varnish has a viscosity between 5 and 40 mPa·s at 25°C.), from which claim 7 depends. Nor does the ’449 patent teach a person of ordinary skill in the art how to make a varnish containing each and every monomer recited in claim 7 in any amount to achieve the relevant functional features recited in claim 1. As a result, claim 7 is invalid for failing to comply with the written description requirement and the enablement requirement.

As another example, claim 8 recites that “the hardenable monomers completing the composition of the varnish comprise at least one function monomer which is adhesion function monomer to ensure adhesion to the substrate.” However, the ’449 patent does not demonstrate that all possible adhesion function monomers in any amount are able to “ensure adhesion to the substrate” when included in a varnish recited in claim 8. Nor does the ’449 patent teaches a person of ordinary skill in the art how to use all possible adhesion function monomers in any amount to “ensure adhesion to the substrate” as recited in claim 8. As a result, claim 8 is invalid for failing to comply with the written description requirement and the enablement requirement.

As another example, claim 10 recites that “the hardenable monomers completing the composition of the varnish comprise at least one function monomer which is viscosity function monomer to allow a reduction in the viscosity of the varnish.” However, the ’449 patent does not demonstrate that all possible viscosity function monomers in any amount are able to “allow a reduction in the viscosity of the varnish” when included in a varnish recited in claim 10. Nor does the ’449 patent teaches a person of ordinary skill in the art how to use all possible viscosity function monomers in any amount to “allow a reduction in the viscosity of the varnish” as recited in claim 10. As a result, claim 10, and claims 11 and 12

dependent therefrom, are invalid for failing to comply with the written description requirement and the enablement requirement.

As another example, claim 11 recites that "the viscosity function monomer is selected from among aliphatic alkyl acrylates having more than five carbon atoms, including octyl-decyl-acrylate, 3,3,5, trimethyl cyclohexanol acrylate, 2(2ethoxyethoxy)ethyl acrylate (EOEOEA), Tetrahydrofurfuryl acrylate (THFA), octyl acrylate, isodecyl acrylate (IDA), 3,3,5 trimethyl cyclohexyl acrylate (TMCHA), iso octyl acrylate (IOA), Tridecyl acrylate (TDA), 2-(2-ethoxyethoxy)ethyl acrylate, Cyclic Trimethylopropane Formal Acrylate (CTFA) or a mixture of two or more of these monomers." However, the '449 patent does not demonstrate that a varnish containing each and every monomer recited in claim 11 in any amount can achieve the relevant functional features recited in claim 1 (e.g., the varnish has a surface tension between 19 and 35 mN/m at 25°C. and the varnish has a viscosity between 5 and 40 mPa·s at 25°C.), from which claim 11 depends. Nor does the '449 patent teach a person of ordinary skill in the art how to use each and every monomer recited in claim 11 in any amount to achieve the relevant functional features recited in claim 1. As a result, claim 11, and claim 12 dependent therefrom, are invalid for failing to comply with the written description requirement and the enablement requirement for this additional reason.

Claim 13 recites that "the photoinitiator is selected from among 2-iso-propyl-thioxanthone, 2-methyl-1-4-methylthiophenyl-2-4-morpholinyl-propanone, benzo-phenone, 2,4,6-tri-methyl-benzoyl-di-phenyl phosphine oxide, 1-hydroxy-cyclo-hexyl-phenyl-ketone, n-methyl-diethanolamine, di-phenyl (2,4,6-tri-methyl-benzoyl)-phosphine oxide, or a mixture of two or more of these photoinitiators." However, the '449 patent does not demonstrate that a varnish containing each and every photoinitiator recited in claim 13 in any amount can be cured in the presence

of UV radiation to form a coating. Nor does the ’449 patent teach a person of ordinary skill in the art how to use each and every photoinitiator recited in claim 13 in any amount to form a varnish that can be cured in the presence of UV radiation. As a result, claim 13 is invalid for failing to comply with the written description requirement and the enablement requirement.

Claim 14 recites that “the photoinitiator represents less than 20 weight % of the varnish.” However, the ’449 patent does not demonstrate that a varnish containing a photoinitiator at any amount less than 20 wright % recited in claim 14 (e.g., at an amount close to 0 weight %) can be cured in the presence of UV radiation to form a coating. Nor does the ’449 patent teach a person of ordinary skill in the art how to use a photoinitiator at any amount less than 20 wright % recited in claim 14 (e.g., at an amount close to 0 weight %) to form a varnish that can be cured in the presence of UV radiation. As a result, claim 14 is invalid for failing to comply with the written description requirement and the enablement requirement.

Claim 15 recites that “the composition of the varnish also comprises: at least one surfactant; and/or at least one antioxidant; and/or at least one anti-foam agent.” However, the ’449 patent does not demonstrate that a varnish containing each and every surfactant, antioxidant, and anti-foam agent recited in claim 15 in any amount can achieve the relevant functional features recited in claim 1 (e.g., the varnish has a surface tension between 19 and 35 mN/m at 25°C. and the varnish has a viscosity between 5 and 40 mPa·s at 25°C.), from which claim 15 depends. Nor does the ’449 patent teach a person of ordinary skill in the art how to use each and every surfactant, antioxidant, and anti-foam agent recited in claim 15 in any amount to achieve the relevant functional features recited in claim 1. As a result, claim 15, and

claims 16 and 32-34 dependent therefrom, are invalid for failing to comply with the written description requirement and the enablement requirement.

