

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: Pascal DRILLET et al.
U.S. Patent No.: 10,961,602 Attorney Docket No.: 58281-0002IP2
Issue Date: March 30, 2021
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Title: Coated Steel Strips, Coated Stamped Products and Methods

Rebuttal Declaration of Dr. Michael Miles

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EX-1006-13	[Reserved]
EX-1014	Cornette et al., “High Strength Steels for Automotive Safety Parts,” SAE Technical Paper Series 2001-01-0078 (2001) (“Cornette”)
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EX-1016	U.S. Patent Application Publication No. 2004/0009366 (“Takagi”)
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EX-1019	Hein et al., “Hot Stamping of USIBOR 1500 P: Part and Process Analysis Based on Numerical Simulation” (2006) (“Hein”)
EX-1020	[Reserved]

EX-1021	Vaissiere et al., “Development of Pre-Coated Boron Steel for Applications on PSA Peugeot Citroën and RENAULT Bodies in White,” SAE Technical Paper Series 2002-01-2048, reprinted from the Proceedings of the 2002 SAE International Body Engineering Conference and Automotive & Transportation Technology Conference (2002) (“Vaissiere”)
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EX-1040-46	[Reserved]
EX-1047	Eriksson et al., “Testing and evaluation of material data for analysis of forming and hardening of boron steel components,” Modelling Simul. Mater. Sci. Eng. 10 277 (2002)
EX-1048	[Reserved]
EX-1049	WO Patent Application Publication No. 2004/106573
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EX-1051	Ahindra Ghosh, “Secondary Steelmaking, Principles and Applications” (2001)
EX-1052	U.S. Patent Publication No. 2004/0238080
EX-1053	M. Suehiro, et al, “Properties of Aluminum-coated Steels for Hot-forming,” Nippon Steel Technical Report No. 88, July 2003
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EX-1056	J.-P. Laurent, “Hot formed Pre-coated boron steels: A solution of the resistance-formability’s dilemma?” 1 st European

Conference of Experts, Hot Forming and Casting Technologies
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EX-1057	OPPOSITION TO RESPONDENTS' MOTION TO COMPEL OR IN THE ALTERNATIVE TO STRIKE, <i>Certain High- Strength Aluminum or Aluminum Alloy-Coated Steel, and Automotive Products and Automobiles Containing Same</i> , Inv. No. 337-TA-1402 (ITC)(December 2, 2024)
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EX-1083

Capture of

https://automotive.arcelormittal.com/news_and_stories/cases/2019Usibor20years (captured February 25, 2026)

I, Dr. Michael Miles, of Springville, UT, declare that:

I. ASSIGNMENT

1. I have been retained by POSCO (“Petitioner”) in connection with the above-captioned petition for Inter Partes Review (“IPR”) of U.S. Patent No. 10,961,602 to Pascal Drillet et al. (“the ’602 Patent”). I understand the ’602 Patent is currently assigned to ArcelorMittal (“Patent Owner”).

2. I was previously engaged by Petitioner as an expert in this matter and, as a result, prepared a prior declaration, EX-1003. I was also previously engaged by Petitioner as an expert in IPR2019-01275, relating to U.S. Patent No. 9,708,683 (EX-1028), which is a parent patent to the ’602 Patent. I have also provided an analysis relating to the ’602 Patent in IPR2024-01376.

3. I have been asked by Petitioner to offer opinions regarding several specific matters that I understand to be at issue in the present case, IPR2025-00370.

II. PATENT OWNER’S PROPOSED CONSTRUCTION OF “INTERMETALLIC LAYER” IS INCORRECT

4. I have reviewed Patent Owner’s arguments regarding the proposed construction of “intermetallic layer,” and I disagree that this term requires a “defined stoichiometry” or an “ordered crystal structure,” as asserted by Patent Owner. Patent Owner’s Response (POR), 9. A POSITA would not have construed

“intermetallic layer” to require these characteristics.

A. None of the claims recite or suggest that an “intermetallic layer” must have a “defined stoichiometry” or an “ordered crystal structure.”

5. The claims of the ’602 Patent include no language requiring a “defined stoichiometry” or an “ordered crystal structure.” Further, none of the language that *is* present suggests or relates to either of those features.

6. I have reviewed all thirty claims of the ’602 Patent, and none require that the “intermetallic layer” have a “defined stoichiometry” or an “ordered crystal structure.” EX-1001, 14:59-18:24. Claim elements relating to the “intermetallic layer” include the following:

- Claims 1 and 21 recite that the intermetallic layer has “a third mean iron composition different from the first and second mean iron compositions, the third mean iron composition being higher than the second mean iron composition.”
- Claim 2 recites that the intermetallic layer is “quasi continuous” and that “less than 10% of [the intermetallic layer] is present at an extreme surface of the product.”
- Claims 13, 16, and 29 recite particular elemental “components by weight based on total weight” of the intermetallic layer.
- Claim 22 recites that “the fourth mean iron composition is lower than the

third mean iron composition [of the intermetallic layer].”

- Claim 24 recites that the intermetallic layer has “a fourth mean aluminum composition different from the first, second and third mean aluminum compositions, the second mean aluminum composition being greater than the third mean aluminum composition.”

7. None of the foregoing claim elements require or relate to a “defined stoichiometry” or an “ordered crystal structure.”

8. For example, the claims are clear in reciting “*mean*” compositions, or elemental weight percentages “based on total weight.” “Mean” compositions would encompass layers *without* defined stoichiometry, e.g., layers with disordered structure or otherwise undefined stoichiometry. The varying compositions at different positions in such a layer would be averaged to obtain the “mean” compositions of the claims. Thus, the claims’ recitations of “mean” iron and aluminum compositions would not imply or suggest Patent Owner’s proposed construction to a POSITA.

