

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

POSCO CO. LTD.,
Petitioner,

v.

ARCELORMITTAL,
Patent Owner.

Case No. IPR2025-00370
U.S. Patent No. 10,961,602

PATENT OWNER'S RESPONSE

TABLE OF CONTENTS

	<u>Page</u>
TABLE OF ABBREVIATIONS	vi
TABLE OF EXHIBITS	vii
I. INTRODUCTION	1
II. SUMMARY OF THE ’602 PATENT	2
III. SUMMARY OF THE DISPUTE	3
IV. LEVEL OF ORDINARY SKILL IN THE ART	8
V. CLAIM CONSTRUCTION	8
A. “superficial layer”	8
B. “intermetallic layer”	9
VI. ARGUMENT	12
A. Grounds 1A-1F: The Takagi-based grounds do not disclose the claimed “intermetallic layer” (Limitations [1f], [21], [24])	12
B. Grounds 1A-1F: The Takagi-based grounds would not have enabled a POSITA to practice the Challenged Claims.....	15
C. Grounds 2A-2F: Suehiro does not disclose the claimed intermetallic layer (Limitations [1f], [21], and [24])	22
D. Grounds 2A-2F: Suehiro does not disclose the claimed superficial layer (Limitations [1g], [21], and [24])	24
E. Grounds 1A-1F and 2A-2F: There is no motivation to combine	26
1. Petitioner’s Assertion that a POSITA Would Be Motivated to or Could Reasonably Make the Combination Is Speculative and Lacks Basis	27

2.	There Would Not Have Been a Motivation to Increase Thickness	28
3.	It Was Beyond the Ordinary Skill of POSITA to Mix and Match Specification Criteria as Petitioner Proposes	35
4.	The science at issue here is complex and unpredictable.....	36
5.	A POSITA would lack the expertise to reasonably succeed in combining the prior art to obtain the Challenged Claims	41
6.	The alleged combination cannot be obtained using just reasonable experimentation.	45
7.	POSITA would not find it “obvious to try” mixing and matching various alleged prior art parameters as Dr. Miles speculates, nor would succeed in doing so	46
F.	Petitioner’s Grounds 1A, 1D, 2A, and 2D Do Not Render Obvious Dependent Claims 10, 12, and 19.....	50
G.	GMW14400 (Grounds 1D-1F and 2D-2F), Suehiro (Grounds 2A-2F), and Cornette (Grounds 1A-1C and 2A-2C) are not prior art	52
1.	GMW14400 (Grounds 1D-1F and 2D-2F)	52
2.	Suehiro (Grounds 2A-2F)	55
3.	Cornette (Grounds 1A-1C and 2A-2C).....	56
H.	Grounds 1A-1F and Grounds 2A-2F: Secondary Considerations demonstrate the non-obviousness of the Challenged Claims	57

TABLE OF AUTHORITIES

	<u>Page(s)</u>
Cases	
<i>Acceleration Bay, LLC v. Activision Blizzard Inc.</i> , 908 F.3d 765 (Fed. Cir. 2018)	52, 53, 57
<i>Adang v. Fischhoff</i> , 286 F.3d 1346 (Fed. Cir. 2002)	22, 23
<i>Amgen, Inc. v. Chugai Pharm. Co., Ltd.</i> , 927 F.2d 1200 (Fed. Cir. 1991)	17
<i>In re Antor Media Corp.</i> , 689 F.3d 1282 (Fed. Cir. 2012)	15
<i>Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.</i> , 776 F.2d 281 (Fed. Cir. 1985)	16
<i>ATD Corp. v. Lydall, Inc.</i> , 159 F.3d 534 (Fed. Cir. 1998)	51
<i>Bayer Schering Pharma AG v. Barr Lab'ys, Inc.</i> , 575 F.3d 1341 (Fed. Cir. 2009)	passim
<i>Blue Calypso, LLC v. Groupon, Inc.</i> , 815 F.3d 1331 (Fed. Cir. 2016)	53
<i>In re Cronyn</i> , 890 F.2d 1158 (Fed. Cir. 1989)	57
<i>Elan Pharms., Inc. v. Mayo Found. for Med. Educ. & Rsch.</i> , 346 F.3d 1051 (Fed. Cir. 2003)	15
<i>Ens Labs Ltd. v. Unstoppable Domains Inc.</i> , IPR2024-00872, Paper 8 (PTAB Nov. 22, 2024)	54, 56
<i>Envirologix Inc. v. Ionian Techs., Inc.</i> , IPR2018-00405, Paper 12 (PTAB July 30, 2018)	54

<i>In re Hillis</i> , 484 F. App'x 491 (Fed. Cir. 2012)	16
<i>In re Hoeksema</i> , 399 F.2d 269 (C.C.P.A. 1968)	16
<i>Intell. Ventures I LLC v. T-Mobile USA, Inc.</i> , 902 F.3d 1372 (Fed. Cir. 2018)	11
<i>KSR Int'l Co. v. Teleflex Inc.</i> , 550 U.S. 398 (2007).....	48, 49
<i>In re Kumar</i> , 418 F.3d 1361 (Fed. Cir. 2005)	16
<i>Medtronic, Inc. v. Barry</i> , 891 F.3d 1368 (Fed. Cir. 2018)	57
<i>Merck & Co., Inc. v. Teva Pharms. USA, Inc.</i> , 395 F.3d 1364 (Fed. Cir. 2005)	58
<i>Microsoft Corp. v. Throughputer, Inc.</i> , IPR2022-01566, Paper 13 (PTAB May 31, 2023)	54
<i>Microsoft Corp. v. Throughputer, Inc.</i> , No. IPR2023-00852, Paper 18 (PTAB Nov. 9, 2023).....	55, 56
<i>Power Mosfet Techs., L.L.C. v. Siemens AG</i> , 378 F.3d 1396 (Fed. Cir. 2004)	12, 13
<i>Raytheon Techs. Corp. v. Gen. Elec. Co.</i> , 993 F.3d 1374 (Fed. Cir. 2021)	15
<i>Samsung Elecs. Co., Ltd. v. Infobridge Pte. Ltd.</i> , 929 F.3d 1363 (Fed. Cir. 2019)	53
<i>Sanofi-Synthelabo v. Apotex, Inc.</i> , 550 F.3d 1075 (Fed. Cir. 2008)	<i>passim</i>
<i>In re Soni</i> , 54 F.3d 746 (Fed. Cir. 1995)	58

<i>In re Wands</i> , 858 F.2d 731 (Fed. Cir. 1988)	16
<i>WBIP, LLC v. Kohler Co.</i> , 829 F.3d 1317 (Fed. Cir. 2016)	58

:

TABLE OF ABBREVIATIONS

Abbreviation	Term
'602 Patent	U.S. Patent No. 10,961,602 (Ex-1001)
'683 Patent	U.S. Patent No. 9,708,683
'683 Patent IPR	IPR2019-01275 (Ex-1031)
Challenged Claims	Claims 1-30 of U.S. Patent No. 10,961,602
Challenged Patent	'602 Patent
Fig.	Figure
IPR	<i>inter partes</i> review
ITC Investigation	<i>Certain High-Strength Aluminum or Aluminum Alloy-Coated Steel, and Automotive Products and Automobiles Containing Same</i> , Inv. No. 337-TA-1402 (ITC)
Patent Owner	ArcelorMittal
Pet.	Petition, Paper 1
Petitioner	POSCO Co., Ltd.
POSITA	person[s] of ordinary skill in the art
RPI	Real Party-In-Interest

TABLE OF EXHIBITS

Exhibit Number	Description
2001	Order No. 7: Procedural Schedule from ITC Investigation
2002	RPI's Takagi Invalidity Chart from ITC Investigation
2003	RPI's Cornette Invalidity Chart from ITC Investigation
2004	RPI's Laurent Invalidity Chart from ITC Investigation
2005	RPI's Nishibata Invalidity Chart from ITC Investigation
2006	RPI's Suehiro Invalidity Chart from ITC Investigation
2007	RPI's Invalidity Contentions from ITC Investigation
2008	Excerpted RPI's Expert Report Regarding Invalidity from ITC Investigation
2009	RPI's Pre-Hearing Brief from ITC Investigation
2010	Patent Owner's Pre-Hearing Brief from ITC Investigation
2011	Day One Trial Transcript from ITC Investigation
2012	Day Two Trial Transcript from ITC Investigation
2013	Day Three Trial Transcript from ITC Investigation
2014	RPI's Opening Post-Hearing Brief from ITC Investigation
2015	Patent Owner's Reply Post-Hearing Brief from ITC Investigation
2016	File History of '602 Patent
2017	File History of '683 Patent
2018	-
2019	-
2020	Curriculum Vitae of Dr. Dierk Raabe
2021	Deposition Transcript of Dr. Michael Miles (Oct. 24, 2025)
2022	Joint Technology Stipulation, <i>Certain High-Strength Aluminum or Aluminum Alloy-Coated Steel, and Automotive Products and Automobiles Containing Same</i> , Inv. No. 337-TA-1402 (ITC)

Exhibit Number	Description
2023	Li, Y., Chen, Y., & Li, S. (2021). Phase transformation testing and modeling for hot stamping of boron steel considering the effect of the prior austenite deformation. <i>Materials Science and Engineering: A</i> , 821, 141447.
2024	Çavuşoğlu, O., Çavuşoğlu, O., Yılmazoğlu, A. G., Üzel, U., Aydın, H., & Güral, A. (2020). Microstructural features and mechanical properties of 22mnb5 hot stamping steel in different heat treatment conditions. <i>Journal of Materials Research and Technology</i> , 9(5), 10901–10908.
2025	Turetta, A., Bruschi, S., & Ghiotti, A. (2006). Investigation of 22MNB5 formability in Hot Stamping Operations. <i>Journal of Materials Processing Technology</i> , 177(1–3), 396–400.
2026	Bariani, P. F., Bruschi, S., Ghiotti, A., & Turetta, A. (2008). Testing formability in the hot stamping of HSS. <i>CIRP Annals</i> , 57(1), 265–268.
2027	Kucera, V., Cabibbo, M., Prusa, F., Fojt, J., Petr-Soini, J., Pilvousek, T., Kolarikova, M., & Vojtech, D. (2021). Phase composition of Al-Si coating from the initial state to the hot-stamped condition. <i>Materials</i> , 14(5), 1125.
2028	Declaration of Dr. Michael Miles, Exhibit 1003, <i>POSCO Co., Ltd. v. ArcelorMittal</i> , IPR2024-01376 (PTAB)
2029	Declaration of Dr. Michael Miles, Exhibit 1003, <i>POSCO Co., Ltd. v. ArcelorMittal</i> , IPR2019-01275 (PTAB)
2030	Petition, <i>POSCO Co., Ltd. v. ArcelorMittal</i> , IPR2024-01376 (PTAB)
2031	Petition, <i>POSCO Co., Ltd. v. ArcelorMittal</i> , IPR2019-01275 (PTAB)
2032	Springer, H., Kostka, A., Payton, E. J., Raabe, D., Kaysser-Pyzalla, A., & Eggeler, G. (2011). On the formation and growth of intermetallic phases during interdiffusion between low-carbon steel and aluminum alloys. <i>Acta Materialia</i> , 59(4), 1586–1600.