B. Indefiniteness Under 35 U.S.C. § 112 ¶ 2

Section 112 requires that the specification "conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention." 35 U.S.C. § 112 ¶ 2. As the Supreme Court clarified, this provision requires that the "claims, viewed in light of the specification and the prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2129 (2014). Defendant contends that, at least under MGI's actual and/or apparent application of the claims, the Asserted Claims of the Asserted Patents fail to distinctly claim what the inventors claim as their alleged invention.

1. The '031 patent

At least under MGI's actual and/or apparent application of the claims, the asserted claims of the '031 patent are invalid under 35 U.S.C. § 112 ¶ 2 for indefiniteness because the specification and prosecution history of the '031 patent would not inform those skilled in the art about the scope of the alleged invention with reasonable certainty. Further, the asserted claims of the '031 patent are invalid for indefiniteness because the specification does not disclose adequate corresponding structure, material, or acts for several claim terms reciting functional language subject to 35 U.S.C. § 112 ¶ 6.

Independent claim 1 fails to satisfy antecedent basis. There is no antecedent basis for the terms, "the shapes of the droplets;" "the shape of an electric waveform;" "the viscosity;" "the temperature;" "the ink container;" "the nozzle;"

therefore, this claim, and those dependent therefrom, are indefinite for lacking antecedent basis.

Claim 7 fails to satisfy antecedent basis. There is no antecedent basis for the terms, "the intermediate value;" therefore, this claim is indefinite for lacking antecedent basis.

In addition, the terms, "each peak value" and "the intermediate value having a value and/or duration to dependent on the viscosity of the ink droplet" are indefinite as there is no indication in the claims or the patent specification about any objective definition for these terms. As a result, this claim is invalid. Claim 8 fails to satisfy antecedent basis as explained for independent claim 1 above—i.e., there is no antecedent basis for "the temperature." Therefore, this claim is invalid.

Independent claims 1 and 12 claim "viscosity." (*E.g.*, '031 patent at cls. 1, 12). The term "viscosity" is subject to different interpretations, including different measurement techniques, and there is no indication in the claims or the patent specification about any objective definition for this term. As a result, independent claims 1 and 12, and the claims depending therefrom, are indefinite.

Dependent claims 7 and 18 recite "an intermediate substantially constant amplitude." '(031 patent at cls. 7, 18). This term is a term of degree, and there is no indication in the claims or the patent specification about any objective boundaries for this term of degree. Federal Circuit "case law is clear that the objective boundaries requirement [of § 112 ¶ 2] applies to terms of degree." *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1364 (Fed. Cir. 2018). A "term of degree fails to provide sufficient notice of its scope," and is thus indefinite, "if it depends on the unpredictable vagaries of any one person's opinion." *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1370-71 (Fed. Cir. 2014) (internal quotation omitted) (holding term "unobtrusive manner" indefinite, because the "phrase is highly

subjective and, on its face, provides little guidance to one of skill in the art"). Thus, when using terms of degree, the patent "must provide some standard for measuring that degree such that the claim language provides enough certainty to one of skill in the art when read in the context of the invention." *GE Lighting Solutions, LLC v. Lights of Am., Inc.*, 663 F. App'x 938, 940 (Fed. Cir. 2016) (internal quotation marks omitted). But the '031 patent's intrinsic evidence fails to provide the required objective boundaries. As a result, dependent claims 7 and 18 are indefinite.

Claims 7 and 18 also requires "(a) neutral value associated with the nozzle arrangement being at rest, (b) a first polarity relative to the neutral value for causing the nozzle arrangement to have a volume *greater* than the neutral value, and (c) a second polarity relative to the neutral value for causing the nozzle arrangement to have a volume *less* than the neutral value; the waveform first polarity having an intermediate substantially constant amplitude between the neutral value and a peak value, each peak value causing a droplet to be expelled from the nozzle arrangement, the intermediate value having an amplitude and/or duration to dependent on the viscosity of the ink droplet." ('031 patent at cls. 7, 8 (emphasis added)). This term is indefinite because the specification and prosecution history of the '031 patent does not inform those skilled in the art about the meaning of this term with reasonable certainty. Specifically, the meaning of a "first polarity … for causing the nozzle arrangement to have a volume greater than the neutral value … having … a peak value … causing a droplet to be expelled from the nozzle arrangement" is not clear to a person of ordinary skill in the art. *Id.* Therefore, for that reason, these claims are invalid.

As another example, the '031 patent's independent claims and some dependent claims require a "nozzle arrangement." (*E.g.*, '031 patent at cls. 1, 7, 8, 12, 18, 19, 21). This term is indefinite because the specification and prosecution

history of the ’031 patent fail to inform a person of ordinary skill in the art what constitutes a “nozzle arrangement.” The specification mentions that a nozzle arrangement includes “a piezoelectric actuator” but does not specify with reasonable certainty the meaning of this term. (’031 patent at 2:8-9). For at least this reason, these claims are invalid.

