PUBLIC VERSION

[redacted]

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before the Honorable Monica Bhattacharyya
Administrative Law Judge

In The Matter Of **CERTAIN HIGH-STRENGTH ALUMINUM OR ALUMINUM ALLOY-COATED STEEL, AND AUTOMOTIVE PRODUCTS AND AUTOMOBILES CONTAINING SAME**	**Investigation No. 337-TA-1402**

RESPONDENTS' CORRECTED PRE-HEARING BRIEF

[redacted]

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TABLE OF ASSERTED AND DOMESTIC INDUSTRY CLAIMS

'602 patent:

Claim 1	
[1pre]	A precoated steel product comprising
[1a]	a strip of base steel having a first side and a second side; and
[1b]	a coating on at least one of the first side of the strip of base steel and the second side of the strip of base steel, wherein the coating results from interdiffusion between the base steel, and an aluminum or aluminum alloy pre-coating, and wherein the coating includes, proceeding from the base steel outwards:
[1c]	(a) an interdiffusion layer having a first mean iron composition,
[1d]	(b) an intermediate layer having a second mean iron composition different from the first mean iron composition,
[1e]	(c) an intermetallic layer having 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; and
[1f]	(d) a superficial layer having a fourth mean iron composition different from the third mean iron composition,
[1g]	wherein the coating has a thickness greater than 30 micrometers.
Claim 2	
[2]	The precoated steel product as recited in claim 1 wherein the layers (c) and (d) are quasi continuous by occupying at least 90% of a level corresponding to each of the layers (c) and (d) and wherein less than 10% of layer (c) is present at an extreme surface of the product.
Claim 3	
[3]	The precoated steel product as recited in claim 1 wherein the base steel includes the following components by weight based on total weight: 0.15%<carbon<0.5%; 0.5%<manganese<3%; 0.1%<silicon<0.5%; 0.01%<chromium<1%; titanium<0.2%; aluminum<0.1%; phosphorus<0.1%; sulfur<0.05%; 0.0005%<boron<0.08%; and further comprises iron and impurities inherent in processing.
Claim 4	
[4]	The precoated steel product as recited in claim 1 wherein the base steel comprises the following components by weight based on total weight: 0.20%<carbon<0.5%; 0.8%<manganese<1.5%; 0.1%<silicon<0.35%; 0.01%<chromium<1%; titanium<0.1%; aluminum<0.1%; phosphorus<0.05%; sulfur<0.03%; 0.0005%<boron<0.01%; and further comprises iron and impurities inherent in processing.
Claim 7	
[7]	The precoated steel product as recited in claim 1 wherein a ratio of titanium to nitrogen in the base steel in weight % is in excess of 3.42."

[redacted]

Claim 8	
[8]	The precoated steel product as recited in claim 2 wherein a ratio of titanium to nitrogen in the base steel in weight % is in excess of 3.42.
Claim 9	
[9]	The precoated steel product as recited in claim 1 wherein the layer (a) has a thickness less than 15 micrometers.
Claim 10	
[10]	The precoated steel product as recited in claim 1 wherein the layer (a) has a thickness less than 10 micrometers.
Claim 18	
[18]	The precoated steel product as recited in claim 1 wherein the interdiffusion layer has a thickness of from 1 micron to 15 microns.
Claim 20	
[20]	"[t]he precoated steel product as recited in claim 1 wherein the fourth mean iron composition is lower than the third mean iron composition.
Claim 21	
[21pre]	A precoated steel product comprising
[21a]	a strip of base steel having a first side and a second side; and
[21b]	a coating on at least one of the first side of the strip of base steel and the second side of the strip of base steel, wherein the coating results from interdiffusion between the base steel, and an aluminum or aluminum alloy pre-coating, and wherein the coating includes, proceeding from the base steel outwards,
[21c]	(a) an interdiffusion layer having a first mean iron Composition,
[21d]	(b) an intermediate layer having a second mean iron composition different from the first mean iron composition,
[21e]	(c) an intermetallic layer having a third mean iron composition different from the first and second mean iron compositions, the third mean iron concentration being higher than the second mean iron composition, and
[21f]	(d) a superficial layer having a fourth mean iron composition different from the first, second and third mean iron compositions,
[21g]	wherein the coating has a thickness greater than 30 micrometers.
Claim 22	
[22]	The precoated steel product as recited in claim 21 wherein the fourth mean iron composition is lower than the third mean iron composition.
Claim 24	
[24pre]	A precoated steel product comprising
[24a]	a strip of base steel having a first side and a second side; and
[24b]	a coating on at least one of the first side of the strip of base steel and the second side of the strip of base steel, wherein the coating results from interdiffusion between the base steel, and an aluminum or aluminum alloy pre-coating, and wherein the coating includes, proceeding from the base steel outwards,
[24c]	(a) an interdiffusion layer having a first mean aluminum Composition,

[redacted]

[24d]	(b) an intermediate layer having a second mean aluminum composition different from the first mean aluminum composition,
[24e]	(c) an intermetallic layer having a third mean aluminum composition different from the first and second mean aluminum compositions, and
[24f]	(d) a superficial layer having 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;
[24g]	wherein the coating has a thickness greater than 30 micrometers.
Claim 26	
[26]	The precoated steel product as recited in claim 24 wherein the layer (a) has a thickness less than 15 micrometers.

'227 patent:

Claim 1	
[1pre]	A hot stamped coated steel product, which comprises:
[1a]	(a) a strip of base steel having a first side and a second side; and
[1b]	(b) a coating on at least one of said first side of said strip of base steel and said second side of said strip of base steel, wherein:
[1c]	(i) said coating results from interdiffusion between said base steel and an aluminum or aluminum alloy pre-coating, and
[1d]	(ii) wherein said coating comprises, proceeding from the base steel outwards:
[1e]	(a) an Interdiffusion layer,
[1f]	(b) an Intermediate layer,
[1g]	(c) an Intermetallic layer, and
[1h]	(d) a Superficial layer,
[1i]	wherein layers (a), (b), (c), and (d) each have a different mean composition from one another,
[1j]	wherein said coating of the hot stamped coated steel product has a thickness greater than 30 micrometers.
Claim 2	
[2]	The hot stamped coated steel product according to claim 1, wherein said layer (a) has a thickness that is less than half of said thickness of the coating.
Claim 4	
[4]	The hot stamped coated steel product according to claim 1, wherein said layer (a) has a thickness of 17 micrometers or less.
Claim 5	
[5]	The hot stamped coated steel product according to claim 1, wherein said layer (a) has a thickness of 15 micrometers or less.

[redacted]

Claim 7	
[7]	The hot stamped coated steel product according to claim 1, wherein the interdiffusion layer has a first mean iron composition, the intermediate layer has a second mean iron composition less than the first mean iron composition; wherein the intermetallic layer has a third mean iron composition, the third mean iron composition less than the first mean iron composition and greater than the second mean iron composition, and the superficial layer has a fourth mean iron composition, the fourth mean iron composition begin less than the third mean iron composition.
Claim 8	
[8]	The hot stamped coated steel product according to claim 1, wherein layer (a) has a thickness that is greater than a thickness of layer (b).
Claim 9	
[9]	The hot stamped coated steel product according to claim 1, wherein layer (a) has a thickness that is greater than a thickness of layer (c).
Claim 10	
[10]	The hot stamped coated steel product according to claim 1, wherein layer (a) has a thickness that is greater than a thickness of layer (d).
Claim 11	
[11]	The hot stamped coated steel product according to claim 1, wherein layer (a) has a thickness: that is greater than a thickness of layer (b); that is greater than a thickness of layer (c); and that is greater than a thickness of layer (d).
Claim 13	
[13]	The hot stamped coated steel product according to claim 1, wherein layer (a) has a thickness that is more than twice a thickness of layer (c).
Claim 15	
[15]	The hot stamped coated steel product according to claim 1, wherein the hot stamped coated steel product is fully martensitic.
Claim 16	
[16]	The hot stamped coated steel product according to claim 1, wherein the base steel consists of the following components by weight based on total weight: 0.15%<carbon<0.5%; 0.5%<manganese<3%; 0.1%<silicon<0.5%; 0.01%<chromium<1%; titanium<0.2%; aluminum<0.1%; phosphorus<0.1%; sulfur<0.05%; 0.0005%<boron<0.08%; a remainder being iron and impurities inherent in processing.
Claim 17	
[17]	The hot stamped coated steel product according to claim 1, wherein the base steel consists of the following components by weight based on total weight:0.15%<carbon<0.25%, 0.8%<manganese<1.8%, 0.10%<silicon<0.35%, 0.01%<chromium<0.5%, titanium<0.1%, aluminum<0.1%, phosphorus<0.1%, sulfur<0.05%, 0.002%<boron<0.005%, a remainder being iron and impurities inherent in processing.