9. Similarly, by referring to elemental “weight based on total weight,” a POSITA would recognize that the claims clearly encompass a wide variety of disorder, compositional and stoichiometric variation, etc., that would be normalized or averaged into elemental compositions “based on total weight,” without requiring or suggesting a defined stoichiometry.

10. Further, nothing in the claims suggests, or even relates to, an “ordered crystal structure.” The focus of the claims appears to be on the mean/total compositions of different elements in the layers, not on whether the atoms of those elements are arranged in an “ordered crystal structure.”

B. Patent Owner’s “intermetallic layer” construction has no basis in the Specification

11. If Patent Owner’s construction of “intermetallic layer” were correct, a POSITA would expect to see references to “defined stoichiometry” or “ordered crystal structure” in the Specification. But these features, and data corresponding to these features, are absent. Based on the Specification, there is no reason a POSITA would read requirements of “defined stoichiometry” and “ordered crystal structure” into “intermetallic layer.”

12. The Specification does not discuss stoichiometry, let alone a “defined stoichiometry” specifically for the “intermetallic layer.” EX-1001. For example, the word “stoichiometry” is not present in the Specification. EX-1001. The Specification also does not discuss any specific phases that might be associated with a “defined stoichiometry”: the sole related mention of “phase” is the Specification’s reference to an “Intermetallic layer appearing as a pale phase,” which (i) does not connect the “phase” to any stoichiometry or composition, and (ii) appears to use the term “phase” broadly to refer to the intermetallic layer’s

“appear[ance],” as opposed to referring to a composition or microstructure of the layer. With the Specification lacking any discussion of a “defined stoichiometry,” a POSITA would not have construed “intermetallic layer” to require that characteristic. Nor does the prosecution history support this construction. EX-1002.

13. The Specification is also silent as to an “ordered crystal structure.” For example, the Specification does not discuss any crystal structures, crystallinity, or similar characteristics. EX-1001. I note Patent Owner’s statement that a “POSITA would have used x-ray diffraction (XRD) or electron backscatter diffraction (EBSD) to verify the presence and ordering of intermetallic compounds,” because such measurement methods can confirm the presence of “a crystal lattice with the different atom types sitting on specific lattice positions, creating atomic ordering.” POR, 12-13; EX-2040, 119. Because “Takagi reports no such testing,” “Takagi lacks sufficient information to determine whether there is an intermetallic layer.” POR, 13. But the ’602 Patent *also* reports no such testing. EX-1001. Thus, following Patent Owner’s argument and construction, the ’602 Patent *also* “lacks sufficient information to determine whether there is an intermetallic layer.” A POSITA reading the ’602 Patent would see no indication that its inventors measured, or were even concerned with, whether the intermetallic layer had an “ordered crystal structure.”

14. Further, a POSITA reviewing the '602 Patent's discussion of the term "intermetallic" would not have found it consistent with Patent Owner's narrow construction. The Specification uses the term "intermetallic" only in a broad, general manner, consistent with its usage in the art as discussed below in §II.D. For example, the Specification refers generally to "alloying of the pre-coating with the steel substrate, which has the effect of creating intermetallic alloys" and "the alloying reaction forming the intermetallic alloy." EX-1001, 1:50-52, 5:57-58. In neither case does the '602 Patent relate these "intermetallic" alloys to a specific layer or discuss any "defined stoichiometry" or "ordered crystal structure" of the "intermetallic alloy." Instead, as a POSITA would have recognized, the '602 Patent appears to use the terms "intermetallic" and "intermetallic alloy" to refer generally to the materials formed through alloying between the pre-coating and the steel blank. This is the same usage of "intermetallic" as is found in contemporaneous documents (*see* discussion at §II.D below), and is inconsistent with requirements of "defined stoichiometry" and "ordered crystal structure."

15. And the '602 Patent is similarly silent as to the measurement methods ("x-ray diffraction or electron backscatter diffraction") that, Dr. Raabe alleges, would be required in order for a POSITA to identify an "intermetallic layer" in Takagi. EX-2040, 134. Thus, the Specification provides no basis for the proposed construction.

C. PO's "intermetallic layer" construction is inconsistent with previous conclusions by Dr. Raabe and PO's other expert

16. PO, citing Dr. Raabe, argues that "Takagi lacks sufficient information to determine whether there is an intermetallic layer" and "[t]here is no other way to determine from Takagi whether an intermetallic layer is present." POR, 12-13. Dr. Raabe is more explicit, opining that "Takagi does not disclose the claimed layers and, in particular, the intermetallic layer." EX-2040, 123. As Dr. Raabe explains, "atomically bound intermetallic compounds—and whether those are ordered in a defined crystal structure—can...be readily and straightforwardly determined by x-ray diffraction or electron backscatter diffraction (among other ways). But Takagi does not disclose such testing and does not disclose any such data. Thus, a POSITA would determine looking at Takagi that Takagi neither discloses nor confirms the presence of an intermetallic layer as required by the Challenged Claims." EX-2040, 134. Here, Dr. Raabe is referring to measurement methods used for characterizing crystal structure.

17. But this reasoning contradicts Dr. Raabe's previous discussion of Takagi. In prior IPR proceedings for the '602 Patent (terminated in favor of the present IPR), Dr. Raabe referred explicitly to "the intermetallic phase layering and structure in Takagi." EX-1076, 166. That is, in the present IPR, Dr. Raabe states that particular measurement methods must be used to identify intermetallics and

that, absent disclosure of those measurements, a POSITA would be unable to identify intermetallic layers in Takagi. But, in the prior IPR, Dr. Raabe referred to Takagi's "*intermetallic* phase layering and structure." EX-1076, 166.