Claim 12 fails to satisfy antecedent basis. There is no antecedent basis for the terms, “the shapes of the droplets;” “the viscosity;” “the temperature;” therefore, this claim, and those dependent therefrom, are indefinite for lacking antecedent basis.

Independent claim 12 requires “a detector for detecting temperature of the ink droplets as the ink flows from the ink container to the nozzle.” (’031 patent at cl. 12). This term is indefinite because the specification and prosecution history fail to inform a person of ordinary skill in the art about the meaning of this term. “[A]s the ink flows from the ink container to the nozzle,” no droplets have been formed yet, the temperature of which the detector would measure. (’031 patent at cl. 12). For at least this reason, this claim and those dependent therefrom are invalid.

Claim 18 is indefinite for the same reasons set forth for claim 7—i.e., it fails to satisfy antecedent basis for and fails to provide an objective definition of the terms identified above for claim 7.

Claim 20 fails to satisfy antecedent basis. There is no antecedent basis for the terms, “the shapes of a plurality of the waveforms;” “the parameters;” ” therefore, this claim, and those dependent therefrom, are indefinite for lacking antecedent basis. Other terms, such as “activate the photoinitiator,” (’031 patent at cl. 9), and “detector machine interface,” (’031 patent at cl. 10), are indefinite because the specification and prosecution history of the ’031 patent do not inform those skilled in the art about the meaning of these terms with reasonable certainty.

The Asserted Claims of the '031 patent are also indefinite because they include terms that are means-plus-function claim limitations subject to § 112 ¶ 6 and the specification discloses insufficient structure for performing the claimed functions. These terms require implementation in a special purpose computer, and the specification does not sufficiently disclose (if at all) an algorithm for performing the claimed functions. The indefinite limitations/claims include at least the following:

Limitation Subject to § 112 ¶ 6	Recited Function	Affected Claims
a transport mechanism for causing relative movement between the substrate and an ink jet nozzle arrangement	causing relative movement between the substrate and an ink jet nozzle arrangement. No corresponding structure.	12
a controller … for controlling the electric source for causing the electric source to derive a waveform having a shape determined by the readout information	causing the electric source to derive a waveform having a shape determined by the readout information This term requires implementation in a special purpose computer, and the specification does not disclose an algorithm for performing the claimed function. Even if no special purpose computer is required, the specification does not disclose sufficient structure.	20
Detector machine interface for enabling a detector arrangement for at least one of the following parameters to enter at least one of the following parameters into the	enabling a detector arrangement for at least one of the following parameters to enter at least one of the following parameters into the interface; viscosity of the	21

Limitation Subject to § 112 ¶ 6	Recited Function	Affected Claims
interface; viscosity of the covering ink, temperature of the covering ink, temperature of the substrate, and relative speed of the substrate and the ink jet nozzle arrangement	covering ink, temperature of the covering ink, temperature of the substrate, and relative speed of the substrate and the ink jet nozzle arrangement. No corresponding structure.	

2. The '806 patent

The asserted claims of the '806 patent are invalid under 35 U.S.C. § 112 ¶ 2 for indefiniteness because the specification and prosecution history of the '806 patent would not inform those skilled in the art about the scope of the alleged invention with reasonable certainty, at least under MGI's actual and/or apparent application of the claims. Further, the asserted claims of the '806 patent are invalid for indefiniteness because the specification does not disclose adequate corresponding structure, material, or acts for several claim terms reciting functional language subject to 35 U.S.C. § 112 ¶ 6.

Claim 1 fails to satisfy antecedent basis. There is no antecedent basis for the terms, "the shapes of the droplets;" "the shape of an electric waveform;" and "said shape;" and "the ink;" "the layer;" therefore, this claim is indefinite for lacking antecedent basis. The term "said shape" is indefinite as there is no indication in the claims or the patent specification about which "shape" it is being referred to—that of the droplet or the electric waveform. For this reason too, this claim, and those dependent therefrom, are invalid.

Independent claims 1, 18, and 27 discuss "viscosity." (*E.g.*, '806 patent at cls. 1, 18, 27). The term "viscosity" is subject to different interpretations, including different measurement techniques, and there is no indication in the claims or the patent specification about any objective definition for this term. As a result, these

independent claims, the claims depending therefrom, and other dependent claims discussing "viscosity" are indefinite.

Claim 2 fails to satisfy antecedent basis. There is no antecedent basis for the term "the nozzle" and "the ink container"; therefore, this claim, and those dependent therefrom, is indefinite for lacking antecedent basis.

Claim 4 fails to satisfy antecedent basis. There is no antecedent basis for the term "the viscosity of the ink droplet." There is no antecedent basis for the term, "the intermediate value;" therefore, this claim is indefinite for lacking antecedent basis.

In addition, the term, "each peak value," is indefinite as there is no indication in the claims or the patent specification about any objective scope for this term. As a result, this claim is invalid.

Claim 5 fails to satisfy antecedent basis. There is no antecedent basis for the term "said heater"; therefore, this claim, and those dependent therefrom, is indefinite for lacking antecedent basis.

Independent claims 1 and 9 require "selecting at least a number of plateaus of thee electric waveform." ('806 patent at cls. 1, 9). This term is indefinite at least because it does not specify to a person of ordinary skill a range for the number of plateaus being claimed with reasonable certainty.