[redacted]

Claim 24	
[24]	The hot stamped coated steel product according to claim 1, wherein the hot stamped coated steel product has a mechanical strength in excess of 1000 MPa.

[redacted]

TABLE OF ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation	Full Name
'227 patent	U.S. Patent No. 11,326,227
'602 patent	U.S. Patent No. 10,961,602
'683 Patent	U.S. Patent No. 9,708,683
AM / ArcelorMittal / Complainant	ArcelorMittal S.A.
[redacted]	[redacted]
Calvert	AM-NS Calvert
CDO	Cease and Desist Order
[redacted]	[redacted]
DI	Domestic Industry
JPL	Jean-Paul Laurent
POSITA	Person of Ordinary Skill in the Art
Roush	Roush Industries, Inc.
[redacted]	[redacted]
Vinfast/Respondents	VinFast Auto Ltd., VinFast Auto, LLC, VinFast USA Distribution, LLC, Vingroup USA, LLC, and VinFast Trading and Production JSC

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TABLE OF COMMONLY CITED EXHIBITS

Exhibit	Description
JX-0001	Certified Copy of U.S. Patent No. 10,961,602
JX-0002	Certified Copy of U.S. Patent No. 11,326,227
CX-0083C	Expert Report of Dr. John Bradley regarding Testing of 2006 Passat
CX-0084C	Expert Report of Stuart Brown regarding Invalidity
CX-0085C	Expert Report of Stuart Brown regarding Noninfringement and Lack of Technical Domestic Industry
CX-0086C	Expert Report of Dr. John Bradley Regarding Testing of VinFast and Domestic Industry Products
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RX-0019	High Strength Steels for Automotive Safety Parts ("Cornette")
RX-0022	Properties of Aluminum-coated Steels for Hot-forming ("Suehiro II")
RX-0062	Developments of high-strength sheet steel qualities and joining-related aspects for use in automotive construction ("Lachmann") – English
RX-0063	Controlling and Monitoring of the Hot-Stamping Process of Boron-Alloyed Heat-Treated Steels ("Engels")
RX-0067	GMW14400
RX-0081	Development of Pre-Coated Boron Steel for Applications on PSA Peugeot Citroen and RENAULT Bodies in White ("Vaissiere")
RX-0104	US20040009366 ("Takagi")
RX-0106	Takagi Translation Certification
RX-0109	US Patent No. 6,296,805 ("Laurent '805")
RX-0111	FR2833504A1 Translation and Certification ("FR Laurent")
RX-1146C	Expert Report of Dr. James R. Fekete Regarding Infringement and Technical Domestic Industry

[redacted]

I. INTRODUCTION

The hearing evidence will definitively show that VinFast has not violated Section 337. At its core, this dispute should be resolved in VinFast's favor because ArcelorMittal has taken irreconcilable positions as it relates to infringement and technical domestic industry on the one hand and validity on the other.

The source of ArcelorMittal's irreconcilable positions is the claims at issues, which recite a layer structure that is created through a process called "hot stamping." The problem for ArcelorMittal is that not only was hot stamping known, but so was the hot stamping of the very type of steel (*i.e.*, steel precoated with aluminum and silicon, including ArcelorMittal's USIBOR 1500) ArcelorMittal now alleges to practice the claims in this Investigation. Indeed, as shown by the numerous prior art references located by the Respondents, hot stamping of USIBOR 1500 was widely known and used within the automotive industry prior to the earliest priority of the Asserted Patents. ArcelorMittal has even conceded that the claimed layer structure could be created through prior hot stamping methods, and the exemplary structure of Figure 1 of the Asserted Patents originated from a third party prior to the alleged earliest priority of the Asserted Patents. As a result of these undeniable facts, ArcelorMittal has sought to differentiate the Asserted Claims based on requirements not found in the claims, such as arguing that the hot stamping process used to create a practicing layer structure must do so in a repeatable, consistent, and robust manner.

In conjunction with having to narrowly apply the claims for its validity case, ArcelorMittal must broadly apply the same claims for purposes of infringement and technical domestic industry. The inconsistency in ArcelorMittal's positions is highlighted by ArcelorMittal's unbelievably broad technical domestic industry allegations, in which ArcelorMittal alleges an unknown number of hot stamped products as practicing the alleged claims. Paradoxically, for purposes of

[redacted]

infringement and technical domestic industry, ArcelorMittal fails to analyze the hot stamping process parameters for any single product alleged to practice the Asserted Claims. In fact, it is undisputed that ArcelorMittal does not even know the hot stamping parameters for most of the products it alleges to practice the Asserted Claims.

Setting aside ArcelorMittal's irreconcilable differences on validity and infringement and technical domestic industry, infringement and technical domestic industry analysis is also deficient as ArcelorMittal cherry-picks favorable testing data from microscopic portions of a product while disregarding data that do not meet the claims. In addition, the Asserted Claims are invalid in view of the numerous instances of hot stamping conducted prior to the allege earliest priority. For example, it was known across the automotive industry that the 2006 Volkswagen Passat made use of hot stamped USIBOR 1500. And it is unsurprising that parts from the 2006 Volkswagen Passat exhibits the layer structure of the Asserted Claims.

For economic domestic industry, ArcelorMittal's sweeping generalities are unsupportable. Despite testing just 15 products—none of which is a proper domestic industry product—ArcelorMittal contends those are representative of an unknowable number of entirely different products from multiple different product lines. ArcelorMittal cannot meet its burden to justify such an expansive extrapolation. And because ArcelorMittal cannot disaggregate these investments on a product-by-product basis, ArcelorMittal will fall short of its burden to show a domestic industry protected by the Asserted Patents.

A. Procedural History

On April 17, 2024, ArcelorMittal filed the Complaint in this case. *See* Compl. The day prior, ArcelorMittal filed another lawsuit in the Central District of California – Western Division asserting the same patents asserted here, which has been stayed through the resolution of this Investigation. This Investigation was instituted on May 20, 2024. EDIS Doc ID No. 821906. The

[redacted]

evidentiary hearing is set to start on March 3, 2025 with the FID due on June 23, 2025, and a Target Date of October 23, 2025.

B. The Parties

1. Complainant

Complainant ArcelorMittal S.A. ("ArcelorMittal", "AM," or "Complainant") is a public limited company organized under the laws of the Grand Duchy of Luxembourg, with its principal place of business at 24-26, Boulevard d'Avranches L-1160 Luxembourg, Grand Duchy of Luxembourg.