Exhibit Number	Description
2033	Lemmens, B., Springer, H., Duarte, M. J., De Graeve, I., De Strycker, J., Raabe, D., & Verbeken, K. (2016). Atom probe tomography of intermetallic phases and interfaces formed in dissimilar joining between Al Alloys and Steel. <i>Materials Characterization</i> , 120, 268–272.
2034	Lemmens, B., Springer, H., De Graeve, I., De Strycker, J., Raabe, D., & Verbeken, K. (2017). Effect of silicon on the microstructure and growth kinetics of intermetallic phases formed during hot-dip aluminizing of Ferritic Steel. <i>Surface and Coatings Technology</i> , 319, 104–109.
2035	Lemmens, B., Springer, H., Peeters, M., De Graeve, I., De Strycker, J., Raabe, D., & Verbeken, K. (2018). Deformation induced degradation of hot-dip aluminized steel. <i>Materials Science and Engineering: A</i> , 710, 385–391.
2036	Springer, H., Kostka, A., dos Santos, J. F., & Raabe, D. (2011). Influence of intermetallic phases and Kirkendall-porosity on the mechanical properties of joints between steel and aluminum alloys. <i>Materials Science and Engineering: A</i> , 528(13–14), 4630–4642.
2037	Steurer, W., Dshemuchadse, Julia. <i>Intermetallics: Structures, Properties, and Statistics</i> . (August 4, 2016)
2038	Sauthoff, Gerhard. <i>Intermetallics</i> (March 9, 1995)
2039	Pottgen, R., Jöhren, D. <i>Intermetallics</i> (2014).
2040	Declaration of Dierk Raabe

I. INTRODUCTION

The Petition challenges the claims of the '602 patent based on twelve different grounds involving two primary references. Petitioner's challenges fail for multiple independent reasons.

Grounds 1A-1F rely on Takagi as a primary reference. Takagi, however, does not disclose the claimed intermetallic layer and is not enabled.

Grounds 2A-2F rely on Suehiro as a primary reference. Like Takagi, Suehiro also does not disclose the claimed intermetallic layer. In addition, Suehiro does not disclose the claimed superficial layer.

All of Petitioner's grounds also rely on obviousness combinations. Petitioner fails to show that a POSITA would have been motivated to combine separate references or that there would have been a reasonable expectation of success. Petitioner repeatedly oversimplifies the field of hot stamping, claiming that the relationship between self-selected and isolated parameters was well-known. The hot-stamping process, however, involves a complex interplay among multiple parameters whose relationship is still being studied today. Many of Petitioner's proposed rationales are based on *ipse dixit* reasoning that was directly contradicted by RPI's expert during the parallel ITC Investigation, which addressed the '602 Patent and involved the same references. Moreover, Petitioner also ignores the

recited level of skill, and that the state of art teaches away from many of Petitioner's proposed rationales for combining references.

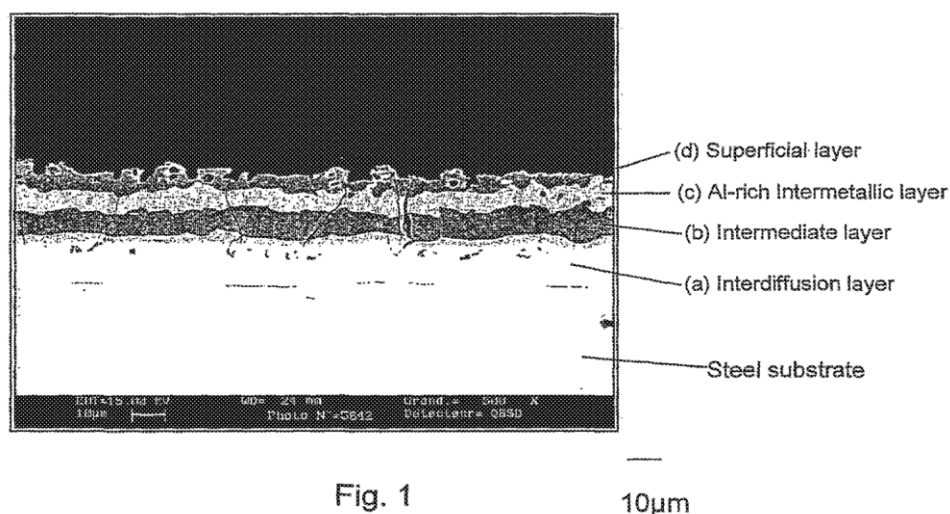
Finally, Petitioner failed to show that a POSITA would have been able to find GMW14400, Suehiro, or Cornette before the priority date of the patent. As such, Petitioner did not show that these references qualify as prior art, meaning Grounds 1A-1F and 2A-2F fail for this additional reason.

For the reasons explained below, the Petition fails to establish that any of the Challenged Claims are unpatentable.

II. SUMMARY OF THE '602 PATENT

The '602 Patent relates to “[c]oated steel strips, coated stamped products and methods.” Ex-1001, Title. The '602 Patent recognizes that “the use of pre-coated steels in hot-stamping processes for the shaping of parts has become important, especially in the automotive industry.” Ex-1001, 1:37-39. However, problems could occur due to “rollers [that] may become fouled” during the hot-stamping process leading to “maintenance of the rollers” and causing productivity to decrease. Ex-1001, 1:66-2:2. The '602 Patent also recognized that there was a need for parts with “very high mechanical resistance,” and “a substantial resistance to shocks, fatigue, abrasion and wear, while retaining a good resistance to corrosion as well as a good capacity for welding, painting and gluing.” Ex-1001, 2:3-23, 11:33-39.

The '602 Patent innovated and enabled a way to obtain, in a repeatable, consistent, and robust manner, a beneficial coating microstructure with the above qualities. Ex-1001, 14:59-18:24. Specifically, as the '602 Patent claims reflect, the inventors created a carefully designed microstructure for hot-stamped aluminum alloy coatings on martensitic steel that required exacting phase transformation, lamellar structure, and intermetallic layering. Figure 1 is an embodiment of the invention and displays an example of the beneficial and required coating microstructure.



Ex-1001, Figure 1.

III. SUMMARY OF THE DISPUTE

The '602 Patent invention claims aluminum alloy coated, press-hardened (i.e., hot stamped) steel products wherein the internal microstructure of the coating is designed to meet certain specific, delineated phase transformation, lamellar, and compositional requirements. *See generally* Ex-1001. As the '602 Patent teaches, a

coating microstructure of this specific design is not the natural byproduct of merely hot stamping aluminum alloy coated steel. Rather, the compositional requirements of the base steel and coating, and the hot-stamping parameters (e.g., heating curves, transfer, dwell, and hold parameters, and press and quenching standards) must all be carefully designed and aligned to yield a product with the required particular microstructural features, all of which result in a coating that is so thin that it is only half as thick as a human hair.

As such, it is undisputed that, to obtain the Challenged Claims, a POSITA would need to design, *inter alia*, the hot stamping heating curves, transfer, dwell, and hold parameters, and press and quenching standards, along with criteria for the mass and composition of aluminum alloy and base steel used, which would then result in diffusion kinetics that yield the specific microstructural design of phase transformation layers called for in the claims. As described below, in reaching the invention, the '602 Patent inventors did just that through *years* of research.

Here, the Petitioner states that a POSITA would “have had an undergraduate degree in materials science, manufacturing engineering, mechanical engineering, or equivalent knowledge, training, or experience, with two years of experience working in metallurgy.” Pet., 6. That is, per the Petition, any generalist in metallurgy, would be able to readily identify in the prior art those values for parameters, materials, and manufacturing specifications necessary to obtain the highly specific microstructural

coating formation called for in the Challenged Claims (or to recreate and enable similar microstructures from pictures printed in alleged prior art). *See generally* Petition. According to Petitioner and RPI, no prior experience is needed in designing manufacturing processes to control and obtain microstructural intermetallic phase transformation layers in coatings that are so tiny that it literally takes a scanning electron microscope to see them. According to Petitioner and RPI, this is something any POSITA in metallurgy can reasonably do.

Petitioner's position here is, however, cut from whole pseudoscientific cloth. As Patent Owner's expert Professor Dierk Raabe explains, the subspecialty of metallurgy at issue in the Challenged Claims—the design and control at the microstructural, molecular level of diffusion kinetics in aluminum alloys to create specific intermetallic lamellar structures by phase transformation—is one of the most exacting, challenging, and unpredictable subspecialties in metallurgy. *See generally* Ex-2040. It is highly complex, involving multiple interrelated variables that yield unpredictable and non-linear results and interactions. It is a field that involves decades of intense research at the highest levels, research that continues even today. As shown below, it is not surprising that the inventors here—all more experienced than Petitioner's generalist POSITA—spent *years* researching and experimenting before coming to the invention of the '602 Patent.

Dr. Raabe is a globally recognized authority and leader in steel metallurgy, microstructure, characterization, and phase transformations, with a particular focus on steel-aluminum interactions, intermetallic phase formation, and diffusion kinetics. Dr. Raabe is Managing Director at the Max Planck Institute for Sustainable Materials (formerly Max Planck Institute for Iron Research, the world's largest research organization dedicated to the study of steels) in Düsseldorf, Germany. Dr. Raabe holds professorships at RWTH Aachen and KU Leuven and holds a doctorate and habilitation in Physical Metallurgy and Metal Physics, both *summa cum laude* by RWTH Aachen University. Dr. Raabe is a member of the German National Academy Leopoldina, the US National Academy of Engineering, and recipient of the Gottfried Wilhelm Leibniz Prize and two ERC Advanced Grants.

Dr. Raabe's research includes extensive investigation into the interplay between microstructural phenomena and mechanical performance of metallic systems, in particular in steels, multiphase alloys, and metal-matrix systems (such as at issue here). As a global leader in microstructural science in metallic materials, Dr. Raabe has authored hundreds of peer-reviewed articles, and his work has been publicly cited over 100,000 times, resulting in his achieving an h-index of 189.

Relevant to this matter, Dr. Raabe's extensive research, including in *Nature*, *Science*, *Acta Materialia*, and related top-tier journals, demonstrates his profound expertise in steel-aluminum joining, interdiffusion mechanisms and intermetallic

formation, and the role of alloying elements, including in martensitic and press-hardened steels, coatings, and steel design. Dr. Raabe is one of the world's preeminent scientists and experts on the subspecialties at issue in the '602 Patent.

For Petitioner's part, Petitioner relies on its expert Dr. Miles's opinion based on his view that POSITAs in metallurgy could readily and reasonably serve as microstructural architects, simply picking and combining microstructural design features from prior art to author manufacturing processes that obtain the Challenged Claims. Dr. Miles opines on what would be "obvious" to those POSITAs concerning designing means of obtaining intermetallic phase transformations of particular lamellar and compositional requirements at a microscopic level, and on how POSITAs would have a reasonable "chance of success" at designing such with just limited "reasonable experimentation." *See generally* Ex-1003.

But Dr. Miles's opinions here appear to be based on essentially naked fiat. While Dr. Miles is no doubt an accomplished metallurgist in the areas of his published articles and patents, nowhere does Dr. Miles set forth any basis to opine on the control of intermetallic phase transformation to yield specified lamellar designs in microstructural architecture (or on the underlying diffusion kinetics), much less in aluminum alloy coatings for press-hardened steels. Ex-2040 ¶¶181-89.

At bottom, the question here is whether Dr. Miles's *ipse dixit* is correct that POSITA metallurgists could simply combine various microstructural features found

in different alleged prior art coating embodiments to yield the Challenged Claims (or to recreate and enable coatings based on SEM images in alleged prior art). For the reasons summarized below and stated by Dr. Raabe, Dr. Miles is wrong—the technical challenges and science here are much more complex and unpredictable than Dr. Miles unsupported opinions. *See, e.g.*, Ex-2025 (“The main reason of [hot stamping’s] restricted application in the industry lies however in the lack of basic knowledge about mechanical and microstructural characteristics.”). Indeed, even RPI’s expert disagrees with Dr. Miles’s view of the art. Ex-2013, 961:4-24. Accordingly, the Petition fails to establish that any of the Challenged Claims are unpatentable.

IV. LEVEL OF ORDINARY SKILL IN THE ART

Solely for this Response, Patent Owner does not challenge Petitioner’s definition of a POSITA.