18. Expert testimony submitted by PO in a different prior IPR also contradicts Dr. Raabe's conclusion. In the IPR that invalidated Patent No. 9,708,683 (EX-1028, "the '683 Patent"), PO's expert Dr. Anthony Deardo defined an "intermetallic layer" as a "layer that contains a compound of two different metals" (or "a series of compounds") "in a matrix." *See* EX-1077, 107:18-108:1, 109:15-20. ("Q: And what about intermetallic, what does intermetallic mean? A: That is a volume that is going to be rich in intermetallic compounds. Q: And intermetallic means there is a mixture of different metals, right? A: It's a compound. Q: A compound of different metals? A: Right....Q: And the intermetallic layer, you said earlier intermetallic is a compound of two different metals. So this would be a layer that contains a compound of two different metals? A: There might be a matrix there too. It could be a series of compounds in a matrix."). Notably, Dr. Deardo never mentioned "defined stoichiometry" or "ordered crystal structure" when testifying about a POSITA's understanding of an intermetallic layer. *Id.*

D. PO's "intermetallic layer" construction is inconsistent with usage of that term in the art

19. I have reviewed the three textbooks cited by Dr. Raabe to support his proposed construction of “intermetallic layer.” EX-2040, 118; EX-2037-39. These textbooks, however, do not support the construction and, in fact, are inconsistent with it. Further, a POSITA would not have looked to these generalist textbooks to define “intermetallic layer” in the specific context of hot-stamping of coated steels; rather, a POSITA would have reviewed literature relating specifically to hot-stamping. Relevant literature of record in this IPR suggests that Patent Owner’s construction is incorrect.

20. As an initial matter, each of the cited textbooks (EX-2037, EX-2038, EX-2039) is related generally to intermetallics. EX-2037 is titled *Intermetallics: Structures, Properties, and Statistics*. EX-207, 1. EX-2038 and EX-2039 are each titled *Intermetallics*. EX-2038, 3; EX-2039, 3.

21. But none of the cited textbooks appears to even *mention* hot-stamping. Dr. Raabe himself stated that the textbooks “do not refer to hot stamping.” EX-1078, 110:19-23. In my opinion, this is a serious deficiency. Scientific terms can often have different meanings or connotations in different contexts. Even if Patent Owner’s construction were correct in the context of generic chemistry (which, as discussed below, it is not), the construction would not necessarily be applicable in the specialized field of hot-stamped, coated steel.

22. Indeed, publications in the specific field of hot-stamping do not use

the term “intermetallic” in the manner proposed by Patent Owner. Instead, these publications use “intermetallic” to refer generally to layers, coatings, and compounds formed during the hot-stamping process, without reference to a “defined stoichiometry” or “ordered crystal structure.”

23. For example, Suehiro '073 uses the term “intermetallic compound” to refer generally to the entire “alloyed aluminum-system plated layer” that can include “one to five phases” that “form a multi-layered structure.” EX-1035, 5:19-21, 14:30-32, 28:15-19. That is, Suehiro '073 uses the term “intermetallic compound” to refer to the entire multi-layer coating formed by hot-stamping. Similarly, FR2833504 refers generally to “an intermetallic alloy” formed “[w]hen the sheet metal blank is reheated” (in the standard hot-stamping process). EX-1025, 7:17-20. “Hot Stamping of USIBOR 1500” refers generally to “the intermetallic alloying reaction between the AlSi-coating and the iron substrate of the blank.” EX-1019, 6. None of these documents use the term “intermetallic” in the manner proposed by Patent Owner, or note the presence of a “defined stoichiometry” or “ordered crystal structure” in an intermetallic layer. Nor, despite discussing the presence of “intermetallic[s],” do any of these documents discuss the two specific measurement methods—XRD and EBSD—that Patent Owner suggests are necessary in order to identify an intermetallic layer. POR, 12-13; EX-1035; EX-1025, EX-1019. To a POSITA, the literature’s usage of “intermetallic”

would suggest a broad construction, not one that requires a “defined stoichiometry” or an “ordered crystal structure.”

24. Further, even the textbooks cited by Dr. Raabe do not support his position. First, it is noteworthy that Dr. Raabe’s specific construction is not provided directly in any of the textbooks. Rather, it represents his attempt to “condense” the textbooks “into a high level version” and “translat[e] from three or four textbooks...into a wording at a high level.” EX-1078, 112:20-21, 113, 14-16. Dr. Raabe has not explained how this “translat[ion]” was performed, for example, how he determined which specific characteristics should be included in his construction.

25. Indeed, in preparing his construction, Dr. Raabe *ignored* an explicit definition provided in one of the textbooks. EX-2038 explains that “[a]ccording to a simple definition... intermetallics are compounds of metals whose crystal structures are different from those of the constituent metals, and thus intermetallic phases and ordered alloys are included.” EX-2038, 11. This explicit definition does not require an “ordered crystal structure” or a “defined stoichiometry,” and yet Dr. Raabe cited this textbook for his construction that *does* require those characteristics. During his deposition, Dr. Raabe sought to discount this definition by pointing to the age of the references cited by EX-2038 to support the definition (“1967” and “’83” are “very, very long ago”) and by describing the definition as

“the simplest possible denominator.” EX-1078, 120:10-121:2. But EX-2038 is a textbook Dr. Raabe himself chose to cite: it strikes me as inconsistent to cite a textbook in order to define “intermetallic layer,” while also denigrating the definition provided by that very textbook.