2. Respondents

The Respondents are VinFast Auto Ltd., VinFast Auto, LLC, VinFast USA Distribution, LLC, Vingroup USA, LLC, and VinFast Trading and Production JSC (collectively "VinFast" or "Respondents"). VinFast is an innovative automotive company specializing in electric vehicles with global reach. VinFast is planning to manufacture its vehicles in the U.S. through a manufacturing plant currently under development in North Carolina.

C. Overview of the Technology

The claims of the '602 and '227 patents recite a layer structure that is formed by a process commonly known as "hot stamping." At a high level, as shown in the figure here, hot stamping involves heating steel to a high temperature and stamping the heated steel so that the steel can be formed into a certain shape. *See* RX-1314 (Cornette) at 2348-2349, Fig. 21; *see also* RX-0022 (Suehiro II) at 691-92 ("[I]n this method it is necessary to heat a steel sheet to a temperature in the austenite temperature range . . . Heated steel sheet is extracted from

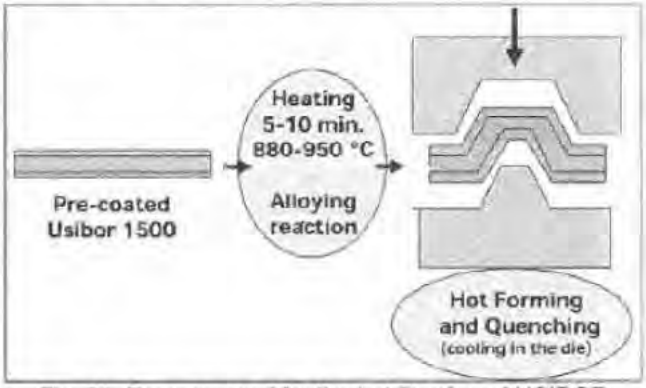

Fig. 21. Process used for the hot forming of USIBOR 1500 Pre-coated.

[redacted]

the furnace, transferred to a pressing machine, formed into a prescribed shape using dies."). When hot stamping is applied to steel pre-coated with aluminum[1], an alloying reaction between the pre-coating and the base steel occurs. *See e.g.*, RX-0022 (Suehiro II) at 694 (Discussing Figure 12 and the alloying between the aluminum pre-coating and the steel sheet). It has been observed that hot stamped pre-coated steel exhibits desirable characteristics, such as increased strength and improved corrosion resistance, paintability, and weldability, for automotive applications. *See e.g.*, RX-0022 (Suehiro II) at AM-ITC-0014692 (Fig. 2 shows improved tensile strength), 695 ("It is clear from these results that a steel sheet having coating layers of Fe-Al alloy phase is superior to a cold-rolled steel sheet"). As a result, the use of hot-stamped pre-coated steel in cars increased throughout the 2000s. RX-0013 (Hein) (AM-ITC-0013127) at 130 ("The huge majority of the car manufacturers are specifying hot-stamped parts for their new vehicles. New hot-stampers appear on the market and several new lines are being built throughout the world.").

Hot stamping of steel pre-coated with aluminum and silicon is necessary to achieve the layer structure recited by the claims of the '602 and '227 patents. Put differently, the layers claimed by the claims of the of the '602 and '227 patents are the result of hot stamping. As recognized by ArcelorMittal's corporate representative, it is possible to achieve recited layers of the Asserted Claims ***before*** the alleged earliest priority of the '602 and '227 patents. RX-1282C (Drillet Tr.) at 81:14-23, 83:7-19, 107:1-8. In fact, even Figure 1, which ArcelorMittal has stated is the invention of the '602 and '227 patents, RX-1171C (Raabe Reb. Rpt.) ¶ 708, did not originate from the named inventors of the '602 and '227 patents, but was created by a third party prior to the alleged earliest priority of the '602 and '227 patents:

[1] One common pre-coated steel used for hot stamping is ArcelorMittal's USIBOR 1500, which is pre-coated with aluminum and silicon. ArcelorMittal's records show USIBOR 1500 has been used as part of hot stamping since at least [redacted] CX-0563C (AM-ITC-0093096) at 93099.

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[redacted]

See RX-1282C (Drillet Tr.) at 105:22-8; *compare* RX-0053C [redacted] (AM-ITC-0102170) at 174 *with* JX-0002 ('602 patent) at Fig. 1.

D. The Patents at Issue–U.S. Patent Nos. 10,961,602 & 11,326,227

ArcelorMittal asserts claims 1-3, 7-9, 20-22, 24, 26 of U.S. Patent No. 10,961,602 (the "'602 patent") and claims 1-2, 4, 5, 7-11, 13, 15-17, 24 of the U.S. Patent No. 11,326,227 ("'227 patent") for infringement (collectively "Asserted Claims"). ArcelorMittal further asserts claims 1-4, 7-10, 18, 20-22, 24, 26 of the '602 patent and claims 1-2, 4-5, 7, 9, 10, 13, 15-17, 24 of the '227 patent (collectively the "DI Claims") are practiced by the alleged Domestic Industry Products. The '602 and '227 patents share a common specification and are generally directed to manufacturing process for hot-stamped pre-coated steel products. *E.g.*, JX-0002 ('602 patent) at 6:63-7:46, JX-0001 ('227 patent) at 6:64-7:45.

E. The Products at Issue

1. The Accused Products

ArcelorMittal accuses two electric vehicle models sold by VinFast: the VF 8 and the VF 9. RX-1146C (Fekete Op. Rpt.) ¶ 46. Specifically, ArcelorMittal accuses certain hot-stamped steel

[redacted]

parts that have been incorporated into the two vehicles, such as the B-pillar. *Id.* The hot-stamped steel parts at issue in VinFast vehicles are manufactured by third party manufacturers [redacted] *Id.* ¶ 47. The underlying steel is supplied by a third-party.

2. The Domestic Industry Products

ArcelorMittal relies on two classes of products for Domestic Industry ("DI"). *Id.* ¶ 40-45.

i. The DI Precursor Products

ArcelorMittal classifies as "DI Precursor Products" base steel with specific aluminum-alloy pre-coating that has been manufactured by its two licensees in the United States: AM-NS Calvert ("Calvert") and [redacted] *Id.* ¶ 41. Only a subset of aluminum-alloy pre-coated base steel with a "coating weight" (*i.e.*, thickness) of "AS 150" or its equivalent meets ArcelorMittal's definition of the DI Precursor Product. *Id.* ¶ 42; RX-1287C (Fekete Tr.) at 156:24-158:8 (testifying "AS80 pre-coating thickness or its equivalent are not DI precursor products"). The resulting list of alleged "DI Precursor Products" is "USIBOR 1500, USIBOR 2000, DUCTIBOR 450, DUCTIBOR 500, DUCTIBOR 1000 with a coating weight of AS 150" and "'ULTRALUME,' with a coating weight of AS 60/60." RX-1183C at 25-26.

ii. The DI Direct Products

ArcelorMittal classifies as "DI Direct Products" all steel components that are manufactured by hot stamping the DI Precursor Products. RX-1146C (Fekete Op. Rpt.) ¶¶ 44-45. Entities that perform hot stamping for automotive manufacturers like [redacted] are called "Tier 1" manufacturers.

<u>Representativeness</u>: ArcelorMittal only analyzed 15 products to support technical domestic industry for this Investigation. RX-1147C (Fekete Supp. Op. Rpt) ¶ 5, ¶ 190. ArcelorMittal's infringement and technical domestic industry expert, Dr. Fekete, admits that 4 of the 15 analyzed products do not practice any claim of the Asserted Patents. RX-1146C (Fekete Op. Rpt.) ¶¶ 194-

[redacted]

99: RX-1287C (Fekete Tr.) at 60:12-62:2. Nonetheless, Dr. Fekete opines that all untested DI Direct Products practice the Asserted Patents, including products that are manufactured by Tier 1 manufacturers **not subpoenaed** in this Investigation. RX-1146C (Fekete Op. Rpt.) ¶¶ 192, 193, 200; RX-1287C (Fekete Tr.) 118:12-119:7. As the evidence will show, this sweeping generalization cannot be reconciled with ArcelorMittal's validity theories.