V. CLAIM CONSTRUCTION

For purposes of this proceeding, Patent Owner proposes that the terms “superficial layer” and “intermetallic layer” be construed.

A. “superficial layer”

The parties appear to agree on the plain and ordinary meaning of “superficial layer,” yet Petitioner departs from that meaning in its analysis of Suehiro. To avoid confusion, the term should be expressly construed. The plain and ordinary meaning

of “superficial layer” is a “surface layer” or “top layer.” Ex-2040 ¶¶114, 168-71. Petitioner and its expert have repeatedly endorsed this understanding. In the ’683 IPR, Petitioner and Dr. Miles stated that a POSITA “would have understood ‘superficial layer’ to mean ‘a surface layer.’” Ex-1031, 32. In IPR2024-01376, Petitioner reaffirmed the same meaning. Ex-2031, 19. In this proceeding, Dr. Miles also confirmed that “superficial layer” carries its plain and ordinary meaning of a “surface layer” or a “top layer.” Ex-2040 ¶¶114, 168-71. Patent Owner agrees with Petitioner and Dr. Miles. *Id.* Accordingly, the term “superficial layer” should be construed as “a surface layer” or “top layer.”

B. “intermetallic layer”

The term “intermetallic layer” requires construction because the parties dispute its plain and ordinary meaning. The disputed term appears in claims that describe a multilayered metallurgical architecture comprising, in sequence, an interdiffusion layer, an intermediate layer, an intermetallic layer, and a superficial layer. The dispute centers on the meaning of “intermetallic layer,” which properly understood means “a layer containing two or more metallic (or metalloid) elements atomically joined with defined stoichiometry in an ordered crystal structure.” Ex-2040 ¶¶115-122. A POSITA would have recognized “intermetallic layer” as a term of art with a settled meaning that preserves the claim’s layered distinctions and avoids superfluity

As used in the art, a “layer” denotes a predominantly lateral stratum exhibiting continuity of phase and composition. *Id.* ¶117. “Intermetallic,” in turn, refers to a compound of two or more metals or metalloids that are atomically joined. *Id.* ¶118. In an intermetallic *layer*, a POSITA would understand that the intermetallic compounds would present in defined stoichiometric ratios and in a specific crystalline phase structure (i.e., present in specific, non-random, and ordered atomic lattice positions). *Id.* ¶119. Thus, an “intermetallic layer,” as used in the art is “a layer containing two or more metallic (or metalloid) elements atomically joined with defined stoichiometry in an ordered crystal structure.” *Id.* ¶120.

The presence of an intermetallic layer structure can be confirmed by, among other means, x-ray diffraction or electron backscatter diffraction. *Id.* ¶119. A POSITA would therefore understand that an “intermetallic layer” is not merely any stratum containing an unorganized or heterogenous mix of multiple metal or metalloid elements as Petitioner and its expert suggest. *E.g.*, Ex-2021 at 114:10-16. Indeed, extrinsic evidence is consistent and reflects that an intermetallic layer would require those metals or metalloids to (1) be atomically joined in solid-state compounds that (2) exist with defined stoichiometry in an ordered crystal structure. Ex-2040 ¶118 (citing Exs. 2037-39); Ex. 2038 at 15 (“[I]ntermetallics form particular crystal structures with ordered atom distributions where atoms are preferentially surrounded by unlike atoms.”)

Petitioner offered no construction for “intermetallic layer” in this proceeding.

Dr. Miles, however, testified that a POSITA would have understood the term to mean “a layer composed of two or more metals or of a metal and a nonmetal in an alloy.” Ex-2040 ¶118 (citing Ex-2021 at 114:10-16). That view is technically and legally flawed. First, it collapses “intermetallic” into the mere presence of two or more elements in an alloy, ignoring the requirement of atomic joining, and ignoring that those compounds must exist with defined stoichiometry in an ordered crystal structure—this is what distinguishes an intermetallic layer from ordinary solid solutions or mixed phases. *Id.* ¶¶118-19. Indeed, Dr. Miles did not support his interpretation with any relevant extrinsic evidence.

Second, Dr. Miles’s interpretation cannot be reconciled with the claim’s layered architecture, which recites four distinct layers: an interdiffusion layer, an intermediate layer, an intermetallic layer, and a superficial layer. Treating “intermetallic layer” as merely a multi-element alloy erases the meaningful distinction among these layers. *Id.* ¶121. As Dr. Miles admitted, under his view, all layers have “some metallics” and a direct consequence of Dr. Miles’s interpretation is that the word “intermetallic” is rendered superfluous and the claim would have the same meaning with that word omitted. *Id.* Constructions, however, that render claim language meaningless or superfluous are disfavored. *See Intell. Ventures I*

LLC v. T-Mobile USA, Inc., 902 F.3d 1372, 1378 (Fed. Cir. 2018); *Power Mosfet Techs., L.L.C. v. Siemens AG*, 378 F.3d 1396, 1410 (Fed. Cir. 2004).

Because “intermetallic layer” is a term of art denoting a distinct, ordered intermetallic phase—one defined by multiple metallic elements being atomically joined with stoichiometry and crystalline ordering—a POSITA would not equate it with any multi-element mixture or alloy. The Board should adopt Patent Owner’s proposed construction.

VI. ARGUMENT

A. Grounds 1A-1F: The Takagi-based grounds do not disclose the claimed “intermetallic layer” (Limitations [1f], [21], [24])

All challenged claims require an “intermetallic layer” with a defined compositional relationship. As explained, an “intermetallic layer” is a layer containing two or more metallic (or metalloid) elements atomically joined with defined stoichiometry in an ordered crystal structure. Ex-2040 ¶¶115-22. Petitioner has not shown that Takagi discloses the claimed intermetallic layer. *Id.* ¶¶ 123-140.

The claimed “intermetallic layer” is not merely any region having certain elemental percentages; it is a defined *phase layer* characterized by intermetallic compounds with defined stoichiometry in an ordered crystal structure (i.e., compounds atomically joining aluminum, iron, or silicon ordered in a defined crystal structure). *Id.* ¶¶115-22. Confirming such a layer requires appropriate testing. *Id.* ¶134. A POSITA would have used x-ray diffraction (XRD) or electron backscatter

diffraction (EBSD) to verify the presence and ordering of intermetallic compounds.

Id. Takagi reports no such testing. *Id.* As such, Takagi lacks sufficient information to determine whether there is an intermetallic layer.

There is no other way to determine from Takagi whether an intermetallic layer is present. Takagi does not identify any layer as intermetallic with a label. Ex-2040 ¶127. Nor does it provide meaningfully relevant information about what it labels “Inter 2” and “Inter 3” in Table 1, the layers that Dr. Miles inconsistently maps to the intermetallic layer. *Id.* ¶¶126, 128. For example, Takagi does not disclose how the Table 1 data was obtained.¹ *Id.* ¶128.

The Figures in Takagi do not show the claimed intermetallic layer. More fundamentally, Takagi does not clearly depict what it considers to be a layer. Ex-1016, Fig. 2A (indecipherable layers). It is unclear whether the layers in Takagi correspond to a phase-layered microstructure like Figure 1 of the Challenged Patent (which embodies the claims) or to something akin to Figure 2 (which does not). *Id.* ¶¶131-32. To the extent Takagi's figures can be deciphered, they indicate that a phase-layered microstructure similar to Figure 1 is *not* present. *Id.* ¶133.

¹ As Dr. Miles now concedes, it is not even clear whether Takagi reports mean compositional data as required by the claims. Compare Ex-1003 ¶51, with Ex-2021, 159:4-17. This is yet another reason why Takagi does not disclose the Challenged Claims.

Petitioner ignored these deficiencies in Takagi. Instead, the Petition focused on the compositional relationship recited in the claims while failing to explain why any Takagi layer with that relationship would be an “intermetallic layer” within the meaning of the claims. Dr. Miles admitted his mapping was based primarily on a layer’s position relative to the surface rather than on whether the layer is an intermetallic layer as claimed. *Id.* ¶135. When pressed, Dr. Miles invoked Cornette to justify that approach. *Id.* ¶136. But when pressed further, he also conceded that Cornette lacks sufficient information to identify an intermetallic layer. *Id.* ¶¶137-38.

The Petition’s failure to apply a consistent claim construction approach is further illustrated by its arbitrary and inconsistent mapping. Takagi discloses “Inner,” “Inter 1,” “Inter 2,” “Inter 3,” and “Outer” purported layers across five test examples. Ex-1016, Fig. 4; Ex-2040 ¶126. Yet when mapping tests 1 and 4, Dr. Miles identifies “Inter 3” as the intermetallic layer, while for test 5 he identifies “Inter 2.” *Id.* ¶126. This inconsistency confirms that his mapping is not grounded in a principled view of the claim language.

At bottom, the claims do not require merely four layers such that any four adjacent strata would suffice. They recite specific types of layers: an interdiffusion layer, an intermediate layer, an intermetallic layer, and a superficial layer, and each layer has distinct characteristics. Dr. Miles ignores those requirements and instead

attempts to map a supposed positional similarity between Takagi's unlabeled and indistinct "layers" (which cannot be reliably discerned from Takagi's figures) and the claimed intermetallic layer. Because Takagi does not identify, characterize, or substantiate an intermetallic layer meeting the claims, Petitioner has not carried its burden to show the Challenged Claims are unpatentable over the Takagi-based grounds.

B. Grounds 1A-1F: The Takagi-based grounds would not have enabled a POSITA to practice the Challenged Claims

Prior art must be enabling to prove anticipation or obviousness. "It is well settled that prior art under 35 U.S.C. § 102(b) must sufficiently describe the claimed invention to have placed the public in possession of it." *Elan Pharms., Inc. v. Mayo Found. for Med. Educ. & Rsch.*, 346 F.3d 1051, 1055 (Fed. Cir. 2003). "Enablement of prior art requires that the reference teach a skilled artisan to make or carry out what it discloses in relation to the claimed invention." *In re Antor Media Corp.*, 689 F.3d 1282, 1290 (Fed. Cir. 2012). "It is insufficient to name or describe the desired subject matter, if it cannot be produced without undue experimentation." *Elan*, 346 F.3d at 1055.

"To render a claim obvious, the prior art, taken as a whole, must enable a skilled artisan to make and use the claimed invention." *Raytheon Techs. Corp. v. Gen. Elec. Co.*, 993 F.3d 1374, 1380 (Fed. Cir. 2021). "[I]f the prior art of record fails to disclose or render obvious a method for making a claimed compound ... it

may not be legally concluded that the compound itself is in the possession of the public.” *In re Hoeksema*, 399 F.2d 269, 274 (C.C.P.A. 1968). “The test of whether a particular compound described in the prior art may have been relied upon to show that the claimed subject matter at issue would have been obvious is whether the prior art provided an enabling disclosure with respect to the disclosed prior art compound.” *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 297 (Fed. Cir. 1985). “Thus when a *prima facie* case of obviousness is deemed made based on similarity to a known composition or device, rebuttal may take the form of evidence that the prior art does not enable the claimed subject matter.” *In re Kumar*, 418 F.3d 1361, 1368 (Fed. Cir. 2005). In sum, “the presumption of obviousness based on close structural similarity is overcome where the prior art does not disclose or render obvious a method for making the claimed compound.” *Id.* (citation omitted).

To determine whether a prior art disclosure is enabling, courts consider the *Wands* factors. *In re Hillis*, 484 F. App'x 491, 495 (Fed. Cir. 2012). These factors include the relative skill of those in the art, the amount of direction or guidance presented, the quantity of experimentation necessary, the presence or absence of working examples, the state of the prior art, and the predictability or unpredictability of the art. *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988). These factors are

“illustrative” and not exhaustive. *Amgen, Inc. v. Chugai Pharm. Co., Ltd.*, 927 F.2d 1200, 1212-13 (Fed. Cir. 1991).