Independent claims 1 and 9 also require "a substrate moving relative to an ink jet nozzle arrangement." ('806 patent at cls. 1, 9). These claims are also invalid for indefiniteness at least because this term does not specify to a person of ordinary skill the meaning of the term "moving relative to" with reasonable certainty.

Independent claim 1 also requires "said shape being controlled by selecting at least a number of plateaus of the electric waveform." ('806 patent at cl. 1). This term is indefinite because it does not specify to a person of ordinary skill in the art

the meaning of "at least a number of plateaus of the electric waveform" with reasonable certainty. Therefore, this claim and those independent therefrom are invalid.

Claim 9 fails to satisfy antecedent basis. There is no antecedent basis for the terms, "the shapes of the droplets;" "the shape of the electric waveform;" and "layer;" therefore, this claim is indefinite for lacking antecedent basis. Claim 10 fails to satisfy antecedent basis. There is no antecedent bases for the terms "the ink container" and "the nozzle"; therefore, this claim, and those dependent therefrom, is indefinite for lacking antecedent basis.

Claim 12 fails to satisfy antecedent basis. There is no antecedent basis for the terms "the viscosity of the ink droplet" and "the intermediate value"; therefore, this claim, and those dependent therefrom, is indefinite for lacking antecedent basis.

Claim 14 fails to satisfy antecedent basis. There is no antecedent basis for the terms, "the shapes of a plurality of the waveforms;" and "the parameters;" " therefore, this claim, and those dependent therefrom, are indefinite for lacking antecedent basis.

Claims 4, 12, 22, and 31 require "(a) neutral value associated with the nozzle arrangement being at rest, (b) a first polarity relative to the neutral value for causing the nozzle arrangement to have a volume *greater* than the neutral value, and (c) a second polarity relative to the neutral value for causing the nozzle arrangement to have a volume *less* than the neutral value; the waveform first polarity having an intermediate substantially constant amplitude between the neutral value and a peak value, each peak value causing a droplet to be expelled from the nozzle arrangement, the intermediate value having an amplitude and/or duration to dependent on the viscosity of the ink droplet." ('806 patent at cls. 4, 12, 22, and 31) (emphasis added). This term is indefinite because the specification and prosecution

history of the ’806 patent does not inform those skilled in the art about the meaning of this term with reasonable certainty. Specifically, the meaning of a “first polarity … for causing the nozzle arrangement to have a volume greater than the neutral value … having … a peak value … causing a droplet to be expelled from the nozzle arrangement” is not clear to a person of ordinary skill in the art. *Id.* Therefore, for that reason, these claims are invalid.

Claim 18 fails to satisfy antecedent basis. There is no antecedent basis for the terms, “the shapes of the droplets;” “the shape of an electric waveform;” “said shape;” “the composition of the varnish;” “the viscosity of the varnish;” “the temperature required;” and “the nozzle;” therefore, this claim is indefinite for lacking antecedent basis. Further, this claim is indefinite because the specification and prosecution history of the ’806 patent fail to inform a person of ordinary skill in the art about its meaning. Therefore, this claim, and those dependent therefrom, are invalid. Claim 19 fails to satisfy antecedent basis. There is no antecedent basis for the term “the layer;” therefore, this claim, and those dependent therefrom, is indefinite for lacking antecedent basis.

Claim 20 fails to satisfy antecedent basis. There is no antecedent basis for the term “the ink container;” therefore, this claim, and those dependent therefrom, is indefinite for lacking antecedent basis.

Claim 22 fails to satisfy antecedent basis. There is no antecedent basis for the term “the viscosity of the ink droplet;” therefore, this claim, and those dependent therefrom, is indefinite for lacking antecedent basis.

Claim 23 fails to satisfy antecedent basis. There is no antecedent basis for the term “said heater;” therefore, this claim, and those dependent therefrom, is indefinite for lacking antecedent basis.

The ’806 patent’s independent claims and some dependent claims require a “nozzle arrangement.” (*E.g.*, ’806 patent at cls. 1, 2, 4, 5, 9, 18, 27). This term is indefinite because the specification and prosecution history of the ’806 patent fail to inform a person of ordinary skill in the art what constitutes a “nozzle arrangement.” The specification mentions that a nozzle arrangement includes “a piezoelectric actuator” but does not specify with reasonable certainty the meaning of this term. (’806 patent at 2:12-13). For at least this reason, these claims are invalid. In addition, claim 14 requires “in response to at least one of the parameters being entered into the interface.” (’806 patent at cl. 14). The term “parameters” is indefinite because it lacks antecedent basis and a person of ordinary skill in the art would not be able to discern its meaning with reasonable certainty. For at least this reason, this claim and those dependent therefrom are invalid. In addition, several dependent claims talk about “an intermediate substantially constant amplitude.” ’806 patent at cls. 4, 12, 22, 31. This term is a term of degree, and there is no indication in the claims or the patent specification about any objective boundaries for this term of degrees. Federal Circuit “case law is clear that the objective boundaries requirement [of § 112 ¶ 2] applies to terms of degree.” *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1364 (Fed. Cir. 2018). A “term of degree fails to provide sufficient notice of its scope,” and is thus indefinite, “if it depends on the unpredictable vagaries of any one person’s opinion.” *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1370-71 (Fed. Cir. 2014) (internal quotation omitted) (holding term “unobtrusive manner” indefinite, because the “phrase is highly subjective and, on its face, provides little guidance to one of skill in the art”). Thus, when using terms of degree, the patent “must provide some standard for measuring that degree such that the claim language provides enough certainty to one of skill in the art when read in the context of the invention.” *GE Lighting Solutions, LLC v.*

Lights of Am., Inc., 663 F. App'x 938, 940 (Fed. Cir. 2016) (internal quotation marks omitted). But the '806 patent's intrinsic evidence fails to provide the required objective boundaries. As a result, those dependent claims are indefinite.