F. Testing of VinFast, DI Products, and Prior Art Volkswagen Passat

VinFast's testing expert, Dr. Bradley, tested the various VinFast and DI Products at issue in this Investigation and the 2006 Volkswagen Passat prior art. CX-0086C (Bradley Testing Rpt.); CX-0083C (Bradley Passat Rpt.). As discussed further below, Dr. Bradley's robust testing results show noninfringement, no technical domestic industry, and invalidity of the Asserted Patents.

ArcelorMittal, on the other hand, outsourced testing of the VinFast Accused Products and the DI Products to three outside laboratories. RX-1146C (Fekete Op. Rpt.) ¶¶ 48-51. ArcelorMittal's testing was allegedly overseen by its consultant, Dr. Baskin, who did not submit an expert report in this Investigation and will not be testifying at the evidentiary hearing. *Id.* ArcelorMittal only tested certain hot-stamped parts of the VF 8 Accused Product, and not VF 9. *Id.* ¶ 52. Further, ArcelorMittal only tested a subset of the DI Products produced by the subpoenaed third parties in this Investigation (or withheld unfavorable testing results). *Id.* ¶ 54. ArcelorMittal did not test the 2006 Volkswagen Passat asserted as prior art in this Investigation. *See generally* RX-1171C (Raabe Reb. Rpt.).

II. JURISDICTION AND IMPORTATION

VinFast acknowledges that the Commission has statutory authority to hear the investigation and *in rem* jurisdiction over the Accused Products. VinFast does not dispute that the importation requirement within the meaning of 19 U.S.C. § 1337(a)(1)(B) is satisfied. EDIS Doc ID 836421 ¶ 5.

[redacted]

III. U.S. PATENT NO. 10,961,602

A. Claim Construction

The parties' positions are set forth in the parties' Joint Claim Construction Chart submitted November 1, 2024. EDIS Doc ID No. 836248. Complainant and Respondents agreed as to the construction of the following terms:

Patent Claims	Claim Term	Agreed on Construction
'602 Patent: Claims 1, 20-22	mean iron composition	Plain and ordinary
'602 Patent: Claims 24, 25	mean aluminum composition	Plain and ordinary
'602 Patent: Claim 2	quasi continuous	Occupying at least 90% of the level corresponding to the considered layer(s)

If claim terms "layer" and "level" are not found to be indefinite, Complainant and Respondents agreed these terms should be given the constructions shown in the below table:

Patent Claims	Claim Term	Agreed on Construction *if not Indefinite*
'602 Patent: Claims 1, 18, 21, 24	interdiffusion layer	Plain and ordinary
'602 Patent: Claims 1, 12, 21, 24, 28	intermediate layer	Plain and ordinary
'602 Patent: Claims 1, 21, 24	intermetallic layer	Plain and ordinary
'602 Patent: Claims 1, 21, 24	superficial layer	Plain and ordinary
'602 Patent: Claim 2	level	Plain and ordinary

1. Level of Skill of a Person of Ordinary Skill in the Art

A person of ordinary skill in the art ("POSITA") for the Asserted Patents would have had "at least an undergraduate degree in materials science, manufacturing engineering, mechanical engineering, or equivalent knowledge, training, or experience, with at least two years of experience working in metallurgy." CX-0084C (Brown Rpt.) ¶ 68. ArcelorMittal has set forth a slightly different definition of a POSITA as a person with "at least an undergraduate degree in materials science, manufacturing engineering, mechanical engineering, or equivalent knowledge, training,

[redacted]

or experience, with at least two years of experience working on the development of steels." RX-1146C (Fekete Op. Rpt.) ¶ 38; RX-1171C (Raabe Reb. Rpt.) ¶ 43. Parties' experts' positions remain the same under either definition of a POSITA. CX-0085C (Brown Reb. Rpt.) ¶ 30; RX-1171C (Raabe Reb. Rpt.) ¶ 46.

B. Noninfringement

The Accused Products do not infringe any of the Asserted Claims of the '602 patent. As discussed below, ArcelorMittal has failed to prove infringement of the '602 patent.

1. All Asserted Claims of the '602 Patent

i. ArcelorMittal failed to establish that Accused Products have the claimed "interdiffusion layer," "intermediate layer," "intermetallic layer," and "superficial layer"

As an initial matter, as explained below in Section § III.D.6, the claimed "layers" are indefinite because ArcelorMittal and its technical expert Dr. Fekete do not advance a standard from which the presence of the layers can be consistently determined by a POSITA.

Next, ArcelorMittal and its expert Dr. Fekete's analysis methodology of "compar[ing] the SEM micrographs taken of the VinFast parts with the four-layer structure depicted in Figure 1 of the Asserted Patents," is unreliable. RX-1146C (Fekete Op. Rpt.) ¶ 61; RX-1287C (Fekete Tr.) at 59:12-21. According to ArcelorMittal's corporate representative and first named inventor, Dr. Pascal Drillet, "whether a band of intermetallic component is a layer or phase" is not determined by "one picture," without knowing more. RX-1282C (Drillet Tr.) at 99:5-100:6. Dr. Brown agrees. As Dr. Brown will testify, for a region or band of material to be considered a "layer," analysis based on one isolated image, or even several images without more information such as the processing condition for the part, is insufficient to determine whether one or more of the claimed layers are present. CX-0085C (Brown Reb. Rpt.) ¶¶ 37-46.

To the extent that the ALJ finds that "layer" is not indefinite, under ArcelorMittal's

[redacted]

apparent interpretation of the plain and ordinary meaning of the term, a "layer" must be homogenous across an entire part. According to Dr. Drillet, a region of material must be "continuous and homogeneous" and have the "same composition" for the region of material to be a "layer," and "[a] multilayer structure of coating has to be the same across the entire part" for the band of intermetallic component to be a layer. RX-1282C (Drillet Tr.) at 99:5-12, 76:23-77:24. He also testified that "for the aluminum enrichment area to become a layer, it would need to be homogenous across the length of the microstructure." *Id.* at 77:20-24. As discussed above and illustrated below, whether a layer is homogeneous and continuous across an entire part cannot be determined by inspecting an isolated image, or even multiple images. CX-0085C (Brown Reb. Rpt.) ¶ 45.

ArcelorMittal's expert Dr. Fekete relies on single SEM images of certain parts to determine whether the asserted claims are met. Reliance on a single SEM image is insufficient to determine whether the claimed layer is present. For example, SEM images for the VinFast part [redacted] demonstrate that depending on which area the same part is tested, it can have different coating morphology. RX-1146C (Fekete Op. Rpt.) Ex. L at 6; RX-0147C-RX-0151C (VINFAST1402-00003820-24); CX-0086C (Bradley Testing Rpt.) ¶ 54.

[redacted] [redacted]

RX-1146C (Fekete Op. Rpt.) Ex. L at 6

[redacted]

[redacted] [redacted]

RX-0147C (VINFAST1402-00003820); RX-0148C (VINFAST1402-00003821)

[redacted] [redacted]

RX-0149C (VINFAST1402-00003822);RX-0150C (VINFAST1402-00003823); *see also* RX-0151C (VINFAST1402-00003824).