Yet here, the generalist and basic skill in the art assigned by Dr. Miles to POSITA lacks sufficient expertise and experience to gap-fill what Takagi fails to disclose. Ex-2040 ¶¶148-56. Takagi does not provide any “direction or guidance” as to what the resulting alleged layered structure would be, nor sufficient parameters to achieve the layered microstructure recited in the Challenged Claims. *Id.* at 157. While Takagi provides data for its Test 1, that data lacks working examples illustrating or evidencing a multi-layered microstructure as required by the Challenged Claims (or even as alluded to in Takagi itself). *Id.*

The development of microstructural and intermetallic phase layering in aluminum-alloy coatings during hot stamping is exceedingly complex and involves numerous interdependent and often unpredictable factors, the kinetics and chemistry of which dynamically change from second to second during the heating, forming, and cooling process. Ex-2040 ¶¶39-58, 66-75, 145-147, 199-246. As such, a POSITA with only ordinary skill in the field as articulated by Dr. Miles could not use Takagi to obtain the microstructure of the Challenged Claims (even without the thickness limitation) without engaging in undue and exceptional experimentation—Takagi offers at best an “invitation to research,” not even a roadmap or starting point

for research (lacking, as Takagi does, any disclosure sufficiently characterizing layered microstructure). *Id.* ¶157.

To arrive at the Challenged Claims, one would have to, among other things, design the manufacturing specifications and process parameters that would achieve the result claimed. Ex-2040 ¶¶141-157. Doing so in a field that is intensely unpredictable, and complex, would be beyond the skill of a POSITA and require undue and excessive experimentation, as explained below. *Id.*

Relative skill of those in the art: According to Petitioner, a POSITA would only “have had an undergraduate degree in materials science, manufacturing engineering, mechanical engineering, or equivalent knowledge, training, or experience, with two years of experience working in metallurgy.” Pet., 6. In short, a POSITA here is an experienced technician working in some aspect of metallurgy. A POSITA is *not* a specialist in, or even experienced with, the microstructural science of aluminum alloy coated hot-stamped steel, much less able to design manufacturing processes to create the specific microstructural phase layers required in the Challenged Claims (or to recreate the microstructure shown in Takagi), without, at minimum, exceptional undue experimentation. Ex-2040 ¶¶148-56.

Here, a POSITA would have to, among other things, design the heating temperatures and rates, dwell and holding times, and cooling conditions that would during hot stamping yield the specific phase transformation, lamellar structure, and

intermetallic layering in an aluminum alloy coating as called for in the Challenged Claims. But a POSITA, even armed with the knowledge in the art at the time, would lack the training, knowledge, and expertise to author such hot stamping designs without undue experimentation. *Id.*

The amount of direction or guidance presented and presence or absence of working examples: Takagi does not disclose the characterization of any alleged relative coating layers or phases for POSITA to use as a guide. Takagi merely states in text only that its experiment resulted in a five-layer coating (not a four-layer coating). *Id.* ¶¶142-43. Takagi provides no guidance as to what that microstructure looked like or of its relative sizing or features. *Id.* To the contrary, based on the distribution of Kirkendall porosity voids throughout the coating shown in Takagi Figure 2A, a POSITA would not conclude that Takagi obtained a four phase-layered microstructure as required by the Challenged Claims at all, thus rendering its teaching further unhelpful. *Id.* ¶¶129-30. Moreover, as also noted above (*see supra* Section VI.A), critically, Takagi does not disclose an intermetallic layer (or a basis to necessarily infer one), which is required to obtain the Challenged Claims. *Id.* Nor, having not disclosed one, does Takagi indicate, disclose or provide guidance on how to obtain an intermetallic layer. *Id.*

The state of the art and the predictability or unpredictability of the art:
The state of the art also would not help a POSITA succeed in recreating the

microstructure of Takagi, much less in obtaining the four-layered microstructure with intermetallic layer as required by the Challenged Claims. The diffusion kinetics and phase transformations and formations required in hot stamping is even today considered a complex, unpredictable field. Ex-2040 ¶153. Today, nearly 20 years after the Challenged Patent was invented, researchers continue to study the relationship among all the different compositional and process parameters and their interdependent impact on the development of microstructural and phase development in hot stamped coatings. *Id.* ¶154; ¶¶66-75.

As RPI's expert succinctly stated, the state of the art did not show a relationship between the parameters and how each of them impacts the development of specific required attributes in microstructural phase layers in aluminum alloy (i.e., the formation of the coating):

I think it's not clear that how each one of those parameters affect the formation of the coating, because there hasn't been a good description in any document I've seen, other than to say that it has an influence, how that influence imposes itself, how those process conditions impose themselves in terms of forming a microstructure in the coating.

Because we've seen that it's possible to form coatings which don't have that microstructure.

And I think that there is according to the literature that I've seen, not a clear consensus in terms of precisely what set of conditions are required to produce that specific microstructure because we see that sometimes it occurs and sometimes it doesn't.

Ex-2013, 961:4-24. Indeed, consistent with RPI's expert's testimony, Takagi itself states that "[t]he mechanism of formation of the layered structure is not fully evident." Ex-1016 ¶[0019]. Rather, the art recognized that the hot stamping process was complex and there was a "lack of basic knowledge about mechanical and microstructural characteristics of sheets." Ex-2040 ¶¶66-75. Thus, the state of the art showed that this art was unpredictable and that there was a lack of knowledge about how the parameters impacted the resulting microstructure.

The quantity of experimentation: Because there was a lack of knowledge in the art, the art was unpredictable—the chemistry and diffusion kinetics at issue in practicing the Challenged Claims are exceptionally complex. *Id.* ¶¶154-57. Moreover, there was no meaningful direction or guidance in Takagi, and a POSITA would not have the necessary background in microstructural science of aluminum alloy coated hot-stamped steel. Thus, an extensive and undue amount of experimentation would be required to create a part with the interdiffusion phase layers reflected in Takagi. *Id.* This is not only beyond the education, knowledge, and work experience of a POSITA, it is also beyond the knowledge of the state of the art. *Id.* Indeed, even today, the relationship among processing parameters, kinetics, and the resulting microstructural layers or phases is still being studied. *Id.* Thus, the quantity of experimentation needed to arrive at either the four-layered

microstructure and intermetallic layer required in the Challenged Claims (or even to create the product in Takagi) would be extensive and undue. *Id.*

In sum, Takagi's disclosures do not provide the necessary information for a POSITA to arrive at the four-layered microstructure and intermetallic layer required in the Challenged Claims without undue and excessive experimentation. *Adang v. Fischhoff*, 286 F.3d 1346, 1358 (Fed. Cir. 2002) ("However, the gaps in the disclosure of [prior art reference] amount to far more than minor details Accordingly, we affirm the Board's conclusion that [prior art reference] did not enable the invention."). Thus, Takagi lacks enablement for the elements in Challenged Claims for which Petitioner asserts it in Petitioner's putative Grounds.

C. Grounds 2A-2F: Suehiro does not disclose the claimed intermetallic layer (Limitations [1f], [21], and [24])

Suehiro does not disclose the claimed intermetallic layer for similar reasons as to Takagi. *See supra* VI.A; Ex-2040 ¶¶158-65; 123-40.

Suehiro does not identify any observed intermetallic compounds or layers, or disclose information necessary to determine whether an intermetallic layer was present. While Suehiro provides some information Takagi lacks (i.e., Suehiro discloses an SEM image visually indicating some compositional stratification), Suehiro, like Takagi, only provide a single line scan to identify elemental composition for a section of coating only a few microns wide. Ex-2040 ¶160. That line scan does not show whether metallic (or metalloid) elements were atomically

joined with defined stoichiometry in an ordered crystal structure (i.e., into an intermetallic phase layer). Suehiro does not provide testing data to show any phase layer with an ordered crystal structure defined by intermetallic compounds. *Id.* ¶161. For example, Suehiro contains no x-ray diffraction or electron backscatter diffraction data. Thus, like Takagi, Suehiro does not disclose observing intermetallics at all, much less in an ordered crystal structure of defined stoichiometry as required to form an intermetallic phase layer, such as required by the Challenged Claims. *Id.* ¶¶159-61.

The Petition fails to overcome any of these deficiencies. *Id.* ¶¶163-65. Dr. Miles conceded that his determination that Suehiro disclosed an intermetallic layer was based on the location of the darkened shaded zone in Suehiro relative to the coating surface. *Id.* ¶¶162. As explained, this is not the proper interpretation of an intermetallic layer. *See supra* section VI.A and V.B.

The flaws with Dr. Miles's approach are made further evident by the inconsistencies in how he analyzed Suehiro and Takagi. Dr. Miles used a different method of identifying and characterizing layers in Suehiro than he did in Takagi. Ex-2040 ¶163. In Suehiro, Dr. Miles consolidates the two purported layers closest to the base steel (shown as Nos. 4 and 5), and treats them collectively as the diffusion layer. *Id.* But for Takagi, Dr. Miles treats the second identification of a purported layer composition ("Inter 1") as an intermediary layer. *Id.* ¶163-64. A properly

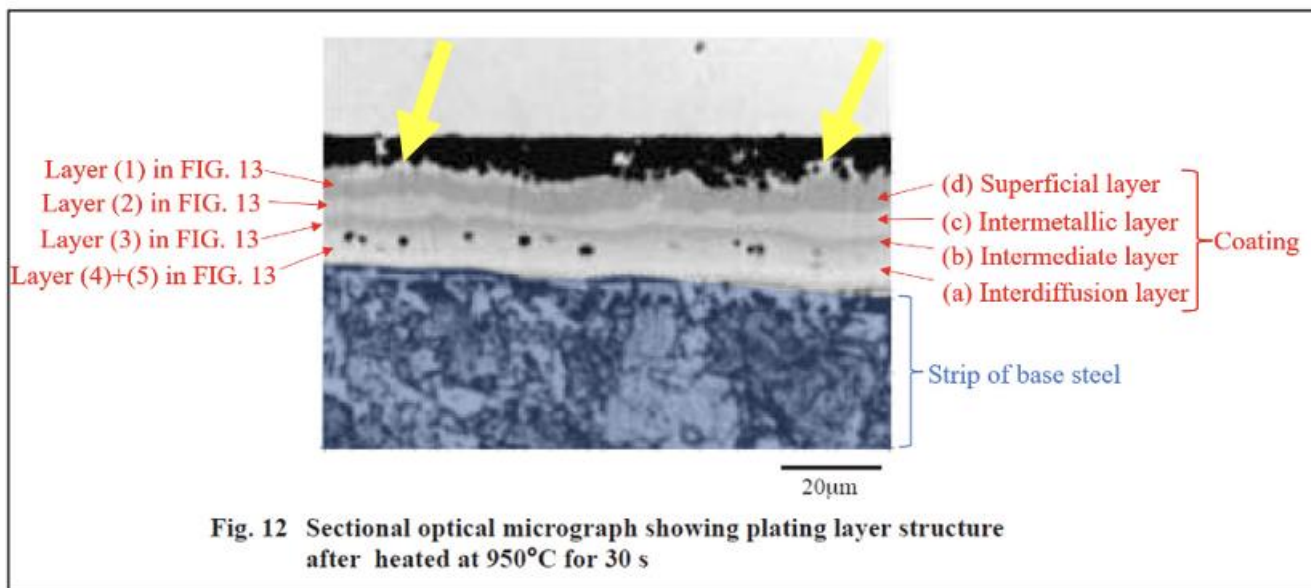
construed term does not have a different meaning from one prior art reference to another prior art reference. Instead, Dr. Miles's analysis is result-oriented.

Thus, as POSITA would recognize, Suehiro neither confirms nor discloses the presence of an intermetallic layer, and Dr. Miles has not shown otherwise. *Id.* ¶¶165-66.