Independent claims 1 and 9, and dependent claim 28, recite "composition of the covering ink." '806 patent at cls. 1, 9, 28. This term is indefinite because the specification and prosecution history of the '806 patent does not inform a person of ordinary skill in the art about the meaning of these terms with reasonable certainty.

Other claim terms, such as "stiffness of the substrate," ('806 patent at cls. 3, 11), "probe," ('806 patent at cls. 8, 17, 26), are also indefinite because the specification and prosecution history of the '806 patent does not inform those skilled in the art about the meaning of these terms with reasonably certainty. Similarly, the term "activates the photonitiator" is indefinite as the patent fails to inform a person of ordinary skill in the art about the steps such an activation entails and how it might occur with reasonable certainty.

Claim 27 fails to satisfy antecedent basis. There is no antecedent basis for the terms, "the shapes of the droplets;" "the composition of the varnish;" "the viscosity of the varnish;" "the temperature required;" and "the nozzle;" therefore, this claim is indefinite for lacking antecedent basis. Further, this claim is indefinite because the specification and prosecution history of the '806 patent fail to inform a person of ordinary skill in the art about its meaning. Therefore, this claim, and those dependent therefrom, are invalid.

Claim 28 fails to satisfy antecedent basis. There is no antecedent basis for the term "the layer;" therefore, this claim, and those dependent therefrom, is indefinite for lacking antecedent basis.

Claim 29 fails to satisfy antecedent basis. There is no antecedent basis for the term "the ink container" and "said number of plateaus," therefore, this claim, and those dependent therefrom, is indefinite for lacking antecedent basis.

Claim 31 fails to satisfy antecedent basis. There is no antecedent basis for the terms "the viscosity of the ink droplet" and "the intermediate value;" therefore, this claim, and those dependent therefrom, is indefinite for lacking antecedent basis.

Claim 33 fails to satisfy antecedent basis. There is no antecedent basis for the term "the shapes of the plurality of the waveforms;" therefore, this claim, and those dependent therefrom, is indefinite for lacking antecedent basis.

As another example, claim 29 of the '806 patent recites "said number of plateaus." ('806 patent at cl. 29). This term is indefinite because it lacks antecedent basis and the specification and prosecution history of the '806 patent fails to inform a person of ordinary skill in the art of the meaning of this term and the exact number of plateaus required by the claim. Therefore, this claim is invalid.

The Asserted Claims of the '806 patent are also indefinite because they include terms that are means-plus-function claim limitations subject to § 112 ¶ 6 and the specification discloses insufficient structure for performing the claimed functions. The indefinite limitations/claims include at least the following:

Limitation Subject to § 112 ¶ 6	Recited Function	Affected Claims
A transport mechanism for causing relative movement between the substrate and an ink jet nozzle arrangement	for causing relative movement between the substrate and an ink jet nozzle arrangement. No corresponding structure.	9. 27
A controller … for controlling the electric source for causing the electric source to derive a waveform having	for causing the electric source to derive a waveform having a shape determined by the readout information.	14, 33

Limitation Subject to § 112 ¶ 6	Recited Function	Affected Claims
a shape determined by the readout information	This term requires implementation in a special purpose computer, and the specification does not disclose an algorithm for performing the claimed function. Even if no special purpose computer is required, the specification does not disclose sufficient structure.	
An operator memory interface for enabling an operator to enter at least one of the parameters into the interface	for enabling an operator to enter at least one of the parameters into the interface. No corresponding structure.	15, 34

3. The '067 patent

At least under MGI's actual and/or apparent application of the claims, the asserted claims of the '067 patent are invalid under 35 U.S.C. § 112 ¶ 2 for indefiniteness because the specification and prosecution history of the '067 patent would not inform those skilled in the art about the scope of the alleged invention with reasonable certainty. Further, the asserted claims of the '067 patent are invalid for indefiniteness because the specification does not disclose adequate corresponding structure, material, or acts for several claim terms reciting functional language subject to 35 U.S.C. § 112 ¶ 6.

For example, Claim 1 fails to satisfy antecedent basis. There is no antecedent basis for the terms, "the operations," "the excitation of the actuator," "the dimensions," "the shape," "the drop," "the zone shape," "the zone position," therefore, this claim is indefinite for lacking antecedent basis. Further, this claim is indefinite because the specification and prosecution history of the '067 patent fail to

inform a person of ordinary skill in the art about its meaning. Therefore, this claim, and those dependent therefrom, are invalid.