26. In addition, EX-2037 emphasizes the difficulty of defining “intermetallic,” noting that “IUPAC recommendations...do not even define the term ‘intermetallic compound.’” EX-2037, 17. IUPAC is the “International Union of Pure and Applied Chemistry,” which, as metallurgists are aware, is an organization that works to define standardized nomenclature in chemistry. The fact that IUPAC itself does not define “intermetallic compound,” and that EX-2037 notes this lack of definition, would have suggested to a POSITA that “intermetallic” would be difficult to define precisely, would likely have a varying meaning depending on the specific context and sub-field, and thus that generalist textbooks such as EX-2037, EX-2038, and EX-2039 would not necessarily be authoritative as to the definition of “intermetallic layer” in the specific context of hot-stamping.

27. Even taken on its own terms, EX-2037’s discussion is inconsistent with Patent Owner’s construction. Specifically, EX-2037 refers to “amorphous intermetallic phases.” EX-2037, 452. As Dr. Raabe explained during deposition, “[a]morphous means you don’t have crystal structure.” EX-1078, 116:18-19. That

is, “amorphous” refers to non-crystalline materials (such as glasses) that lack an ordered crystal structure. So, although Dr. Raabe argues that an “intermetallic layer” is required to have an “ordered crystal structure,” he cites a textbook discussing “intermetallic phases” that “don’t have crystal structure.” EX-2040, 120; EX-2037, 452; EX-1078, 116:18-19. As a POSITA would have recognized, Dr. Raabe’s construction is plainly inconsistent with the textbook he himself cites. Based on that and the other textbooks, a POSITA would not have understood “intermetallic layer” to require an “ordered crystal structure” or a “defined stoichiometry.”

28. Also, even if one takes a generalist approach to interpreting “intermetallic layer,” the result still does not support PO’s position. In the ’683 Patent’s IPR, the petitioner cited a dictionary definition of “intermetallic,” from “Webster’s Third New International Dictionary,” as “composed of two or more metals or of a metal and a nonmetal in an alloy,” and this definition was not disputed. EX-1031, 24; EX-1079, 3; EX-1071; EX-1081.

E. PO’s “intermetallic layer” construction would contradict the prior analysis of Cornette

29. The Final Written Decision in an IPR for the ’683 Patent, a parent patent to the ’602 Patent, found claim 1 (reciting “an intermetallic layer”) unpatentable over Cornette. EX-1028, claim 1; EX-1029, 50. This decision is

incompatible with PO's newly-proposed construction of "intermetallic layer." PO's position appears to be that the presence of an "intermetallic layer" can be supported only by a verbatim disclosure of such a layer (as in the '602 Patent) or through "x-ray diffraction or electron backscatter diffraction" data that would support the presence of an "ordered crystal structure." POR, 10, 12-13, 22-23; EX-2040, 119, 127, 134. These diffractive measurement methods are known to be useful for measuring crystal structure.

30. But, based on my review, Cornette does not use the term "intermetallic" and does not present the data types (e.g., x-ray diffraction data) indicated by PO. EX-1014. PO's reasoning, then, appears to require a finding that Cornette does not disclose an "intermetallic layer."

31. Indeed, Dr. Raabe explicitly argues that "[a]s a POSITA would recognize, Cornette thus neither discloses nor provides any data or testing to conclude that an intermetallic layer as required by the Challenged claims was present there." EX-2040, 136. This is in direct contradiction to the Board's prior finding that "Cornette discloses a coating comprising...an Intermetallic layer." EX-1029, 39.

F. Takagi and Suehiro each disclose an "intermetallic layer"

32. Even if Patent Owner's construction is adopted, Takagi and Suehiro each still disclose an "intermetallic layer" satisfying the claims of the '602 Patent.

33. Takagi explicitly discloses layers composed of intermetallic compounds. Specifically, Takagi describes that “during the growth of the Al-Si-Fe alloy layer by the heat treatment, mutual diffusion between Al coating and steel substrate layer produces various Al-Si-Fe ternary intermetallic compounds...The Al-Si-Fe alloy layer formed by the heat treatment has a layered structure made up of these intermetallic compounds.” EX-1016, [0016]. The cited layers of Takagi are layers of this “layered structure,” are therefore “made up of...intermetallic compounds,” and thus would have been understood by a POSITA as being “intermetallic layers,” because they are layers “made up of” “intermetallic compounds.” *Id.*

34. Patent Owner’s statement that “Takagi does not identify any layer as intermetallic with a label” ignores the clear description of “intermetallic compounds” that Takagi *does* provide. POR, 13. While Takagi may not use a “label” for any one specific layer, Takagi unmistakably discloses layers composed of “intermetallic compounds.” That Takagi “reports no [] testing” like “x-ray diffraction (XRD) or electron backscatter diffraction (EBSD) to verify the presence and ordering of intermetallic compounds” does not detract from this clear disclosure: as discussed above in §II.B, the ’602 Patent reports no such testing, either. EX-1001; POR, 12-13.