D. Grounds 2A-2F: Suehiro does not disclose the claimed superficial layer (Limitations [1g], [21], and [24])

The Challenged Claims all require a “superficial layer.” As explained, a superficial layer is a “surface layer” or “top layer.” *See supra* section V.A. Petitioner asserts that Suehiro's Layer (1) is the superficial layer. Pet., 65. However, layer (1) is not and cannot be the superficial layer because it is not in the superficial (i.e., surface) layer position in Suehiro's SEM. Ex-2040 ¶¶167-179.

A simple visual examination of the SEM shows that there is another layer above (i.e., exterior to) layer (1). *Id.* ¶¶177-78. In an SEM, as Dr. Miles previously admitted, different brightness or contrast is “reflective of the composition of the imaged material.” *Id.* ¶174. In other words, a different brightness indicates a layer with a different composition. *Id.* ¶¶174-75. In Suehiro, there is another layer, with a different brightness, above layer (1) as shown below with the yellow arrows. *Id.* ¶¶177-178.



Annotated Suehiro FIG. 12

Ex-1003 ¶148 (adding additional annotations).

Indeed, Dr. Miles admitted that there is a layer above what he and the Petition identify as allegedly being the claimed superficial layer:

12 Q. Okay. And then, if we look at the
13 Suehiro -- I guess you could look at your Paragraph 148
14 above. If you look at Figure 12?
15 A. Yeah.
16 Q. And you see the layer 1 is kind of a darker
17 gray layer, is that fair to say, middle, gray layer?
18 A. Yeah.
19 Q. Okay. And above that there is an
20 additional layer of lighter material; correct?
21 A. Correct.
22 Q. And that layer is not numbered or
23 identified in your annotations here to Suehiro
24 Figure 12; correct?
25 A. Correct.

Ex-2021, 206:12-25. Thus, what Petitioner and Dr. Miles identified as the superficial layer is not and cannot constitute the “superficial layer” required by the Challenged Claims. Ex-2040 ¶179.

E. Grounds 1A-1F and 2A-2F: There is no motivation to combine

A POSITA would not have been motivated to combine the aluminum alloy coating microstructure of either Takagi or Suehiro with a thicker aluminum alloy coating based on Cornette or GMW14400 with any reasonable expectation of success.

Petitioner argues that a POSITA would have been motivated to combine the microstructure allegedly disclosed in either Takagi or Suehiro with a thicker overall resulting coating that the Petition and Dr. Miles ascribe to Cornette and GMW14400,

including because of alleged benefits or market demand for thicker coating, which, as shown below, misstates these references. Pet., 12-13, 52-53, 59, 86. Instead, there are multiple reasons Petitioner's reliance on Cornette and GMW14400 as a basis for a motivation to combine is misplaced.

1. Petitioner's Assertion that a POSITA Would Be Motivated to or Could Reasonably Make the Combination Is Speculative and Lacks Basis

As an initial matter, Petitioner's bases for a motivation to combine rely on Dr. Miles's assessment of the knowledge of a POSITA. Dr. Miles, however, while an accomplished individual in other aspects of material sciences, does not have experience with the specific subject matter of the Challenged Patent. Ex-2040 ¶¶181-89. He has never published any work or research related to martensitic press-hardened steels, nor did he work with them when the Challenged Claims were invented. *Id.* In fact, Dr. Miles has never published on or researched setting or experimenting with hot-stamping parameters; and he has never researched or worked with hot stamping aluminum alloy-coated steel. *Id.* Accordingly, Dr. Miles has never worked with or researched obtaining phase layered microstructures in aluminum alloy-coated steel, much less via hot stamping, much less to obtain an intermetallic phase layer as required by the Challenged Claims, much less done so at the time when those Challenged Claims were invented. *Id.* These are all areas that are fundamental and foundational to the Challenged Patent. *Id.* ¶¶186-89.

In sum, Dr. Miles lacks experience and expertise in the issues relevant to the Challenged Patent on which he is opining, and certainly lacked that experience in these subspecialties at the time of the Patented invention. *Id.* Thus, Dr. Miles's opinions about motivation to combine are mere ipse dixit lacking any sound basis. They should not be given any weight.

2. There Would Not Have Been a Motivation to Increase Thickness

According to the Dr. Miles, the Challenged Claims are obvious because there was a motivation to seek a thicker coating post-hot stamping. This is wrong for several reasons, *id.* ¶¶190-98, and directly contradicts Dr. Miles's opinion from the 683 IPR.

In the 683 IPR, Dr. Miles opined that there would not have been an incentive to increase thickness—the exact opposite opinion he renders now. According to Dr. Miles in that proceeding, a POSITA would instead have been motivated to decrease coating thickness:

layer (a) of less than 10 microns. And, as I previously explained at paragraph 164 of my declaration in Ex. 1003, known design needs would have supplied ample motivation for a PHOSITA to have routinely optimized the pre-coating thickness: “reducing a thickness of the coating by 5 μm (or even 3 μm) would result in a substantial cost saving as less material is used on each part (e.g., especially when thousands of coated parts are manufactured). Because of this, a PHOSITA would have been motivated to reduce the pre-coating thickness in order to save costs. In addition, because an automobile’s overall weight impacts fuel economy, a PHOSITA would have been motivated to perform routine experimentation using reduced coating thicknesses in order to reduce weight and cost, in my opinion.”

Ex-2029 ¶19. Today, Dr. Miles’s results-oriented and hindsight driven approach have led him to contradict himself and opine that a POSITA *would* seek to make the aluminum alloy coating at least 25% thicker. Ex-1003 ¶¶28-32. For obvious reasons, Dr. Miles’s bootleg turn in opinion should be given little weight.

In addition, there are many manufacturing and technical reasons why one would not have been motivated to obtain a post-hot stamping coating thickness of greater than 30 μm as required by Petitioner’s proffered combinations. Ex-2040 ¶¶190-98. Achieving a post-hot stamping coating thickness of more than 30 μm means that more pre-coating must be used on the base steel before the hot stamping process begins. *Id.* ¶191-96. Using more pre-coating would, of course, increase manufacturing costs (as Dr. Miles himself stated in his prior sworn declaration). *Id.*

But more critically, applying more pre-coating to a base steel can create significant problems during the manufacturing process. *Id.* For example, pre-coating is applied to a base steel using a hot-dip process. *Id.* ¶193. To obtain a thicker pre-coating, the requirements for the precoating aluminum alloy immersion bath for the base steel would need to be more exacting, which in turn would lead to longer manufacturing times, potential waste (product outside of specification), and reduced output. *Id.* During the heating step of the hot-stamping process, the increase in aluminum coating also leads to an excessive transfer of liquid to the production equipment, causing fouling in the hot stamping line and related manufacturing surfaces. *Id.*; Ex-2013, 116:21-117:19; Ex-1001, 1:65-2:2. Fouling would lead to equipment problems, cause equipment to degrade faster, and eventually require production lines to stop operation to facilitate repairs, leading again to longer manufacturing times, reduced output, and increased costs. Ex-2040 ¶190; Ex-1001, 1:65-2:2.

As another problem, the more coating that is applied, the higher probability that the coating will not be applied evenly across the base steel. Ex-2040 ¶194. When the coating is not applied evenly, the resulting diffusion layers will not form properly, which can impair, for example, weldability. *Id.*

An increase in aluminum-alloy coating also increases thermal insulation. *Id.* ¶195. Using more coating means that the heating step will be less efficient, which can require additional heating curve adjustments resulting in, among other things,

the use of increased temperatures and longer heating times. *Id.* In addition, when the coating mass and thickness is increased, the diffusion kinetics substantially change, as atoms must diffuse farther through the material physically and the ratio of aluminum and silicon to iron will be materially changed. *Id.* ¶195. This requires longer heating times (i.e., increased cost and manufacturing times), as well as redesigning the heating curve and holding parameters to address the new chemistry ratios and required diffusion kinetics (which, as detailed below, a POSITA would have known to be a task beyond their skill). *Id.*; *infra* section VI.E.5.

Yet, when heating and holding times are extended, it is more likely that pockets of space will develop in the coating (called Kirkendall porosities or voids), which, if unmanaged, results in coating failure. Ex-2040 ¶¶230-31. Ratios of silicon may be adjusted to, in part, reduce the incident of these voids. *Id.* ¶232. But silicon ratios are determined, by the coating composition, such that this adjustment can require changing the compositional formulation of the coating. *Id.* That is, to manage these voids and maintain integrity of the coating, it may not be feasible to use the same compositional formulation for a 10 or 15 µm precoating as for a 25 µm precoating. *Id.*

As another issue, an increase in coating means the interdiffusion phase layers will be thicker and more pronounced. *Id.* ¶196. However, unless the microstructure is properly designed as set forth in the Challenged Claims, thicker interdiffusion

phase layers will lead to issues with formability because there is an increased likelihood that the part's surface coating will crack or have other issues during the forming step. *Id.* As noted above, thicker coatings require more time for interdiffusion between the aluminum and steel, increasing the fouling risk. *Id.* ¶¶190.

As a result, contrary to Dr. Miles's opinion, Cornette and GMW14400 would not have provided a motivation to increase thickness. *Id.* ¶¶247-263. As an initial matter, Dr. Miles simply rewrites Cornette's disclosure to argue that it ascribed a benefit to a post hot-stamping coating thickness of greater than 30 µm. *Id.* ¶¶247-254. Cornette, however, does no such thing. Instead, it provides a benefit to a post hot-stamping coating thickness of 25 µm. *Id.* Thus, even without all the aforementioned problems with increasing the pre-coating thickness, Cornette does not provide a motivation to increase thickness. *Id.*

Similarly, GMW14400 would not have provided a motivation to increase thickness. *Id.* ¶¶258-263. First, a POSITA would not have been the intended audience for GMW14400. *Id.* A POSITA in this proceeding would have been an experienced technician working in some aspect of metallurgy. A POSITA would not have been someone who has risen to the highly specialized role of designing hot-stamping processing procedures for aluminum-alloy coated steel (much less specifically for GM). A POSITA would not have been motivated by GMW because

GMW was directed to and intended for a very different and very specific audience.

Id. Second, GMW14400 does not ascribe any benefit to post-stamping coating thickness of greater than 35 μm . A POSITA would have understood that there are significant problems with increasing pre-coating thickness, and absent being required by GM as a contracted supplier (which is not the position a POSITA would be in), a POSITA seeking to hot stamp aluminum-alloy coated steel would not have wanted to absorb increased costs and risk of equipment damage necessary to achieve a greater than 35 μm post-stamping coating thickness. *Id.* But even if a POSITA would have been motivated to seek a greater thickness, there is no reason a POSITA would have tried to do so while maintaining the claimed structure or composition of Takagi or Suehiro, which was not required of the GM specification. *Id.* A POSITA would not have been focused on creating a four-layer microstructure structure featuring an intermetallic layer, as that was not needed for the GM specification. As a result, a POSITA would not have been focused on creating a four-layer microstructure structure featuring an intermetallic layer, as that was not needed for the GM specification. *Id.* Instead, a POSITA would have been focused on manufacturing parts as quickly and simply as possible for GM while adhering to the *minimum* requirements outlined in GMW14400. *Id.*

In sum, for multiple reasons, the conventional wisdom when the Challenged Claims were invented was that increasing the thickness of the aluminum alloy coating was not commercially desirable and created numerous problems. *Id.* ¶155. Petitioner and its expert Dr. Miles oversimplify this very complex field, arguing by fiat that it would be obvious that “more is better.” But the opposite is true—what was conventionally thought at the time was that more was *not* better. *Id.* It was not until the inventors set forth their specific microstructural design and teachings in the '602 Patent that a microstructural design for phase layers in thicker aluminum alloy coating was created and enabled that would facilitate high weldability, high paintability, as well as avoid cracking and formation failure. *Id.*

Although a general POSITA would not have been involved with the *design* of the hot-stamping process or the design of microstructural phase layers in aluminum alloy coatings for the reasons explained above, a POSITA would have been well-aware of the problems caused by using additional amounts of pre-coating. *Id.* ¶261. For example, a technician or operator on a hot-stamping line would be well-aware of production problems caused by fouling of the equipment and the other issues described (as these issues are parallel to slag formation that occurs at multiple stages of metallurgical processing). *Id.* Thus, a POSITA would have been aware of the reasons that taught away from trying to achieve a thicker steel coating (such as trying

to achieve the 35 μm threshold for aluminum alloy coatings suggested in GMW14400). *Id.*

There is no factual support to suggest that POSITA would have been motivated to combine Takagi or Suehiro, with GMW14400 or Cornette.