Dr. Bradley's SEM images demonstrate that the same part that Dr. Fekete relies on to support infringement has pockets of lighter-shaded material that are scattered across a background of darker-shaded material without forming well-defined boundary. CX-0020C (Brown Tr.) at 137:19-138:6; CX-0085C (Brown Reb. Rpt.) ¶¶ 39-46. The SEM images do not show "[a] multilayer structure of coating [is] ***the same across the entire part***" for a region of material of a component to be a layer. RX-1282C (Drillet Tr.) at 99:11-12. A POSITA is unable to determine whether the darker-shaded material is the intermediate layer, the superficial layer, or neither. There simply is no layer that is continuous and homogenous and the same across the entire part.

[redacted]

CX-0085C (Brown Reb. Rpt.) ¶ 40. Moreover, a POSITA is unable to determine whether the scattering of the lighter-shaded material is the intermetallic layer (it is not, as it is neither continuous nor homogeneous). Similar issues appear in other parts of the VinFast samples where the SEM images show pockets of lighter-shaded material scattered across a background of darker-shaded material without forming well-defined boundary. RX-1146C (Fekete Op. Rpt.) Ex. L at 13; CX-0085C (Brown Reb. Rpt.) ¶¶ 40-42; RX-0144C–RX-0146C (VINFAST1402-00003782-84); RX-0142C–RX-0143C (VINFAST1402-00003773-74). Similar non-continuous / homogenous structure appears in the SEM images of VinFast parts [redacted] RX-1146C (Fekete Op. Rpt.) Ex. L at 13; CX-0085C (Brown Reb. Rpt.) ¶ 44.

For all of the foregoing reasons, Dr. Fekete and ArcelorMittal failed to establish that the Accused Products include each of the 4 claimed "layer[s]" required to infringe the '602 and '227 patents.

ii. ArcelorMittal failed to establish that Accused Products have a "coating" that "has a thickness greater than 30 micrometers"

As an initial matter, ArcelorMittal and its expert, Dr. Fekete, rely on 2 documents from VinFast's suppliers [redacted] and [redacted] that list a coating thickness range of [redacted] but these specification values do not establish that the Accused Products have coating thickness over 30 µm – only testing of the actual Accused Products can show that the limitation is met. RX-1287C (Fekete Tr.) at 48:6-14 ("the only way of really knowing is to look at a micrograph of the material."). And indeed, testing shows that coating thickness is not met in many instances.

A POSITA would understand that a coating must have thicknesses greater than 30 µm across the entirety of a product to satisfy this claim limitation, because the claimed coating comprises 4 different layers, which must be continuous and homogeneous across the entire

[redacted]

product. If the constituent layers of the claimed coating are continuous and homogeneous, the coating itself would also be continuous and homogeneous with a thickness that meets the claim limitations throughout the entire product. Furthermore, the claimed coating would not have the various purposes of the coating listed by the Asserted Patent, such as "good resistance to corrosion as well as a good capacity for welding, painting and gluing," JX-0002 ('602 patent) at 11:38-39, if the coating could be, for example, very thin (e.g., 5 µm) at certain locations and over 30 µm at other locations. Such differences in coating thickness would represent differences in the part's ability to be welded given the difference in electrical resistivity of the coating. Corrosion resistance would also vary, as the coating would differ in composition. As such, Dr. Brown will testify that the entirety of the product must have coating with a thickness greater than 30 µm to meet this claim limitation. CX-0084C (Brown Rpt.) ¶ 48.

Neither ArcelorMittal's expert Dr. Fekete's test results nor VinFast's expert Dr. Bradley's test results show that measurements of coating thickness is greater than 30 microns. For example, the data that Dr. Fekete relies on to support infringement shows that some components have a thickness less than 30 microns. RX-0131 (AM-ITC-0102877 showing [redacted] having an average measurement of [redacted]); CX-0084C (Brown Rpt.) ¶ 49. Dr. Bradley's test results further demonstrate that [redacted] has a thickness below 30 µm at many locations.

[redacted]

[redacted]

Position #	1	2	3	4	5	6	7	8	Average
Coating Thickness (µm)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

CX-0086C (Bradley Testing Rpt.) ¶ 55; RX-0170C (VINFAST1402-00005721).

[redacted]

Position #	1	2	3	4	5	6	7	Average
Coating Thickness (µm)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

CX-0086C (Bradley Testing Rpt.) ¶ 55; RX-0171C (VINFAST1402-00005724) (annotated).

[redacted]

Furthermore, Dr. Fekete's own test results show many locations within the tested samples have average thicknesses below the 30 µm required by all claims, as indicated by red boxes. RX-1146C (Fekete Op. Rpt.) Ex. L. CX-0085C (Brown Reb. Rpt.) ¶¶ 52-53. Cherry-picking of thickness measurements exceeding 30 µm and excluding other thickness measurements below the required thickness is not a reliable scientific methodology and cannot establish that the claim limitation is met. CX-0085C (Brown Reb. Rpt.) ¶¶ 51-55.

[redacted]

2. Claim 2

ArcelorMittal failed to establish that Accused Products have alleged "layers (c) and (d)" that are "quasi continuous by occupying at least 90% of a level corresponding to each of the layers (c) and (d)," and that "less than 10% of layer (c) is present at an extreme surface of the product," as required by claim 2 of the '602 patent. As an initial matter, ArcelorMittal and its expert Dr. Fekete fail to provide any analysis that the SEM micrographs show that the intermetallic layer and the superficial layer each occupy at least 90% of the level of which each layer corresponds, and that each layer is quasi continuous. Aside from his statement that he tested the parts according to the protocol developed by Dr. Baskin and himself where he compared the SEM micrographs of the parts with the four-layer structure depicted in Figure 1, Dr. Fekete does not provide any supportive analysis. RX-1146C (Fekete Op. Rpt.) ¶ 73. He does not show how the SEM micrographs compare to Figure 1 of the Asserted Patents. *Id.* ¶ 74.

Furthermore, SEM micrographs from Dr. Fekete's report and Dr. Bradley's test results further show that in addition to the fact that there are no claimed four-layer structure, more than

[redacted]

10% of what ArcelorMittal alleges as the layer (c) is exposed at the extreme surface. *See, e.g.*, RX-0147–RX-0150C (VINFAST1402-00003820-23) ([redacted] RX-0144C (VINFAST1402-00003782) ([redacted] RX-0603C (VINFAST1402-00005711) ([redacted] CX-0086C (Bradley Testing Rpt.) RX-0147C–RX-0150C (VINFAST1402-00003820-23) ([redacted] RX-0144C (VINFAST1402-00003782) ([redacted] RX-0603C (VINFAST1402-00005711) ([redacted] CX-0086C (Bradley Testing Rpt.) ¶¶ 54-56; CX-0085C (Brown Reb. Rpt.) ¶¶ 57-58.

3. Claims 9 and 26

ArcelorMittal failed to establish that "layer (a) has a thickness less than 15 micrometers" of claims 9 and 26 of the '602 patent is met by the Accused Products. For example, Dr. Fekete's own testing show that layer (a) has a thickness of [redacted] micrometers for part [redacted] as shown below:

[redacted]

RX-1146C (Fekete Op. Rpt.) Ex. F at 2 (annotated); CX-0085C (Brown Reb. Rpt.) ¶ 59.

A POSITA would understand that a coating must have layer (a) thicknesses less than 15 µm across the entirety of an accused product to satisfy this claim limitation, because the claimed coating comprises 4 different layers, which must be continuous and homogeneous across the entire product. CX-0085C (Brown Reb. Rpt.) ¶ 60. ArcelorMittal and its expert Dr. Fekete failed to show that layer (a) has a thickness less than 15 micrometers.

C. No Technical Domestic Industry

[redacted]

1. Overview of the Domestic Industry Products

The alleged technical domestic industry products fall into two categories: (1) "DI Precursor Products" and (2) "DI Direct Products." Neither category of the technical domestic industry products practice the DI Claims.