35. Suehiro does not use the term “intermetallic.” EX-1055. However, in

view of the very widespread agreement in the art that hot-stamping processes like Suehiro's give rise to intermetallic coatings, a POSITA would have understood that Suehiro's layer (2) is an intermetallic layer, as applied in the Petition at pg. 65. For example, Takagi describes that the hot-stamping process gives rise to "a layered structure made up of these intermetallic compounds." EX-1016, [0026]. Suehiro '073 describes that "when a steel sheet is heated to a high temperature of not lower than 800 °C, Fe diffuses up to the surface for a short period of time and an aluminum plated layer changes to an intermetallic compound, hereinafter called 'alloyed aluminum- system plated layer'." EX-1035, 5:16-21. FR2833504 describes that "When the sheet metal blank is reheated, the coating combines with the substrate to form an intermetallic alloy." EX-1025, 7:17-18. "Hot Stamping of USIBOR 1500" describes an "intermetallic alloying reaction between the AlSi-coating and the iron substrate of the blank." EX-1019, 6. JP2004244704 describes that the "alloying process transforms the surface into an intermetallic compound. EX-1034, [0005]-[0006]. Together, these documents paint a clear picture of intermetallics arising naturally and essentially universally as an expected result of performing hot-stamping on coated steel. A POSITA would have understood that Suehiro's hot-stamping process would similarly result in intermetallics and, thus, Suehiro's layer (2) would have been understood as an intermetallic layer.

III. THE ART'S PROCESS PARAMETERS MATCH THOSE OF THE '602 PATENT

36. As discussed in my prior declaration, for the hot-stamping process parameters discussed by the '602 Patent, the art's values match or are very similar to those disclosed by the art. EX-1003, 37. For example, I previously identified pre-coating thickness, heating rate, temperature, hold time, and cooling rate as parameters with values matching or very similar to those the '602 Patent and the prior art. EX-1003, 37.

37. To expand this analysis, I further evaluated disclosures of steel sheet thickness and the proportion of silicon in the pre-coating, because these parameters were discussed during Dr. Raabe's deposition. EX-1078, 52:13-17, 53:9-13. Like the previously-analyzed parameters, the art discloses matching or very similar values for steel sheet thickness and silicon percentage in comparison to the '602 Patent. This is shown in the table below. Like the previously-assessed parameters, the silicon proportion and steel sheet thickness match or are very similar between the '602 Patent and the art.

Parameter	'602 Patent ¹	'602 Patent Example 2 ¹	Takagi ²	Cornette ³	Suehiro ⁴
Pre-coating thickness (μm)	20 – 33	20 – 33	10 – 20	25	---
Heating rate (°C/s)	4 - 12	10	8; 1-10	---	~8 ⁵ , 10
Temperature (°C)	880 - 940	920	900, 920, 950	880-950; 900	900, 950
Hold time (min)	< 3 – 13	< 6	3, 4, 5; 2-8; 2-10	< ⁶ 5 – 10; 5	0.5; 3
Cooling rate (°C/s)	> 30, or > 50	---	20 – 100; 30	---	> 20, > 30
Steel sheet thickness (mm)	0.7 - 3	1.2	1.4	---	1.4, 1.6
Si% in pre-coating (%)	5 - 11	9.3	5	---	10

IV. MANY PROCESS PARAMETERS RAISED BY PATENT OWNER ARE MISSING FROM THE '602 PATENT

38. As discussed above, for the process parameters discussed by the '602

¹ EX-1001, 5:9-14, 6:63-7:1, 7:12-14, 7:41-43, 7:46-50, 11:12-14, 11:54-62, 12:32-

39.

² EX-1016, [0026]-[0028], [0033]-[0035], [0037], FIG. 4

³ EX-1014, 9

⁴ EX-1055, [02], [07], [09], [14]-[15], [18], FIG. 3

⁵ Based on “2 min” heating time to reach “950°C”. EX-1055, [14].

Patent and raised by Patent Owner or Dr. Raabe, the art provides matching or very similar values. However, Patent Owner and Dr. Raabe have also raised *other* process parameters that are allegedly critical for obtaining the claimed coatings. These parameters include “dew point,” non-linear heating curve design, and “mass.” EX-2040, 45, 75, 146, 218-219; POR, 39, 47; EX-1078, 28:3-9.

39. I have reviewed the '602 Patent to assess whether it discusses these parameters. It does not. EX-1001. For example, the '602 Patent neither discusses nor suggests any relevance of dew point or a related parameter (e.g., humidity). EX-1001. For heating, the '602 Patent only describes a “heating rate,” lacking disclosure of additional heating curve or heating stage information, such as discussion of multiple heating stages or a non-linear heating curve. EX-1001, 7:12-35. The '602 Patent also does not refer to a “mass;” further, Dr. Raabe’s declaration equates “mass” with “coating thickness,” which is addressed in detail in my prior declaration. EX-2040, 75; EX-1003, 28-42, 119-122; EX-1001. Dr. Raabe notes that Suehiro does not disclose a “stamping contact time,” but the '602 Patent does not discuss this parameter, either. EX-2040, 94; EX-1001. Dr. Raabe also states that “[i]f the surrounding atmosphere isn’t controlled, oxidation and

⁶ “<” in this table indicates that the disclosed time includes both the heating ramp-up time and the hold time, where a specific hold time is not provided.

scale can form,” but the ’602 Patent does not describe any relevance or consideration of the atmosphere, much less specific atmospheric parameter(s) that might prevent “oxidation” or “scale.” EX-2040, 52; EX-1001.

40. Given the ’602 Patent’s silence on the above parameters, the ’602 Patent apparently assumes that a POSITA would be able to determine suitable values for those parameters without requiring further guidance by the ’602 Patent. For dew point and heating curve, Dr. Raabe admitted as much during his deposition. EX-1078, 39:22-42:18, 57:3-59:9.