3. It Was Beyond the Ordinary Skill of POSITA to Mix and Match Specification Criteria as Petitioner Proposes

a. There would have been no reasonable expectation of success in achieving Petitioner's proposed combination with just reasonable experimentation

Notwithstanding that there would not be a motivation to combine the microstructure of Takagi or Suehiro with a thicker coating Petitioner ascribes to Cornette or GMW14400, to the extent someone still wanted to obtain that combination, it could not be done with just reasonable experimentation. *Id.* ¶¶208-46. A POSITA would have had no reasonable expectation of success to achieve a post-hot stamping aluminum alloy coating thickness greater than 30 μm while still retaining the microstructure of Takagi or Suehiro (or while obtaining the microstructure required of the Challenged Claims). To take the multi-layered microstructure Petitioner ascribes to Takagi or Suehiro and replicate it except in a thicker coating form would require substantial expertise, experience, and extensive experimentation. *Id.* Even more complicated would be trying to obtain the four-layer microstructure of the Challenged Claims (including the required intermetallic phase layer) based on “upsizing” the limited disclosures of Takagi or Suehiro. *Id.*

Even Petitioner's expert agrees that "trial and error" would be "require[d]," Ex-1003 ¶36, albeit severely underestimating the scope of such efforts. Ex-2040 ¶208-46.

4. The science at issue here is complex and unpredictable

Obtaining specific phase layering and controlled formation and coalescence of intermetallic materials from iron diffusing into aluminum alloy is exceedingly complex and unpredictable. *Id.* ¶¶208-46. The task here is not simply, as Petitioner seems to presume, taking Takagi's microstructure and "upsizing" it to make it "bigger" (i.e., thicker). *Id.* Designing and controlling microstructure via diffusion kinetics to form intermetallic phase layers is *not* like baking a muffin—you don't just add more batter to the pan, maybe heat a little longer, and get the same muffin, just taller. *Id.* ¶203.

The flaw in Petitioner's conclusory *ipse dixit* is that it presupposes that the various microstructural attributes (like intermetallic phase layering) and hot stamping parameters (like heating curves) can simply be combined as one might combine the ingredients at a salad bar to obtain the desired combination. *E.g.*, Ex-1003 ¶34-35. They cannot. Ex-2040 ¶¶208-46.

According to Petitioner's flawed logic, because there are a "finite number of possible experimental values" for compositions and various hot stamping parameters, the result called for in the Challenged Claims could be supposedly achieved by "trial and error" with mere "routine experimentation." Ex-1003 ¶36.

But this is belied by the fact that there is not only an enormous range of options within each variable—e.g., an untold number of options to set heating curves alone—but that the interaction between those variables can be unpredictable. Ex-2040 ¶¶212-222. Petitioner overlooks that the allegedly “finite” number of ways to combine compositional elements, precoating thickness, various heating curve options, holding times, and cooling parameters is very, very, very large and the relationship among these variables and the hot-stamped microstructure was unpredictable and still being researched. *Id. Cf. Sanofi-Synthelabo v. Apotex, Inc.*, 550 F.3d 1075, 1088 (Fed. Cir. 2008) (“Only with hindsight knowledge that the dextrorotatory enantiomer has highly desirable properties, can Apotex argue that it would have been obvious to select this particular racemate and undertake its arduous separation.”).

Indeed, Petitioner does not identify the number of constituent options in all the parameters required to form the alleged combination or calculate the product of each multiplied against each other. Dr. Miles just concludes by fiat that the options are “finite” and thus identifiable by “trial and error.” Ex-1003 ¶36. To indulge Dr. Miles’s logic would render every patent ever issued supposedly obvious, as every invention ever made combines the “finite” resources known to mankind in a way that would be discoverable with unlimited trial and error.

Designing hot stamping parameters that manipulate diffusion kinetics to yield a particular multi-layered intermetallic microstructure in an aluminum alloy is neither a one or two-dimensional exercise nor depends entirely on predictable result effective parameters. *Id.* ¶¶208-46. This is not like boiling water where the amount of heat applied or volume of water heated yields predicable, calculable results as to when the water will boil. Here, as RPI's own expert has testified, "it's not clear [] how each one of those parameters [heating curves, holding, and quenching parameters] affect the formation of the coating...." Ex-2013 (Brown), 961:4-24. As RPI's expert testified *after reviewing every reference raised here by Petitioners*: "[T]here is according to the literature that I've seen, not a clear consensus in terms of precisely what set of conditions are required to produce that specific microstructure because we see that sometimes it occurs and sometimes it doesn't." *Id.* As RPI's expert explained: "there hasn't been a good description in any document I've seen, ... [as to] how those process conditions [heating curves, holding, and quenching parameters] impose themselves in terms of forming a microstructure in the coating." *Id.*

The view of RPI's expert is confirmed by the very references Petitioner relies on now. As Takagi itself stated at the time: "The mechanism of formation of the layered structure is not fully evident." EX-1016 ¶[0019]. Here, as Dr. Raabe explains, not a single variable—not elemental compositions, not thickness, not

heating curves, not temperatures nor rates, not holding times, nor quenching parameters—was itself known to give rise to the multi-layered intermetallic microstructure required by the Challenged Claims. Ex-2040 ¶¶217-22. Rather, the desired microstructure was the product of the complex interaction of these multiple factors, many of which themselves yield unpredictable results as detailed below. *Id.* This is why it took the inventors themselves *years* of extensive research to come to the inventions in the Challenged Claims. Ex-2011, 103:1-104:25, 108:3-109:3, 110:8-111:21, 119:16-120:2, 129:10-131:12, 130:10-134:8.

As Dr. Raabe explains, even a single variable, like the heating curve, can itself be exceedingly complex and subject to immense variation. Ex-2040 ¶¶218-20. Heating need not be linear or constant—heating can be accelerated, decelerated, or held steady for any period throughout the heating stage, resulting in enormous optionality and variation. *Id.* Heating curves in hot stamping often are not linear (defined by two points and heating rate), or even a simple curve, but can constitute a complex series of variable adjustments over the heating period. *Id.* And, while such adjustments and variables affect kinetics generally, it was not known how such adjustments affected or could be modulated to create the multi-layered intermetallic microstructure required by the Challenged Claims. *Id.*

This wide, broad range of just heating curve options alone, combined with other variables noted above like variation in coating thickness, results in a sea of hot

stamping parameter design options—but without sufficient guidance in the art at the time (or in Takagi or Suehiro) as to how the multi-layered intermetallic microstructure required by the Challenged Claims might be obtained or maintained at different coating thicknesses. Ex-2040 ¶¶211-22.

As such, a POSITA tasked with, for example, combining the microstructure shown in Takagi or Suehiro with a thicker aluminum alloy coating (e.g., Cornette or the parameters listed in GMW14400) would not have a reasonable likelihood of success. As Dr. Raabe explains, whatever impact the above variables may have on diffusion kinetics is altered when material thickness is altered. *Id.* ¶¶223-25. Whatever parameters give rise to, for example, a four-layered intermetallic microstructure yielding a 25 μm coating, will not result in the same microstructure in a thicker or thinner coating. *Id.*

Rather, to increase the thickness of the coating while maintaining the same targeted microstructure (albeit enlarged), the specification designer must redesign the other parameters to again achieve the targeted microstructure under different diffusion kinetics in a different material thickness. *Id.* 226. And, as noted above and below, at the time the Challenged Claims were invented, there was no understanding in the field as to how exactly these variables could be modulated to achieve that result. *Id.*; Ex-2013, 961:4-24. At best, Petitioner's combination serves as an "invitation to experiment," which in no way suggests any reasonable

expectation of success in that experiment, absent undue experimentation (e.g., plugging and chugging through countless variations of parameters in hopes of happening upon the Challenged Claims). Ex-2040 ¶227-34.

5. A POSITA would lack the expertise to reasonably succeed in combining the prior art to obtain the Challenged Claims

This lack of reasonable expectation of success is heightened because, as detailed above, the POSITA here—an experienced technician—would not be expected to have any experience designing hot stamping parameters to obtain particular multi-layered phases, much less intermetallic phase layers, in aluminum alloy via diffusion kinetics. *Id.* ¶228-29. To do so here, a POSITA would need to make significant adjustments to the process in light of the issues outlined above, such that it would require much more than just trivial adjustments to a hot stamping process (and beyond their experience). *Id.* Thus, Petitioner is simply incorrect that adjustments to Takagi were “within the skill” of a POSITA and “would have been achievable with a reasonable expectation of success.” *Id.* As noted above, Dr. Miles simply does not have the experience base to reasonably make that conclusion. *See supra*, section VI.E.1.

In sum, there is no evidence that a POSITA would have had a reasonable expectation of success in modifying Takagi or Suehiro with Cornette or GMW14400, *without impacting the other properties of Takagi or Suehiro.* *Id.* ¶¶215-34, 237. Indeed, as just one example—as noted above, additional coating

reduces heating efficiency and alters diffusion kinetics, implicating required changes to the heating curve. *Id.* This impacts the formation of layers, including individual layers within the interdiffusion layers, including requiring greater individual layer thicknesses (as is readily apparent if the overall thickness needs to be greater than 35 μm , then the individual layers must also be thicker). *Id.* There is no evidence about how a longer formation time required for thicker coatings and layers impacts the elemental composition of these layers (or the correlative formation of intermetallic compounds). *Id.* Dr. Miles does not address (but appears to assume) that the elemental composition of each layer and the relationships of the elemental composition among the layers will stay the same. *Id.* This is not so. *Id.*

As heating time increases, and the layers grow thicker, more diffusion occurs and the elemental composition of each layer changes. *Id.* ¶¶215-34; *see also* Ex-2013, 961:4-24. The longer formation time also raises substantial challenges by the formation of voids (the result of the Kirkendall effect) that can result in the coating's failure. *Id.* ¶¶230-34. The Kirkendall effect is a necessary and inherent phenomenon created when two metals diffuse into each other at different rates—here, aluminum diffusing downward quickly, iron diffusing upward much, much more slowly. *Id.* Because the lattice must remain continuous, this imbalance leaves a flux of vacancies (i.e., empty lattice sites) through which atoms can move during diffusion. *Id.* If unmanaged, if these vacancies occur faster than they can be absorbed, they

condense into voids (i.e., Kirkendall porosity). *Id.* These voids (shown in SEM images such as Takagi (Ex-1016) Figure 12 as black dots in the coating) are a crystallographic signature of imbalanced atomic fluxes from diffusion that must be managed to permit proper formation of the layers required by the Challenged Claims. *Id.*

The longer heating required to direct diffusion through thicker material in Petitioner's purported combinations would promote more Kirkendall voids—the heating curves and times required to form, for example, the intermetallic layer of the Challenged Claims in a thicker coating would also amplify Kirkendall porosity if not properly managed. *Id.* It takes substantial experience, massive experimental effort, and substantial time and research to thread these competing needs of longer heating and controlling porosity. *Id.* Complex variations in temperature, time, heating rates transfer rates, and composition are required. *Id.*

For example, ratios of silicon may be adjusted to, in part, reduce Kirkendall porosity. *Id.* Silicon ratios are determined, however, by the coating composition, such that this adjustment can require changing the compositional formulation of the coating. *Id.* That is, to manage Kirkendall porosity, it may not be feasible to use the same compositional formulation for a 10 or 15 μm precoating as for a 25 μm precoating. *Id.* So the POSITA may need to design a new coating formulation as

well to obtain the microstructure required of the Challenged Claims in thicker coatings than used by Takagi or Suehiro. *Id.*

Similarly, the diffusion kinetics affected by changes in the heating curve implicated in attempting a thicker coating can affect the coalescence of, or give rise to the degradation of, the desired phase layers themselves. *Id.* That is, as the coating thickness increases, the likelihood increases that the ordered four-part phase layers required in the Challenged Claims, with intermetallic layer, may not be obtained. There is thus no evidence that a POSITA would have had a reasonable expectation of success navigating these competing dynamics and challenges in modifying Takagi or Suehiro with GMW14400 or Cornette, *without altering the other properties of Takagi or Suehiro. Id.*

Dr. Miles put forth no evidence other than his fiat that a POSITA would have any reasonable expectation of success in altering one variable of Takagi (thickness) while keeping the other characteristics static—this is exceedingly complicated and onerous to achieve. *Id.* Dr. Miles does not even mention the challenges with managing porosity (much less opine that a generalist POSITA would be able to design systems to manage it without undue experimentation). In forming his opinions, Dr. Miles conceded that, in his analysis, he did not consider complicating factors such as Kirkendall porosity. *Id.*, ¶233; Ex-2021 at 234:22-23, 235:7-8.