The DI Precursor Products are pre-coated steel products from ArcelorMittal that have not been hot stamped. These products include USIBOR 1500, USIBOR 2000, DUCTIBOR 450, DUCTIBOR 500, and DUCTIBOR 1000 with a coating weight of AS 150 and ULTRALUME with a coating weight of AS 60/60. Because hot stamping is required to create the layers recited in the DI Claims, there does not appear to be a dispute that the DI Precursor Products do not have the layers recited by the DI Claims. RX-1282C (Drillet Tr.) at 32:19-33:5 (testifying that formation of layer is impacted by heating rate, thickness, and furnace type); RX-1146C (Fekete Op. Rpt.) ¶ 42; CX-0085C (Brown Reb. Rpt.) ¶¶ 66-67.

The DI Direct Products are hot stamped DI Precursor Products. There is an ***unknown number*** of DI Direct Products at issue in this Investigation. RX-1287C (Fekete Tr.) at 119:14-121:25. The hot stamping of the DI Precursor Products are performed by third-party Tier 1 manufacturers. The third-party Tier-1 manufacturers can be broken down into two categories: (1) those subpoenaed in this Investigation[2] and (2) those that have not been subpoenaed in this Investigation. Based on information obtained from the subpoenaed third parties, there are at least 175 DI Direct Products manufactured by the subpoenaed third parties that are at issue in this Investigation. RX-1287C (Fekete Tr.) at 126:15-25 ([redacted] parts), 127:25-:128:2 ([redacted] parts), 128:17-19 ([redacted] parts), 151:8-152:2 [redacted] parts).

[2] The subpoenaed third parties include [redacted] and [redacted]

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[redacted]

In addition, there are an ***unknown number*** of DI Direct Products from an ***unknown number*** of third-party Tier 1 manufactures that are also at issue in this Investigation.

i. Lack of Representativeness

Despite the unknown number of third-party Tier 1 manufacturers that create the unknown number of DI Direct Products, ArcelorMittal has alleged representativeness based on testing performed on a small subset (15 of the products manufactured by the subpoenaed third-party Tier 1 manufacturers) of the DI Direct Products. ArcelorMittal's representative products analysis, however, is highly flawed and should be disregarded.

First, ArcelorMittal does not provide any analysis identifying which product is representative of which other products. Given the number of products at issue and the number of Tier 1 manufacturers that create such product, ArcelorMittal's failure to identify which product is representative of which other product highlights the shortcomings of its representative analysis.

Second, ArcelorMittal fails to provide analysis or explanation to account for the differences in the processing parameters used to create DI Direct Products. As ArcelorMittal's validity expert Dr. Raabe and corporate representative and inventor Dr. Drillet testified, the creation of the layer structure recited in the Asserted Claims depends on the specific hot stamping parameters used. RX-1282C (Drillet Tr.) at 32:19-33:5 ("Q. Without knowing the heating rate, the thickness, and the furnace type, you cannot predict whether a part will have a stratified layer structure at the end of the furnace step? A. That's correct."), 112:14-113:6 (invention is "associated with process parameters defined in order to obtain in a robust manner, in a robust and reproducible manner for the majority of hot stampers, so to obtain this microstructure"), 114:2-16 ("Q. So the invention is defining the process in a repeatable, robust way to generate the microstructure? A. Yes. Q. Part of the process in the invention is the time and temperature that an aluminum-coated substrate will spend in the furnace. Right? A. With only the time and temperature that the aluminum-coated

[redacted]

substrate will spend in the furnace, you would not be able to generate the four layers. Q. You also need to know the heating rate. Right? A. That's the key parameter."); RX-1289C (Raabe Tr.) at 103:25-104:11 ("If you don't follow certain process variables, it's very unlikely that this type of result described in Claim 1 can be reproduced in a reliable way that makes it fit for a mass market."), 105:13-106:23 ("Q. Do the claims require process parameters in order for the claims to be satisfied? A. The claims require that certain protocols are followed."), 297:10-298:21, 303:2-17. Moreover, testimony from each of the subpoenaed third-party Tier 1 manufacturers indicate that the hot stamping parameters vary on a product-by-product basis. *See, e.g.*, RX-1278C ([redacted] Tr.) at 80:21-82:21; RX-1273C ([redacted] Tr.) at 118:18-119:9; RX-1279C ([redacted] Tr.) at 85:23-86:13; RX-1277C ([redacted] Tr.) at 171:10-172:2; RX-1280C ([redacted] Tr.) at 57:2-58:13. So too do their documents. RX-0135C (EBM-ITC_00006); CX-0448C ([redacted] 000121); CX-0445C ([redacted] 000227); CX-0411C ([redacted] CX-0399C ([redacted] ITC_000001); RX-0141C (TA 0000058). Yet, despite the importance of the hot stamping parameters to the creation of the recited layers, ArcelorMittal did not obtain the specific processing parameters used for any DI Direct Product from any of the subpoenaed third-party Tier 1 manufacturers. As such, ArcelorMittal did not, and cannot account for any differences in the hot stamping parameters in its representative products analysis.

Third, ArcelorMittal's representative products analysis is contradicted by its own testing of the DI Direct Products. In particular, ArcelorMittal and its expert, Dr. Fekete, concede that testing for three parts produced by [redacted]

[redacted] do not satisfy the Asserted Claims. RX-1146C (Fekete Op. Rpt.) ¶¶ 194-95, Ex. W. Although Dr. Fekete attempts to explain away the negative testing as "manufacturing anomalies," he does so without the benefit of knowing the hot stamping parameters for the three parts (*i.e.*, how the parts are manufactured). As such, Dr. Fekete's opinion amounts to nothing more than speculation. It further contradicts the testimony of Dr. Drillet (ArcelorMittal's corporate representative) and Dr. Raabe (ArcelorMittal's validity expert) indicating that the specific parameters are vital to the formation of the recited layers. *See e.g.*, RX-1282C (Drillet Tr.) at 32:19-33:5, 112:14-113:6, 114:2-16; RX-1289C (Raabe Tr.) at 103:25-104:11, 105:13-106:23, 297:10-298:21, 303:2-17.

Fourth, ArcelorMittal's and Dr. Fekete's reliance on customer specifications establish representativeness. Contrary to Dr. Fekete's suggestion, the customer specifications do not require the presence of the layer structure recited in the Asserted Claims. *See e.g.*, CX-0691 (AM-ITC-0106598) (Ford specification). To the extent that Dr. Fekete relies on the performance characteristics found in the customer specification as evidence of the presence of the layer structure recited in the DI Claims, Dr. Fekete falls into the logic pitfall of mistaking what is sufficient for what is necessary. While the inventors claim that the presence of layers are sufficient to lead to certain performance characteristics, there is no evidence demonstrating that the layers are ***necessary*** to achieving such performance characteristics. As demonstrated by the prior art, which ArcelorMittal contends do not result in the recited layers, hot stamped pre-coated USIBOR 1500 exhibited many of the performance characteristics required by the customer specifications. This includes yield strength, weldability, and paintability. *See e.g.*, RX-0019 (Cornette) at AM-ITC-0014506-508; RX-0010 (Laurent) at AM-ITC-12169-170; RX-0022 (Suehiro II) at AM-ITC-0014692, 695; RX-0081 (Vaissiere) at VINFAST1402-00003255-258; RX-0049 (AM-ITC-

0078747) at 748. As such, the DI Claims are either invalid (because the layers are necessary for performance characteristics) or the DI Direct Products do not practice the DI Claims (because the layers are not necessary for the performance characteristics).

ArcelorMittal's suggestion alleged compliance with customer specifications supports representativeness is incorrect. Specifications to not guarantee formation of the claimed features, as AM's testing of [redacted] parts from [redacted] / [redacted] shows. RX-1146C (Fekete Op. Rpt.) ¶¶ 194-95, Ex. W. And OEM specifications do not require the claimed feature. *E.g.*, RX-1286C ([redacted] Tr.) at 58:10-16.