V. SEVERAL PARAMETERS RAISED BY PATENT OWNER ARE RESULTS OF PROCESSING, NOT PROCESS PARAMETERS

41. Dr. Raabe additionally discussed “formability,” “adherence,” “fouling,” “transfer time,” and “Kirkendall porosity.” EX-1078, 59:13-16, 65:4-7, 67:7-16; EX-2040, 74-75, 232-233. A POSITA would have known, however, that formability, adherence, fouling, and Kirkendall porosity are *results* (outputs) of processing, not process parameters (inputs) themselves. That is, formability, adherence, fouling, and Kirkendall porosity are characteristics of a hot-stamped product that might depend on the process parameters I discussed above. However, a POSITA working on hot-stamped products would not be specifically and directly selecting values for these parameters. Dr. Raabe acknowledged this for formability, adherence, and fouling. (“Q: But formability and adherence are not themselves

process parameters, correct? A: No. They are the result – you are correct. They are the result of adhering to the teaching of the claim...[and] matching the window as described by the patent”; “Q: To avoid fouling, you control the precoating thickness, heating rate, things of that nature, the process parameters we discussed previously, correct? A: Correct.”). EX-1078, 66:14-17, 67:17-24. Also, Kirkendall porosity, and even “porosity” in general, are not discussed in the ’602 Patent. EX-1001.

42. As for transfer time, the ’602 Patent states that “the transfer time between the exit of the furnace and stamping should be less than 10 s.” EX-1001, 10:63-64. But a POSITA would have interpreted this as little more than a direction to perform the transfer quickly, which would accord with standard practice in the field: a POSITA would see no reason to delay hot-stamping after removal of a heated blank from a furnace, and, indeed, the default assumption of a POSITA would have been that the transfer should be performed as fast as possible, so that stamping could be performed on a hot blank. Dr. Raabe himself acknowledged that a POSITA would have known the negative effect of a high transfer time, as taught by the ’602 Patent. *See* EX-1078, 71:19-72:8 (“Q: Would a person of ordinary skill in the art without this teaching in the '602 patent understand there would be an upper limit on the transfer time? A: A person of ordinary skill in the field would understand that when the transfer time is excessively say above the 10 second

range given here, then you might lose some of the austenite. So a person of skill in the field should hopefully know that, yes. Q: So they would know that if you have a transfer time that's over 10 seconds, there might be a loss of some of the austenite as you mentioned? A: Yes. I would agree to that. However, you need the patent to teach you that what the consequence of that would be and these are two different statements.”).

VI. CORNETTE’S DISCLOSURE OF “25 μm ” REFERS TO A PRE-COATING THICKNESS, NOT A COATING THICKNESS

43. As discussed in my prior Declaration, “Cornette itself notes that ‘[t]he average [pre-coating] layer thickness showing the best compromise between corrosion protection and weldability is 25 μm ’ and links this ‘best’ pre-coating thickness to a ‘typical’ thickness of the alloyed ‘Fe-Al-Si’ layer of ‘about 40 μm at the steel surface.’ EX-1014, 9.” EX-1003, 24. Patent Owner disputes this description, stating that “Dr. Miles simply rewrites Cornette’s disclosure” and arguing that Cornette “provides a benefit to a post hot-stamping coating thickness of 25 μm .” POR, 32. That is, Patent Owner contends that Cornette’s “25 μm ” refers to a desirable coating thickness after hot-stamping, not a desirable pre-coating thickness.

44. This is a misreading of Cornette. For reference, the relevant section of

Cornette is reproduced below.

DESCRIPTION OF THE COATING

The coating, made of aluminum and silicon, is applied with a hot dipped process.

The average layer thickness showing the best compromise between corrosion protection and weldability is 25 μm .

Heating the pre-coated boron steel (generally 900°C, 5 minutes) creates an alloying reaction between substrate (iron) and the coating (aluminum - silicon) which leads to a hard multiphase alloy layer.

Fe-Al-Si layer is typically about 40 μm at the steel surface. The following photo shows a section view of the coating after heat treatment:

Cornette, 9

45. Cornette provides a discussion of hot-stamping that clearly indicates “25 μm ” as referring to a pre-coating thickness. First, Cornette discusses the pre-coating (or “coating”), explaining how it is “applied with a hot dipped process.” EX-1014, 9. As part of that same discussion, Cornette notes that the “average layer thickness showing the best compromise...is 25 μm .” EX-1014, 9. It is only *after* describing the “25 μm ” feature that Cornette discusses “[h]eating the pre-coated boron steel...creates an alloying reaction between substrate (iron) and the coating (aluminum – silicon) which leads to a hard multiphase alloy layer. Fe-Al-Si layer is typically about 40 μm at the steel surface.” EX-1014, 9. Thus, Cornette’s discussion is divided into characteristics *before* heating (including the “25 μm ” thickness) and characteristics *after* heating (including a “typical” thickness of “about 40 μm ”). This would have signified to a POSITA that the 25 μm thickness

is a pre-coating thickness, not a coating (post-heating) thickness.

46. Patent Owner's interpretation is less parsimonious, for two distinct reasons. First, Patent Owner's interpretation requires Cornette to zig-zag back and forth in time in the hot-stamping process: starting with a hot-dipped pre-coating, going forwards in time (skipping past the heating process) to discuss a post-heating thickness, then going backwards in time to discuss the heating process, and then going forwards in time again to discuss a second post-heating thickness. This would be an unusual way to present information. The more typical approach, consistent with the interpretation provided in my prior Declaration, would be to first discuss characteristics prior to heating, then discuss the heating, and then discuss post-heating characteristics.