6. The alleged combination cannot be obtained using just reasonable experimentation.

There is nothing routine about the experimentation required to obtain the Challenged Claims. *Id.* ¶243. Although Petitioner asserts a POSITA would have “arrived at various coatings with layers having various thicknesses and compositions,” Pet., 15, Petitioner’s argument is essentially that POSITA should “vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result.” *Bayer*, 575 F.3d at 1347. An invention is not obvious when a POSITA would need to do the inventing his or herself by varying all the parameters and trying all possible choices because the relationship among all the variables was not known and the art did not provide guidance about how parameters impact one another or impact the resulting attributes of the hot stamped part. *Id.*; Ex-2040 ¶¶208-46; Ex-2013, 961:4-24. For the reasons discussed above, given the complexity, unpredictability, specialized knowledge and experience required, still developing understanding in the field of the underlying kinetics, and generalist level of ordinary skill a POSITA would have, the alleged combination could not be obtained by POSITA through mere routine experimentation alone. Ex-2040 ¶244-46.

7. POSITA would not find it “obvious to try” mixing and matching various alleged prior art parameters as Dr. Miles speculates, nor would succeed in doing so

Dr. Miles, however, opines that the alleged combination “would have entailed nothing more than applying Cornette’s known techniques and parameters to Takagi [Suehiro] to obtain a predictable result.” Ex-1003 ¶¶32, 138. But this is just Dr. Miles’s *ipse dixit*, contradicted by the state of the art, contradicted by RPI’s own expert, and simply wrong. Ex-2040 ¶¶208-46; Ex-2013, 961:4-24.

Forming a specific intermetallic layered microstructure by diffusion kinetics during hot stamping is a complex process and the relationships between and among the various parameters is neither straightforward nor predictable. *Id.* Petitioner’s attempt to argue that certain parameters would have been obvious to try or to combine improperly looks at parameters in isolation without considering their impact on other hot stamping parameters and variables affecting microstructural development, and without considering the level of skill and knowledge in the field.

For example, Petitioner asserts that there was a supposed known “direct correlation” between pre-coating thickness and post-coating thickness. Ex-1003 ¶137. But this is true by ignoring the impacts of additional pre-coating thickness on other attributes, and only at superficial and extremely general level—the more pre-coating material one starts with, the more post-hot-stamped coating there will be. Ex-2040 ¶255-257. But Petitioner’s argument fails when Petitioner tries to impose

a specific relationship between the pre-coating and post-hot-stamped coating thickness. Specifically, Petitioner asserts that the art recognized that there was generally a 50% increase in the post-hot-stamped coating thickness. *Id.* ¶28. This is wrong. Ex-2040 ¶255-257.

As Dr. Raabe explains, the post-hot-stamped coating thickness is going to be impacted by many parameters during the heating process prior to hot stamping, including heating temperature, heating time, heating rate, oven size, and more. Ex-2040 ¶256. Indeed, Petitioner's support for its proposition makes clear that its characterization of a 50% increase is an observation specific to the process described in that reference, under the specific heating conditions used there. Ex-1025, 5:1-20 ("The alloying, through interdiffusion, leads to an increased thickness of the layer which, *for the treatment specified above*, generally corresponds to a 50% increase." (emphasis added)). Ex-2040 ¶256.

Moreover, the general notion that more pre-coating material leads to more post-processing coating says nothing about *how* more pre-coating impacts diffusion kinetics and the formation of microstructural layering during the diffusion process. *Id.* ¶256-57. It is not possible to have a "50%" increase in the post-coating, without impacting the other properties of the final hot stamped coating—but Petitioner and Dr. Miles have not shown what the relationship is among these variables. *Id.* Petitioner makes the same error when it comes to pre-coating composition—varying

the Al% and Si% in the pre-coating will impact the heating process, the formation of layers, the growth of the layers, the diffusion kinetics, the Kirkendall effect (the formation of voids in microstructural layers), the composition of the layers, and the characteristics of the final coating. *Id.* ¶238. The same is true of the base steel, varying the elements in the base steel will also impact the diffusion kinetics. *Id.* But again, neither Petitioner nor Dr. Miles put forth evidence of how those interdependent relationships operate (or how a POSITA would know how to control them).

In sum, Petitioner just assumes that various hot-stamping parameters in the prior art are a smorgasbord of variables that would be “obvious to try.” For example, Petitioner asserts that it would have been “obvious to try” and combine several different features. *E.g.*, Pet., 14. But an invention is only obvious under the “obvious to try” doctrine when “there are a finite number of identified, *predictable solutions*, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 402 (2007) (emphasis added). “A finding of obviousness would not obtain where what was ‘obvious to try’ was to explore a new technology or general approach that seemed to be a promising field of experimentation, where the prior art gave only general guidance as to the particular form of the claimed invention or how to achieve it.” *Bayer Schering Pharma AG v. Barr Lab’ys, Inc.*, 575 F.3d 1341,

1347 (Fed. Cir. 2009) (internal quotations and citation omitted). As such, where, as in this case, there is evidence that variables interacted in an unpredictable or unexpected way, a combination can be nonobvious. *KSR*, 550 U.S. at 421.

The parameters associated with hot stamping do not have a predictable relationship and there are not just a “small or easily traversed” number of possibilities. *Bayer*, 575 F.3d at 1347. RPI’s own expert admitted that it was not known how the parameters at issue gave rise to the microstructural properties at issue here. Ex-2009, 961:4-24. As Dr. Raabe explained, hot stamping is a highly complex field, with many parameters that impact one another. Ex-2040 ¶¶39-58, 66-75. Indeed, research still exists today about the impact of various parameters on the hot stamping process and on the development and properties of microstructural layering in aluminum alloy coatings. *Id.*

Thus, a POSITA would not have had “confidence” (Ex-1003 ¶137) that the proposed modification would be successful. Contrary to Dr. Miles’s assertion, changing the pre-coating to a thickness of 25 μm is not a “small modification” compared to the 10-20 μm range disclosed by Takagi. At that scale, a difference of 5-15 μm is significant. Ex-2040 ¶205. To go from a pre-coating thickness of 10 μm to 25 μm would more than double the volume of coating material, giving rise to downchain impacts on diffusion kinetics, microstructural layer formation, and the resulting properties of the hot stamped part. *Id.*

As explained above, there are many reasons why a POSITA would not have had any reasonable expectation of success that they could double the volume of aluminum alloy coating while maintaining (or improving) the attributes and benefits inherent in Takagi. *Id.* ¶184. Yet, while a POSITA may not have been able to obtain the Challenged Claims from the prior art as Dr. Miles assumes, a POSITA likely *would have* recognized that complexity and unpredictability at issue—a POSITA would not have thought that they could “obviously try” just mixing and matching aspects from different alleged prior art as Dr. Miles presumes. *Id.*

* * *

Because of the complexity, unpredictability, specialized knowledge and experience required—and still developing understanding in the field of the underlying kinetics—a POSITA, having but a generalist level of ordinary skill in the field, would not have been able to obtain Petitioner’s alleged combinations through mere routine experimentation nor had any reasonable expectation of doing so. Given the above, there would not have been any reasonable expectation of success for a POSITA to achieve the Challenged Claims by combining the microstructure of Takagi and Suehiro with the coating of GMW14400 or Cornette.

F. Petitioner’s Grounds 1A, 1D, 2A, and 2D Do Not Render Obvious Dependent Claims 10, 12, and 19

Claim 10 requires that the interdiffusion layer is less than 10 micrometers and claims 12 and 19 require specific compositional percentages for the layers. None of

Petitioner's prior art references individually disclose the recited claim elements. *Id.*

¶¶266-71. Instead, for the Takagi-based grounds Dr. Miles alleges that a POSITA would have been motivated to experiment. Ex-1003 ¶¶ 70-73. This is based on pure hindsight and not supported by the evidence. A “[d]etermination of obviousness can[]not be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.” *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546 (Fed. Cir. 1998). Indeed, Dr. Miles does not explain why a POSITA would have been motivated to experiment with adjusting the thickness of the interdiffusion layer, especially to make it smaller which would run against Dr. Miles's view that a POSITA would have been motivated to increase the overall thickness. Ex-2040 ¶¶266-71. Indeed, Dr. Miles concedes that Takagi actually teaches away from decreasing the thickness of the interdiffusion layer. *Id.* And for Suehiro-based grounds, Dr. Miles assumes, without any support, Suehiro could just be scaled proportionally while keeping all other attributes the same. *Id.* This is incorrect as changing one attribute will impact all other attributes of the stamped part. *Id.* Indeed, Dr. Miles does not explain how reducing the interdiffusion layer or scaling the interdiffusion layer would impact all other attributes of the hot stamped part and why that resulting part would still meet the other limitations of the independent claim. He simply ignores this.

Similarly, for claims 12 and 19, Dr. Miles assert that the compositional percentages disclosed in the prior art are similar and provide no meaningful difference from those recited in the claims. *Id.* ¶¶266-71. This is pure ipse dixit. If a compositional percentage changed in one layer, that change would need to come from somewhere (e.g., another layer). *Id.* ¶¶266-71. In other words, all other attributes of a layer would change. There is no evidence that a POSITA would have had a reasonable expectation of success in trying to achieve the claimed limitations, which is something that none of Petitioner's references disclose. In sum, there is no motivation to combine and Petitioner's grounds do not render obvious claims 10, 12, and 18.

G. GMW14400 (Grounds 1D-1F and 2D-2F), Suehiro (Grounds 2A-2F), and Cornette (Grounds 1A-1C and 2A-2C) are not prior art

Petitioner has not shown that Cornette, GMW14400, or Suehiro was publicly available because it failed to show that any of them could have been located by an *interested* person before the critical date. *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 772 (Fed. Cir. 2018).

1. GMW14400 (Grounds 1D-1F and 2D-2F)

Petitioner relies solely on June Munford and Shannon Schuster for its theory as to why GMW14400 was publicly available before the critical date. Pet., 2 (citing Ex-1027).