For example, Claim 16 fails to satisfy antecedent basis. There is no antecedent basis for the terms, “the operations,” “the management,” “the zone shape,” “the zone position,” “the quantity,” therefore, this claim is indefinite for lacking antecedent basis. Further, this claim is indefinite because the specification and prosecution history of the ’067 patent fail to inform a person of ordinary skill in the art about its meaning. Therefore, this claim, and those dependent therefrom, are invalid.

For example, Claim 18 fails to satisfy antecedent basis. There is no antecedent basis for the terms, “the excitation of the actuator,” “the dimensions,” "the shape” therefore, this claim is indefinite for lacking antecedent basis. Further, this claim is indefinite because the specification and prosecution history of the ’067 patent fail to inform a person of ordinary skill in the art about its meaning. Therefore, this claim, and those dependent therefrom, are invalid.

For example, Claim 32 fails to satisfy antecedent basis. There is no antecedent basis for the terms, “the operations,” “the management,” therefore, this claim is indefinite for lacking antecedent basis. Further, this claim is indefinite because the specification and prosecution history of the ’067 patent fail to inform a person of ordinary skill in the art about its meaning. Therefore, this claim, and those dependent therefrom, are invalid.

For example, independent claims 1, 16, and 32 require “a series of nozzles arranged in a ramp.” (*E.g.*, ’067 patent at cls. 1, 16, 32). The term “ramp” is subject to different interpretations, and there is no indication in the claims or the patent specification about any objective definition for this term. As a result, independent claims 1, 16, and 32, and the claims depending therefrom, are indefinite.

As another example, dependent claim 18 requires determining "the dimensions and the shape of a viscous product drop in accordance with an average viscosity of the product." ('067 patent at cl. 18). The term "in accordance with an average viscosity of the product" is also indefinite because the specification and prosecution history of the '067 patent does not inform those skilled in the art about the scope and meaning of this term with reasonable certainty. The patent does not inform with any reasonable certainty how to calculate an average viscosity, and also, there are different measurement techniques for viscosity. Also, the patent does not inform with any reasonable certainty what it means to be "in accordance." At least for the foregoing reasons, this claim is invalid.

Dependent claim 2 requires "reiteration of the offset passage of the substrate." ('067 patent at cl. 2). There is no antecedent basis for "the offset passage," and there is no reasonably certain meaning to "offset passage." The specification and prosecution history of the '067 patent does not inform those skilled in the art about the scope and meaning of this term with reasonable certainty. At least for the foregoing reasons, this claim is invalid.

Dependent claim 2 requires "the application zone is specified for each substrate by a configuration file…," whereas claim 1 requires "said application zone being defined for each substrate by a configuration file…." There is no reasonable certainty as to what it means for the application zone to be "specified" as compared to "defined," and whether the "configuration file" recited in claims 1 and 2 are the same or different files. The specification and prosecution history of the '067 patent does not inform those skilled in the art about the scope and meaning of this term with reasonable certainty. At least for the foregoing reasons, this claim (and/or claim 1) is invalid.

Dependent claim 4 requires "the application zone is specified by the relative movement…" whereas claim 1 requires "said application zone being defined for each substrate by a configuration file…." There is no reasonable certainty as to what it means for the application zone to be "specified" as compared to "defined." The specification and prosecution history of the '067 patent does not inform those skilled in the art about the scope and meaning of this term with reasonable certainty. At least for the foregoing reasons, this claim (and/or claim 1) is invalid.

Independent claim 1 requires a "hollow needle." ('067 patent at cl. 1). This term is indefinite because the specification and prosecution history of the '067 patent fail to inform those skilled in the art about the meaning of this term with reasonable certainty. At least for this reason, this claim and those dependent therefrom are invalid.

Independent claims 1, 16, and 32, in addition to other claims, require a "configuration file." (*E.g.*, '067 patent at cls. 1, 16, 32). This term is indefinite because the specification and prosecution history of the '067 patent fail to inform a person of ordinary skill in the art of the meaning of this term with reasonable certainty. Therefore, these claims and those dependent therefrom are invalid.

Independent claim 1 requires a "viscosity between 100 and 1000 centipoises." '067 patent at cl. 1. Similarly independent claim 32 requires a "viscosity between 10 and 1000 centipoises." (*Id.* at cl. 32). Also, dependent claim 34 requires a "viscosity greater than 10 and less than or equal to 1000 centipoises. (*Id.* at cl. 34). These terms are indefinite because the specification and prosecution history of the '067 patent fail to inform a person of ordinary skill in the art of the meaning of their meaning with reasonable certainty, including because there are different measurement techniques for viscosity. Therefore, these claims and those dependent therefrom are invalid.

Dependent claim 2 requires "reiteration of the offset passage of the substrate." ('067 patent at cl. 2). The term "offset passage" is indefinite because it lacks antecedent basis and the specification and prosecution history of the '067 patent fail to inform a person of ordinary skill in the art of the meaning of this term and the exact nature of information contained in such a file with reasonable certainty. Therefore, this claim is invalid.