2. ArcelorMittal failed to establish DI Direct Products practice the DI Claims

i. All DI Claims of the '602 Patent

a. ArcelorMittal failed to establish that DI Direct Products have the claimed "interdiffusion layer," "intermediate layer," "intermetallic layer," and "superficial layer"

As an initial matter, as explained below in Section § III.D.6, the claimed "layers" are indefinite because ArcelorMittal and its technical expert Dr. Fekete do not advance a standard from which the presence of the layers can be consistently determined by a POSITA.

Next, as explained above in relation to noninfringement, ArcelorMittal and its expert Dr. Fekete's analysis methodology of "compar[ing] the SEM micrographs taken of the VinFast parts with the four-layer structure depicted in Figure 1 of the Asserted Patents," is unreliable. RX-1146C (Fekete Op. Rpt.) ¶ 61; RX-1287C (Fekete Tr.) at 59:12-21. According to ArcelorMittal's corporate representative and first named inventor, Dr. Pascal Drillet, "whether a band of intermetallic component is a layer or phase" is not determined by "one picture," without knowing more. RX-1282C (Drillet Tr.) at 99:5-100:6. Dr. Brown agrees. As Dr. Brown will testify, for a region or band of material to be considered a "layer," analysis based on one isolated image, or

[redacted]

even several images without more information such as the processing condition for the part, is insufficient to determine whether one or more of the claimed layers are present. CX-0085C (Brown Reb. Rpt.) ¶¶ 97-114.

To the extent that the ALJ finds that "layer" is not indefinite, under the plain and ordinary meaning of the term, a "layer" must be homogenous across an entire part as explained above in relation to noninfringement. According to Dr. Drillet, a region of material must be "continuous and homogeneous" and have the "same composition" for the region of material to be a "layer," and "[a] multilayer structure of coating has to be the same across the entire part" for the band of intermetallic component to be a layer. RX-1282C (Drillet Tr.) at 99:5-12, 76:23-77:24. He also testified that "for the aluminum enrichment area to become a layer, it would need to be homogenous across the length of the microstructure." *Id.* at 77:20-24. As discussed above and illustrated below, whether a layer is homogeneous and continuous across an entire part cannot be determined by inspecting an isolated image, or even multiple images.

ArcelorMittal's expert Dr. Fekete relies on single SEM images of certain parts to determine whether the DI Claims are met. However, reliance on a single SEM image is insufficient to determine whether the claimed layer is present. CX-0085C (Brown Reb. Rpt.) ¶ 99. Independent testing of the various DI Direct Products by VinFast's expert Dr. Bradley in fact shows that the SEM images do not show the claimed 4-layer structure. For example, Dr. Bradley's SEM images of [redacted] DI Direct Product, [redacted], show that the same part that Dr. Fekete relies on to support technical domestic industry do not display the claimed 4-layer structure:

RX-0169C (VINFAST1402-00005547); RX-0165C (VINFAST1402-00005493); CX-0086C (Bradley Testing Rpt.) ¶ 61; *see also* RX-0166C (VINFAST1402-00005503); RX-0167C (VINFAST1402-00005515); RX-0168C (VINFAST1402-00005534).

Lack of layers are also shown in Dr. Bradley's SEM images of other DI Direct Products:

– CX-0086C (Bradley Testing Rpt.) ¶ 59; RX-0153C (VINFAST1402-00005259); RX-0152C (VINFAST1402-00005234); RX-0154C (VINFAST1402-00005279). – CX-0086C (Bradley Testing Rpt.) ¶ 60; RX-0155C (VINFAST1402-00005292); RX-0156C (VINFAST1402-00005314).

– CX-0086C (Bradley Testing Rpt.) ¶ 62; RX-0157C (VINFAST1402-00005325). – CX-0086C (Bradley Testing Rpt.) ¶ 63; RX-0158C (VINFAST1402-00005337). – CX-0086C (Bradley Testing Rpt.) ¶ 64; RX-0159C (VINFAST1402-00005350).

[redacted] CX-0086C (Bradley Testing Rpt.) ¶ 65; RX-0160C (VINFAST1402-00005358). [redacted] – [redacted] CX-0086C (Bradley Testing Rpt.) ¶ 66; RX-0161C (VINFAST1402-00005372). [redacted] – [redacted] CX-0086C (Bradley Testing Rpt.) ¶ 67; RX-0162C (VINFAST1402-00005384).

[redacted] – [redacted] CX-0086C (Bradley Testing Rpt.) ¶ 68; RX-0163C (VINFAST1402-00005410). [redacted] – [redacted] CX-0086C (Bradley Testing Rpt.) ¶ 69; RX-0164C (VINFAST1402-00005431).

Appearance of the coating in certain sample locations does not establish that such coating morphology exists elsewhere on the same part. Moreover, even Dr. Fekete's SEM images do not show continuous and homogeneous layers. CX-0085C (Brown Reb. Rpt.) ¶ 100. For all the foregoing reasons, Dr. Fekete and ArcelorMittal failed to establish that the DI Direct Products include each of the 4 claimed "layer[s]" required to practice the Domestic Industry Claims.

b. DI Direct Products lack "coatings" that "have a thickness greater than 30 micrometers"

ArcelorMittal and its expert Dr. Fekete failed to establish the DI Direct Products' "coating" "has a thickness greater than 30 micrometers" as required by all Domestic Industry Claims. CX-0085C (Brown Reb. Rpt.) ¶ 115. As an initial matter, ArcelorMittal and its expert Dr. Fekete cites documents from [redacted] and [redacted] GM, and Ford, but these specification values do not establish that the DI Direct Products have coating thickness over 30 µm – only testing of the actual DI Direct Products can show that the limitation is met. RX-1287C

[redacted]

(Fekete Tr.) at 48:6-14 ("the only way of really knowing is to look at a micrograph of the material."). And indeed, testing shows that coating thickness is not met in many instances.

As explained above in relation to infringement, a POSITA would understand that a coating must have thicknesses greater than 30 μm across the entirety of a product to satisfy this claim limitation, because the claimed coating comprises 4 different layers, which must be continuous and homogeneous across the entire product. CX-0084C (Brown Rpt.) ¶ 48. As such, Dr. Brown will testify that the entirety of the product must have coating with a thickness greater than 30 μm to meet this claim limitation.

Furthermore, Dr. Fekete's own test results show many locations within the tested samples have average thicknesses below the 30 μm required by all claims. Below are some examples highlighting in red the coating thicknesses below 30 μm.

[redacted] [redacted]

[redacted]

RX-1146C (Fekete Op. Rpt.) Ex. U (annotated); CX-0085C (Brown Reb. Rpt.) ¶ 115. Cherry-picking of thickness measurements exceeding 30 µm and excluding other thickness measurements below the required thickness is not a reliable scientific methodology and cannot establish that the claim limitation is met. CX-0085C (Brown Reb. Rpt.) ¶ 115.

ii. Claim 2

ArcelorMittal failed to establish that the alleged "layers (c) and (d) are quasi continuous by occupying at least 90% of a level corresponding to each of the layers (c) and (d)," and that "less than 10% of layer (c) is present at an extreme surface of the product," as required by claim 2 of the '602 patent. CX-0085C (Brown Reb. Rpt.) ¶ 116-17. As an initial matter, ArcelorMittal and its expert Dr. Fekete fail to provide any analysis that the SEM micrographs show that the intermetallic layer and the superficial layer each occupy at least 90% of the level of which each layer corresponds, and that each layer is quasi continuous. Aside from his statement that he tested the parts according to the protocol developed by Dr. Baskin and himself where he compared the SEM micrographs of the parts with the four-layer structure depicted in Figure 1, Dr. Fekete does not provide any supportive analysis. RX-1146C (Fekete Op. Rpt.) ¶ 219. He does not show how the SEM micrographs compare to Figure 1 of the Asserted Patents. *Id.* ¶ 220.