47. Further, Patent Owner's interpretation requires that Cornette disclose two different post-coating thicknesses: a 25 μm thickness that is the "average layer thickness showing the best compromise between corrosion protection and weldability," and a 40 μm thickness that is "typical." EX-1014, 9. But Cornette does not provide any discussion relating to differences between these two values. For example, Cornette provides no explanation of why the "typical" thickness would be different from the "best compromise" thickness, which a POSITA would expect to find in such a discussion. This would be an unusual omission. Instead, a POSITA would expect the two thicknesses to refer to different layers/coatings: one

referring to the pre-coating, and one referring to the coating.

VII. A POSITA WOULD HAVE BEEN MOTIVATED TO ACHIEVE THE CLAIMED COATING THICKNESS IN COMBINATION WITH THE CLAIMED LAYER STRUCTURE

48. PO argues that “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.” POR, 33.

49. But Takagi specifically discusses the advantages provided by Takagi’s layered structure, such that a POSITA would have been motivated to retain that structure when also obtaining the coating thicknesses required by GMW14400. For example, Takagi discloses that “[t]he Al-Si-Fe alloy layer formed by the heat treatment has a layered structure made up of these intermetallic compounds, and offers advantages of formability, corrosion resistance and weldability.” EX-1016, [0016]. Indeed, Takagi’s Table 1 notes that the cited Nos. 1, 4, and 5 coatings each provide effective formability, corrosion resistance, and weldability. EX-1016, Table 1. Takagi also discusses how Takagi’s inner layer composition “is effective for preventing progress of crack and securing sufficient corrosion resistance;” that Takagi’s outer layer composition “combine[s] weldability and corrosion resistance” and can be achieved “by forming an Al-Si-Fe layer having a multi-layer structure;” and that “[t]hermal stability is improved by alloying an Al-Si-Fe

coating layer entirely into a multi-layer structure.” EX-1016, [0017], [0020], [0024], [0025].

VIII. PO’S ALLEGED UNPREDICTABILITY OF COATING THICKNESS ADJUSTMENT IS UNDERCUT BY THE ’602 PATENT

50. PO argues that modifying a coating thickness to achieve the claimed “thickness greater than 30 micrometers,” while retaining the other claimed coating characteristics, would not have been achievable with a reasonable expectation of success. POR, 35, 41-45, 49-50. For example, PO argues that “[w]hatever 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,” and further argues that a “5-15 μm ” difference in pre-coating thickness is a “significant” modification that could not be made with a reasonable expectation of success. POR, 40, 49.

51. But the ’602 Patent itself suggests the opposite. The ’602 Patent discloses only a broad range of pre-coating thickness, without the specificity that, PO argues a POSITA would have required in order to achieve the claimed coatings.

52. Specifically, the ’602 Patent discloses that “the thickness [] of the pre-coating is preferably from 20-33 micrometers.” EX-1001, 5:17-18. The ’602 Patent provides the same range of “20-33” micrometers for the FIG. 1 coating that, per

Dr. Raabe, is “an embodiment of the claimed invention.” EX-1001, 11:60-62, 12:34-35; EX-2040, 63. Nowhere does the ’602 Patent provide a more precise thickness used to achieve the claimed four-layer coating with a thickness greater than 30 micrometers. EX-1001.

53. 33 μm represents a 65% increase in pre-coating thickness compared to 20 μm , much higher than the 25% increase (from 20 μm to 25 μm) that the Petition suggests for modifying Takagi based on Cornette. Petition, 14. But Dr. Raabe’s position is that a POSITA would have been enabled based on the broad disclosed range of 20-33 μm . For example, during his deposition, Dr. Raabe discussed that a POSITA “start[ing] with” the range “between 20 and 33 micrometers” “would enable a person of ordinary skill in the field to reproduce these claims,” when read in conjunction with “all the many other parameters that we have discussed.” EX-1078, 78:22-23, 81:7-15. Indeed, Dr. Raabe stated that the POSITA would have been able to obtain not only a coating thickness “greater than 30 micrometers” but also the more specific value of 40 micrometers. EX-1078, 79:18-24.

54. That is, Dr. Raabe’s position is that it would have been within the skill of a POSITA to achieve a target coating thickness, with the claimed four-layer structure, provided with only (i) a broad “starting” range of pre-coating thickness and (ii) the other process parameters discussed by the ’602 Patent. But, as discussed in §III above and in my prior Declaration, the art teaches essentially the

same process parameter values disclosed by the '602 Patent. Further, the art teaches at least as specific a starting point for pre-coating thickness as the '602 Patent: GMW14400's pre-coating thickness range of "20 to 33" μm *exactly matches* the '602 Patent's range, and Cornette discloses a 25 μm pre-coating thickness. EX-1016, 7; EX-1014, 9. It follows that a POSITA, motivated by GMW14400 and Cornette as discussed above, would have had a reasonable expectation of success in selecting a suitable pre-coating thickness to obtain a coating thickness that satisfies the Challenged Claims.

IX. TAKAGI DISCLOSES MEAN COMPOSITIONAL DATA

55. Patent Owner argues that "it is not even clear whether Takagi reports mean compositional data as required by the claims" and that "[t]his is yet another reason why Takagi does not disclose the Challenged Claims." POR, 13. To support this argument, Dr. Raabe cites my deposition agreement with the statement that "what we may be given is average compositional data; correct? We don't know for sure what it is, right?" EX-2021, 159:13-17; EX-2040, 128.

56. But my agreement during the deposition was *not* with the statement that "it is not even clear whether Takagi reports mean compositional data as required by the claims." Rather, I agreed with counsel's statement that "we don't know for sure what it is" in the context of the immediately-preceding discussion that Takagi may or may not have used a line scan to obtain Takagi's composition

data, as shown below:

7	Q.	And we are not to the extent a line scan
8		was used, we are not given that line scan data here;
9		correct?
10	A.	Correct. What we may be given is
11		understood composition from a line scan, if that's what
12		they did.
13	Q.	Right. And just to clarify your testimony,
14		you said what we may be given is average compositional
15		data; correct? We don't know for sure what it is;
16		right?
17	A.	Right.