Independent claims 16 and 32 recite "said computer device managing the operations on each of the work stations according to the position of the substrate, to the read station and to the drying station, and/or with the management of the information received at the different work stations to coordinate the operations." ('067 patent at cl. 16, 32). This term is indefinite at least because there is no reasonable certainty as to its meaning or scope, including because it includes the nonsensical language "according to the position of the substrate, to the read station and to the drying station, and/or with the management of the information received at the different work stations to coordinate the operations." This term is also indefinite because it mixes method steps with an apparatus claim. *See e.g.*, *IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377, 1384, 77 U.S.P.Q.2d 1140 (Fed. Cir. 2005). Therefore, these independent claims, and those dependent therefrom, are invalid.

Independent claims 1, 16, and 32 recite "a read station for reading and determining at least one position of the substrate and/or of markers placed on the substrate." This term is indefinite at least because there is no reasonable certainty as to its meaning or scope, including because there are multiple meanings as to the subject of "reading and determining." Therefore, these independent claims, and those dependent therefrom, are invalid.

Independent claims 1, 16, and 32 recite "a read station for reading and determining at least one position of the substrate and/or of markers placed on the substrate." This term is indefinite at least because there is no reasonable certainty as to its meaning or scope, including because there are multiple meanings as to the subject of "reading and determining." Therefore, these independent claims, and those dependent therefrom, are invalid.

Independent claims 1, 16, and 32 recite "a read station for reading and determining at least one position of the substrate and/or of markers placed on the substrate." This term is indefinite at least because there is no reasonable certainty as to its meaning or scope, including because there are multiple meanings as to the subject of "reading and determining." Therefore, these independent claims, and those dependent therefrom, are invalid.

Independent claims 1, 16 and 32 recite "selective control of each actuator of each nozzle" '067 patent at cl. 1, 16, 32. This term is indefinite at least because there is no reasonable certainty as to its meaning or scope, including because it mixes method steps with an apparatus claim. *See e.g.*, *IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377, 1384, 77 U.S.P.Q.2d 1140 (Fed. Cir. 2005). Therefore, these independent claims, and those dependent therefrom, are invalid. The Asserted Claims of the '067 patent are also indefinite because they include terms that are means-plus-function claim limitations subject to § 112 ¶ 6 and the specification discloses insufficient structure for performing the claimed functions. These terms require implementation in a special purpose computer, and the specification does not sufficiently disclose (if at all) an algorithm for performing the claimed functions. The indefinite limitations/claims include at least the following:

Limitation Subject to § 112 ¶ 6	Recited Function	Affected Claims
A movement device for moving the substrate between the different work stations	Moving the substrate between the different work stations. No corresponding structure.	1, 16, 32
A device for grasping and transferring the substrate form the input magazine to the movement device and from the movement device to the output magazine	Grasping and transferring the substrate from the input magazine to the movement device and from the movement device to the output magazine. No corresponding structure.	1, 16, 32
A read station for reading and determining at least one position of the substrate and/or of markers placed on the substrate	Reading and determining at least one position of the substrate and/or of markers placed on the substrate. This term requires implementation in a special purpose computer, and the specification does not disclose an algorithm for performing the claimed function. Even if no special purpose computer is required, the specification does not disclose sufficient structure.	1, 16, 32

4. The '449 patent

At least under MGI's actual and/or apparent application of the claims, the asserted claims of the '449 patent are invalid under 35 U.S.C. § 112 ¶ 2 for indefiniteness because the specification and prosecution history of the '449 patent would not inform those skilled in the art about the scope of the alleged invention with reasonable certainty. Further, the asserted claims of the '449 patent are invalid

for indefiniteness because the specification does not disclose adequate corresponding structure, material, or acts for several claim terms reciting functional language subject to 35 U.S.C. § 112 ¶ 6.

Independent claim 1 recites the term "varnish." The term "varnish" is indefinite at least because there is no indication in the claims or the patent specification about any objective definition for this term and this term does not specify to a person of ordinary skill in the art with reasonable certainty what material is considered as a "varnish." As a result, independent claim 1, and claims 2-35 dependent therefrom, are indefinite.

Independent claim 1 recites the term "viscosity." The term "viscosity" is subject to different interpretations, including because there are different measurement techniques, and there is no indication in the claims or the patent specification about any objective definition for this term. As a result, independent claim 1, and claims 2-35 dependent therefrom, are indefinite.

Independent claim 1 requires "a hardenable oligomer." The term "oligomer" is indefinite at least because it does not specify to a person of ordinary skill in the art with reasonable certainty the molecular weight or the number of monomer repeat unit in a compound to be considered as an "oligomer." As a result, independent claim 1, and claims 2-35 dependent therefrom, are indefinite.

Independent claim 1 requires "a hardenable monomer." The term "hardenable monomer" is indefinite at least because it does not specify to a person of ordinary skill in the art with reasonable certainty what compound is considered as a "hardenable monomer." For example, the '449 patent teaches that viscosity function monomers are examples of hardenable monomers and can include "2(2ethoxyethoxy)ethyl acrylate (EOEOEA), Tetrahydrofurfuryl acrylate (THFA), octyl acrylate, isodecyl acrylate (IDA), 3,3,5 trimethyl cyclohexyl acrylate

(TMCHA), iso octyl acrylate (IOA), Tridecyl acrylate (TDA), 2-(2-ethoxyethoxy) ethyl acrylate and/or Cyclic Trimethylpropane Formal Acrylate (CTFA)." (*See* column 6, lines 1-21). However, a person of ordinary skill in the art may not consider them as "hardenable monomers" as these compound generally do not undergo a crosslinking reaction to form a cured or hardened material because they include only one carbon-carbon double bond. As a result, independent claim 1, and claims 2-35 dependent therefrom, are indefinite.