Ms. Munford relies on the declaration of Ms. Schuster to assert that GMW14400 was available for purchase from Accuris since December 1, 2005. Ex-1027 ¶8 (citing Appendix SCHUSTER01). But Ms. Schuster only states that GMW14400 was “listed in our database and available to the public for purchase online since December 1, 2005.” Merely stating something is “available to the public” is insufficient to show public availability. *See Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1349 (Fed. Cir. 2016). Instead, Petitioner needed to, but did not, show that an interested POSITA would have been able to locate GMW14400. *Samsung Elecs. Co., Ltd. v. Infobridge Pte. Ltd.*, 929 F.3d 1363, 1372 (Fed. Cir. 2019); *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 772-73 (Fed. Cir. 2018). Petitioner never identified any basis why a POSITA would have known to look to Accuris at that time.

In IPR2024-01376,² the institution decision disagreed and stated that an interested person would have been able to locate GMW14400 because “Information Handling Services” or “Accuris” had GMW14400 available for purchase. Paper 11 at 34. But respectfully, whether it was available for purchase is inapposite to Petitioner’s burden to show that an interested POSITA would have found GMW14400. Petitioner provided no evidence that a POSITA would have searched

² Petitioner submitted the same declaration in IPR2024-01376 and this proceeding.

for automobile standards intended for GM's contract manufacturers. *See generally* Ex-1003. Petitioner identifies no theory and provides no evidence as to why a POSITA would have been motivated to do so.

Next, Ms. Munford relies on three websites from Internet Archive, Ex-1027 ¶¶9, 11, 13, but, again, Petitioner never identifies any basis as to why a POSITA would have known about the hyperlinks behind these websites. *Ens Labs Ltd. v. Unstoppable Domains Inc.*, IPR2024-00872, Paper 8 at 19-20 (PTAB Nov. 22, 2024); *Microsoft Corp. v. Throughputer, Inc.*, IPR2022-01566, Paper 13 at 11-12 (PTAB May 31, 2023). The IPR2024-01376 institution decision believed Petitioner had identified a theory where a POSITA would have known about these websites they allegedly “provide[d] information for aerospace engineers.” But Petitioner has not identified any theory why a POSITA would be looking to aerospace engineering resources regarding the subject matter of this invention—use of high-strength steel in automobiles. Whether aerospace engineers would have known about Accuris is irrelevant to whether a POSITA would have known about Accuris.

Finally, Ms. Munford's archived websites are from 2003, years before GMW14400 allegedly became publicly available in December 2005. Ex-1027 (Appendix IHS01 is from July 19, 2003, IHS02 is from February 17, 2003, and IHS03 is from June 11, 2003); *see Envirologix Inc. v. Ionian Techs., Inc.*, IPR2018-00405, Paper 12 at 13-15 (PTAB July 30, 2018) (“Absent in the Petition is evidence

related to whether the Ehse's Dissertation was publicly accessible in the relevant time frame.”). Petitioner never identifies any basis to believe a website in 2003 would have any relevance as to what was on that website years later. *Microsoft Corp. v. Throughputer, Inc.*, No. IPR2023-00852, Paper 18 at 20 (PTAB Nov. 9, 2023) (finding Ms. Munford's reliance on website screenshot from the wrong timeframe was “not probative” of whether reference was publicly accessible).

In sum, the proffered evidence does not support that a POSITA would have known about GMW14400.

2. Suehiro (Grounds 2A-2F)

Petitioner relies solely on June Munford to allege that Suehiro was publicly available before the critical date. Pet., 2 (citing Ex-1058). According to Ms. Munford, Suehiro was made available to the public because the following two URLs were captured by the Internet Archive on November 19, 2004 and October 2, 2003, respectively: <http://www0.nsc.co.jp/kenkyusho/contenthtml/S378/s37805.pdf>, <http://www0.nsc.co.jp/kenkyusho/contenthtml/S378/s378.html>. Ex-1058 ¶¶8-12.

First, although Ms. Munford attaches an exhibit purporting to show the first URL was captured by the Internet Archive on November 19, 2004, when Patent Owner's expert visited that URL, the earliest recorded capture date was November 3, 2005. Thus, Ms. Munford's opinion that Suehiro was available no later than November 19, 2004, is not supported. Petitioner and Ms. Munford did not explain

how the Internet Archive captures websites or provide a declaration from the Internet Archive explaining how something purportedly existing when she submitted her declaration is no longer available.

Second, Ms. Munford's theory of public accessibility appears to be that a table of contents page located at the second URL, linked to Suehiro and therefore enabled someone to locate Suehiro. Ex-1058 ¶12. But there is no evidence that an interested person would have known about or been able to locate the table of contents located at that second URL, which is a highly specific URL: <http://www0.nsc.co.jp/kenkyusho/contenthtml/S378/s378.html>. See, e.g., *Ens Labs Ltd. v. Unstoppable Domains Inc.*, IPR2024-00872, Paper 8 at 19-20 (PTAB Nov. 22, 2024) (“[T]his does not suffice to support that one of ordinary skill in the art would have sought out the Read the Docs website and, once there, located [the reference] without prior knowledge of [the reference] and the URL at which [the reference] was available.”); see also *Microsoft Corp. v. Throughputer, Inc.*, No. IPR2023-00852, Paper 18 at 20 (PTAB Nov. 9, 2023) (finding Ms. Munford's “conclusory assertion” that a reference “was made available to the public” was “insufficient to establish public accessibility”).

3. Cornette (Grounds 1A-1C and 2A-2C)

Petitioner relies solely on Mel DeSart to allege that Cornette was publicly available before the critical date at the University of Washington's Engineering

Library. Pet., 2 (citing Ex-1015). “[I]n the context of references stored in libraries . . . we generally inquire whether the reference was sufficiently indexed or cataloged.” *Medtronic, Inc. v. Barry*, 891 F.3d 1368, 1380 (Fed. Cir. 2018). Mr. DeSart’s declaration provides no information about whether Cornette was indexed or cataloged in any way, let alone meaningfully. Instead, it merely says that when Cornette was received by the library, it was stamped with the words “Engineering” and “University of Washington” and the date and then routed for “shelving.” Ex-1015 ¶2. Petitioner fails to provide any information showing that a POSITA or interested person could have located Cornette at the University of Washington before the critical date. Petitioner’s evidence is insufficient to show that Cornette was publicly available. *In re Cronyn*, 890 F.2d 1158, 1161 (Fed. Cir. 1989) (“[References] were not accessible to the public because they had not been either cataloged or indexed in a meaningful way.”); *see also Acceleration Bay*, 908 F.3d at 773 (“Substantial evidence supports its findings that Lin was not publicly accessible, including that Lin was not indexed in a meaningful way.”).

H. Grounds 1A-1F and Grounds 2A-2F: Secondary Considerations demonstrate the non-obviousness of the Challenged Claims

Secondary considerations, such as commercial success, long-felt need and praise, and unexpected results also show that it would not have been obvious to combine the references in Petitioner’s Grounds. “Commercial success is relevant because the law presumes an idea would successfully have been brought to market

sooner, in response to market forces, had the idea been obvious to persons skilled in the art.” *Merck & Co., Inc. v. Teva Pharms. USA, Inc.*, 395 F.3d 1364, 1376 (Fed. Cir. 2005). For unexpected results, “[t]he basic principle behind this rule is straightforward—that which would have been surprising to a person of ordinary skill in a particular art would not have been obvious. The principle applies most often to the less predictable fields, such as chemistry, where minor changes in a product or process may yield substantially different results.” *In re Soni*, 54 F.3d 746, 750 (Fed. Cir. 1995). “Evidence of a long felt but unresolved need tends to show non-obviousness because it is reasonable to infer that the need would have not persisted had the solution been obvious.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1332 (Fed. Cir. 2016).

Before the invention of the Challenged Patent, USIBOR was not a commercial success; it was Dr. Drillet and his co-inventors who were tasked with developing innovations that could increase USIBOR’s commercial viability because only “very small volumes” were being sold before 2004. Ex-2009, 172:7-10. After the invention, USIBOR sales increased significantly (as it serves as a base-steel component in practicing the Challenged Claims). *Id.*, 147:22-148:6, 1066:22-1067:20, 716:1-14.

Now, USIBOR (and DUCTIBOR) is a “very significant business success,” with more than half a million tons sold in North America alone between

ArcelorMittal and its licensees in 2023. *Id.*, 89:9-14. The commercial success tied to the Challenged Patent is further reflected in the fact that they are widely licensed. *Id.*, 85:13-15. There was also a long-felt need and praise for the invention. Ex-2040 ¶272. In the industry, there was a need for high-strength steel that displayed better weldability, paintability, and better corrosion resistance. Ex-2009, 1067:21-1068:8, 108:3-109:3, 461:21-463:3. There were also unexpected results as the prior art had not achieved a hot stamped steel product that displayed at least the same qualities sought after in the art—i.e., better weldability, paintability, and better corrosion resistance. *Id.*, 1068:9-16, 147:22-148:6.

As demonstrated by the timeline—the invention and subsequent sales of USIBOR—there is a nexus between the secondary considerations and Challenged Claims. As Dr. Drillet explained, the sales of USIBOR were minimal before the invention, Dr. Drillet was specifically tasked with coming up with innovations to improve sales, and that sales in fact improved drastically after the invention. *Id.*, 147:22-148:6, 1066:22-1067:20. Thus, secondary considerations also show that the Challenged Claims are not unpatentable.

DATED: November 19, 2025

Respectfully Submitted,

/Brian Buroker/

Brian M. Buroker (Reg. No. 39,125)
GIBSON, DUNN & CRUTCHER LLP

1700 M St. NW
Washington, D.C. 20036
Phone: (202) 955-8500
Fax: (202) 467-0539
Email: bburoker@gibsondunn.com

Benjamin Hershkowitz (Reg. No. 41,833)
Gibson, Dunn & Crutcher LLP
200 Park Avenue
New York, NY 10166
Phone: (212) 351-4000
Email: bhershkowitz@gibsondunn.com

Mark Reiter (Reg No. 35,785)
Gibson, Dunn & Crutcher LLP
2001 Ross Avenue Suite 2100
Dallas, TX 75201
Phone: (214) 698-3400
Email: mreiter@gibsondunn.com

Raymond A. LaMagna
(pro hac vice)
GIBSON, DUNN & CRUTCHER LLP
333 South Grand Avenue
Los Angeles, CA 90071
(213) 229-7000
rlamagna@gibsondunn.com

Allen Kathir
(pro hac vice)
Gibson, Dunn & Crutcher LLP
200 Park Avenue
New York, NY 10166
Phone: (212) 351-4000
Email: akathir@gibsondunn.com

Counsel for Patent Owner

CERTIFICATION UNDER 37 C.F.R. § 42.24(d)

Under the provisions of 37 C.F.R. § 42.24(d), the undersigned attorney hereby certifies that this document complies with the type-volume limitations of 37 C.F.R. § 42.24(b). The word count of the foregoing Patent Owner's Response is 12,914, according to the word count tool in Microsoft Word.

DATED: November 19, 2025

By: / Brian M. Buroker /

Brian M. Buroker (Reg. No. 39,125)
GIBSON, DUNN & CRUTCHER LLP
1700 M St. NW
Washington, D.C. 20036
Phone: (202) 955-8500
Fax: (202) 467-0539
Email: bburoker@gibsondunn.com

Counsel for Patent Owner

CERTIFICATE OF SERVICE

The undersigned certifies service pursuant to 37 C.F.R. § 42.120 of a copy of this Patent Owner's Response and supporting materials upon Petitioner by email on November 19, 2025, to the following email addresses of record:

IPR58281-0002IP1@fr.com

DATED: November 19, 2025

By: /Brian M. Buroker/

Brian M. Buroker (Reg. No. 39,125)
GIBSON, DUNN & CRUTCHER LLP
1700 M St. NW
Washington, D.C. 20036
Phone: (202) 955-8500
Fax: (202) 467-0539
Email: bburoker@gibsondunn.com

Counsel for Patent Owner