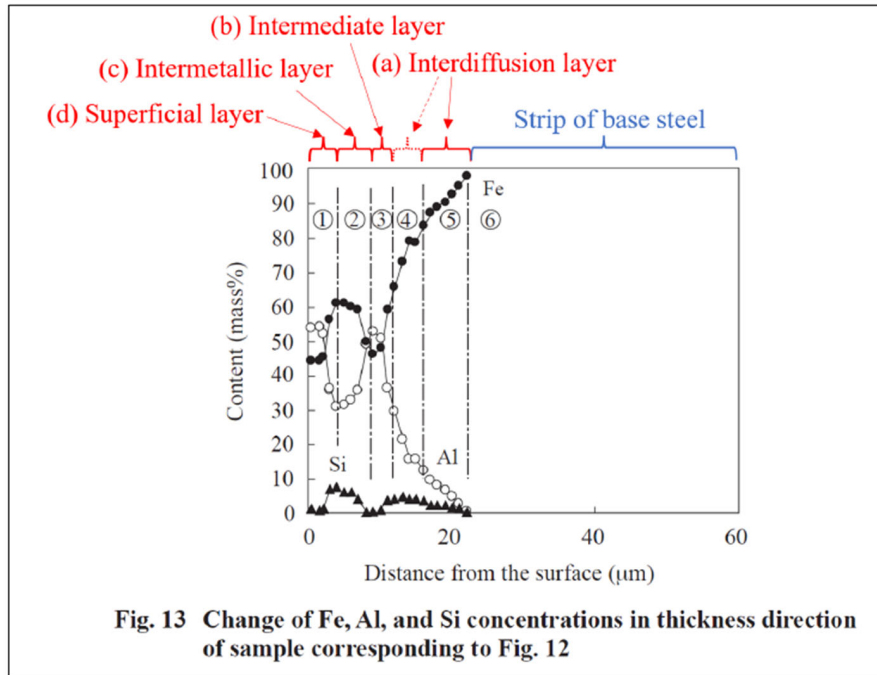
EX-2021, 159:7-17

57. That is, we do not know for sure exactly what method Takagi used to obtain mean compositional data. I did not, and do not, agree that Takagi may not disclose mean composition data.

58. To the contrary, for the reasons discussed in my prior Declaration, a POSITA would have clearly understood Takagi's "percent by mass" to refer to mean compositions. *See* EX-1003, 51-52.

X. SUEHIRO DISCLOSES A SUPERFICIAL LAYER

59. As shown in the annotated version of Suehiro FIG. 13 below, the Petition's claim 1 discussion mapped the superficial layer to the outermost layer (1) in Suehiro's coating. Petition, 64-65.



Suehiro, FIG. 13

60. Suehiro's FIG. 13 unmistakably shows that layer (1) is a superficial layer, because layer (1) is the layer present at the surface. That is, as a POSITA would have understood, the position where "Distance from the surface" is "0" is the surface itself. In FIG. 13, the layer that has a "Distance from the surface" of "0" is layer (1), which is correctly applied as "(d) Superficial layer." This point is not reasonably disputable. Dr. Raabe's comments to the contrary strain credulity and place his credibility in question. EX-1078, 249:13-252:13, 255:1-258:15.

61. Further, Suehiro's accompanying description states that "the alloy phase consists of five layers." EX-1055, [15]. All five layers are accounted for in FIG. 13 (layers (1)-(5)), and layer (1) is both the outermost one and explicitly

present at “the surface.” PO’s argument—essentially, that the annotation in FIG. 12 points to the wrong layer—cannot detract from this independent, cited disclosure of a “superficial layer.”

XI. Dr. RAABE’S STATEMENTS SUPPORT THE OBVIOUSNESS OF CLAIM 10

62. Statement made by Dr. Raabe during his deposition corroborate that claim 10 (“the layer (a) has a thickness less than 10 micrometers”) is obvious. He minimized the relevance of the “less than 10 micrometers” limitation, describing it as “a very, very fine subdetail,” and grouping it with “third or fourth order aspects.” EX-1078, 206:11-17, 217:14-19. He also downplayed associated composition-related effects, stating that “when then there’s a minor thickness variation in that second or third order point, yes, it is not to be excluded that this might also translate into minor chemical variations also, but they would not be maybe game changers pertaining to the main claim number 1 as the nature of intermetallic.” EX-1078, 217:23-218:4. That is, Dr. Raabe’s position is that claim 10 relates only to “minor thickness variation” that might “translate into minor chemical variations also,” which would “not be game changers.” This suggests that a POSITA would be able to achieve the “less than 10 micrometers” thickness while also satisfying the composition limitations of claim 1.

XII. CONCLUSION

63. The findings and opinions set forth in this declaration are based on my work and examinations to date.

64. I may continue my examinations. I may also receive additional documentation and other factual evidence over the course of this IPR that will allow me to supplement and/or refine my opinions. I reserve the right to add to, alter, or delete my opinions and my declaration upon discovery of any additional information. I reserve the right to make such changes as may be deemed necessary.

65. In signing this declaration, I recognize that the declaration will be filed as evidence in an IPR before the PTAB. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: February 26, 2026

By:

Dr. Michael Miles
Springville, UT

A handwritten signature in blue ink, reading "MP Miles", is written over a horizontal blue line.