Independent claim 1 requires "a hardenable monomer, at least one hardenable monomer contained in the composition being selected from a group formed by alkoxylated and/or poly-alkoxylated acrylic monomers having one or more di- or tri-acrylates" and requires that "the varnish has a weight ratio between total hardenable oligomer and total hardenable monomer higher than 1:6 and lower than 1:2." Claim 1 does not specify to a person of ordinary skill in the art with reasonable certainty whether the term "total hardenable monomer" refers to the hardenable monomer "selected from a group formed by alkoxylated and/or poly-alkoxylated acrylic monomers having one or more di- or tri-acrylates" only or whether this term may include other monomers described in the '449 patent. For example, the '449 patent teaches that viscosity function monomers can include "2(2ethoxyethoxy)ethyl acrylate (EOEOEA), Tetrahydrofurfuryl acrylate (THFA), octyl acrylate, isodecyl acrylate (IDA), 3,3,5 trimethyl cyclohexyl acrylate (TMCHA), iso octyl acrylate (IOA), Tridecyl acrylate (TDA), 2-(2-ethoxyethoxy) ethyl acrylate and/or Cyclic Trimethylpropane Formal Acrylate (CTFA)." (*See* column 6, lines 1-21). Claim 1 does not specify to a person of ordinary skill in the art with reasonable certainty whether the term "total hardenable monomer" include the above examples of viscosity function monomers, which may not be considered hardenable and are not

di-acrylates or tri-acrylates. As a result, independent claim 1, and claims 2-35 dependent therefrom, are indefinite.

Independent claim 1 requires "a photoinitiator." The term "photoinitiator" is indefinite at least because it does not specify to a person of ordinary skill in the art with reasonable certainty under what conditions a compound is considered as a "photoinitiator." As a result, independent claim 1, and claims 2-35 dependent therefrom, are indefinite.

Claim 2 recites that "[t]he varnish according to claim 1 having a resistance to delamination between 4 and 20 N/cm, the resistance being measured as per standard ISO/IEC 10373-1." However, claim 2 depends from claim 1, which is directed to a varnish to be deposited by inkjet. In other words, the varnish of claim 2 is a liquid and therefore cannot have the resistance to delamination recited in claim 2. As a result, claim 2 is indefinite.

The '449 patent teaches that "[r]esistance to delamination can be measured using standard ISO/IEC 10373-1. For this measurement a film is deposited on the varnish and said film's resistance to delamination is measured." (*See* column 1, lines 42-45). However, it is well known in the art that the resistance to delamination recited in claim 2 depends on various factors including the composition of the film deposited on the varnish, and the temperature and pressure under which the film is laminated to the varnish. Because these factors are not defined in claim 2, this claim is indefinite.

Claim 4 recites "the weight ratio between hardenable oligomer and hardenable monomer is higher than 1:5 and/or lower than 1:3." However, claim 1, from which claim 4 depends, recites "the varnish has a weight ratio between total hardenable oligomer and total hardenable monomer higher than 1:6 and lower than 1:2." Thus, claim 4 is indefinite as it does not specify to a person of ordinary skill in

the art with reasonable certainty whether it refers to "the weight ratio between one hardenable oligomer and one hardenable monomer" or "the weight ratio between total hardenable oligomer and total hardenable monomer" as recited in claim 1.

Claim 7 recites "the di-acrylate and tri-acrylate monomers are selected from among hexanediol di-acrylate (HDDA), … esterdiol diacrylate (EDDA), … trimethylol propane tri-acrylate, … or a mixture of two or more of these monomers." By contrast, claim 1, from which claim 7 depends, recites "at least one hardenable monomer contained in the composition being selected from a group formed by alkoxylated and/or poly-alkoxylated acrylic monomers having one or more di- or tri-acrylates." A person of ordinary skill in the art would understand that HDDA, EDDA, and trimethylol propane tri-acrylate recited in claim 1 are not alkoxylated and/or poly-alkoxylated di- or tri-acrylates because they do not include an alkoxy group in addition to the ester group in these compounds. As a result, claim 7 is indefinite.

Claim 8 requires "adhesion function monomer." This term is indefinite least because it does not specify to a person of ordinary skill in the art with reasonable certainty what compound is considered as an "adhesion function monomer." As a result, claim 8, and claims 9, 26, and 27 dependent therefrom, are indefinite.

Claim 10 requires "viscosity function monomer." This term is indefinite least because it does not specify to a person of ordinary skill in the art with reasonable certainty what compound is considered as a "viscosity function monomer." As a result, claim 10, and claims 11, 12, 28, and 29 dependent therefrom, are indefinite.

Claim 15 requires "anti-foam agent." This term is indefinite least because it does not specify to a person of ordinary skill in the art with reasonable certainty what compound is considered as an "anti-foam agent." As a result, claim 15, and claim 16 dependent therefrom, are indefinite.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and correct copy of the above and foregoing document has been served on June 5, 2023, to counsel of record via email.

/s/ John T. Johnson
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