[redacted]

Furthermore, SEM micrographs from Dr. Fekete's report and Dr. Bradley's test results further show that in addition to the fact that there are no claimed four-layer structure, more than 10% of what ArcelorMittal alleges as the layer (c) is exposed at the extreme surface. *See, e.g.*, RX-1146C (Fekete Op. Rpt.) Ex. U; RX-0169C (VINFAST1402-00005547); RX-0159C (VINFAST1402-00005350); RX-0163C (VINFAST1402-00005410); CX-0086C (Bradley Testing Rpt.) ¶¶ 61, 64, 68; CX-0085C (Brown Reb. Rpt.) ¶¶ 116-17.

iii. Claims 7 and 8

ArcelorMittal failed to establish that the "ratio of titanium to nitrogen in the base steel in weight % is in excess of 3.42," as required by claims 7 and 8 of the '602 patent. CX-0085C (Brown Reb. Rpt.) ¶ 118. Dr. Fekete relies on a Ford specification that "call[s] for ranges of titanium and nitrogen with a ratio always greater than 3.42," but such specification alone does not support that the DI Direct Products meet this claim limitation. RX-1146C (Fekete Op. Rpt.) ¶¶ 241, 242 (citing Ford Specification AM-ITC_0106598). Dr. Fekete further relies on Exhibit N of his report for the ratio of titanium to nitrogen in weight, but Dr. Fekete chose not to report any values for the % weight for Titanium, Nitrogen, or the ratio thereof. Such absence of data fails to establish that this claim is practiced.

[redacted]

RX-1146C (Fekete Op. Rpt.) Ex. N (annotated); CX-0085C (Brown Reb. Rpt.) ¶ 118.

[redacted]

iv. Claims 9, 18, and 26

ArcelorMittal failed to establish that the DI Direct Products have layer (a) that has a thickness less than 15 micrometers. CX-0085C (Brown Reb. Rpt.) ¶¶ 119-21. For example, Dr. Fekete's own testing show that alleged layer (a) has a thickness of 16.32 micrometers for part [redacted]

[redacted]

RX-1146C (Fekete Op. Rpt.) ¶ Ex. O at 2 (annotated); CX-0085C (Brown Reb. Rpt.) ¶ 119. Furthermore, Dr. Fekete states that certain Tier 1 hot stamper documents show that layer (a) of the DI Direct Products must be less than or equal to [redacted] micrometers, a range that substantially overlaps with the claimed layer thickness, but the test for infringement is whether the claimed limitation of thickness less than 15 micrometers is met, not whether there is a substantial overlap with the claimed layer thickness. RX-1146C (Fekete Op. Rpt.) ¶ 242, p. 177 (claim 26), ¶ 304.

A POSITA would understand that a coating must have layer (a) thicknesses less than 15 μm across the entirety of the DI Direct Products to satisfy these claims, because the claimed coating comprises 4 different layers, which must be continuous and homogeneous across the entire product. CX-0085C (Brown Reb. Rpt.) ¶ 121.

v. Claim 10

ArcelorMittal failed to establish that the DI Direct Products have layer (a) that has a thickness less than 10 micrometers. CX-0085C (Brown Reb. Rpt.) ¶¶ 122-24. Dr. Fekete's own testing show that at least three of the eight tested parts for the alleged layer (a) has a thickness of

[redacted]

RX-1146C (Fekete Op. Rpt.) Ex. O at 2 (annotated); CX-0085C (Brown Reb. Rpt.) ¶ 122. Furthermore, Dr. Fekete also states that certain Tier 1 hot stamper documents show that layer (a) of the DI Direct Products must be less than or equal to [redacted] micrometers, a range that substantially overlaps with the claimed layer thickness, but the test for infringement is whether the claimed limitation of thickness less than 10 micrometers is met, not whether there is a substantial overlap with the claimed layer thickness. RX-1146C (Fekete Op. Rpt.) ¶ 244. And as discussed above, specification documents requiring the alleged interdiffusion layer be 10 micrometers or less is not enough to establish that the alleged layer (a) has a thickness less than 10 micrometers. CX-0085C (Brown Reb. Rpt.) ¶ 123.

A POSITA would understand that a coating must have layer (a) thicknesses less than 10 µm across the entirety of the DI Direct Products to satisfy this claim limitation, because the claimed coating comprises 4 different layers, which must be continuous and homogeneous across the entire product. CX-0085C (Brown Reb. Rpt.) ¶ 124. ArcelorMittal and its expert Dr. Fekete failed to show that layer (a) has a thickness less than 10 micrometers. *Id.*

[redacted]

D. Invalidity

1. ArcelorMittal failed to establish earlier priority date

Faced with prior art that ArcelorMittal has asserted to satisfy the patents, *see* Section § III.D.3.i, ArcelorMittal seeks an earlier priority date of at least December 2005. ArcelorMittal, however, has not developed the evidence necessary to support the alleged earlier priority date for either of the Asserted Patents. Specifically, ArcelorMittal has provided insufficient evidence to demonstrate conception or reduction to practice by at least December 2005.

It is well established that conception is complete only when the idea is so clearly defined in the inventor's mind that only ordinary skill would be necessary to reduce the invention to practice, without extensive research or experimentation. *Sewall v. Walters*, 21 F.3d 411, 415 (Fed. Cir. 1994); *see also Coleman v. Dines*, 754 F.2d 353, 359 (Fed. Cir. 1985) (conception must include every feature of claimed invention). Because it is a mental act, courts require corroborating evidence of a contemporaneous disclosure that would enable one skilled in the art to make the invention. *Coleman*, 754 F.2d at 359; *see also Burroughs Wellcome Co. v. Barr Lab'ys, Inc.*, 40 F.3d 1223, 1228 (Fed. Cir. 1994).

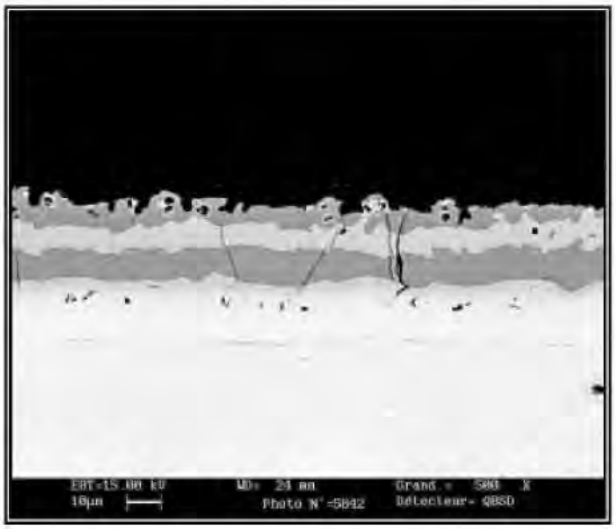
The alleged corroborating evidence that ArcelorMittal relies on does not meet the requirements for establishing conception. The evidence cited by ArcelorMittal breaks down into three broad categories:

> (1) a document authored by Ms. Raisa Grigorieva, an intern that started at ArcelorMittal ***after*** the alleged conception – CX-0891C (AM-ITC-0102350) (cover page in French); RX-0054 (AM-ITC-0102220) (French version); CX-0890C (AM-ITC-0102285) (English version); *see also* RX-1282C (Drillet Tr.) at 141:24-143:20;
> (2) redacted communications with counsel that provide zero insight as to the underlying substance of the communications – CX-0893C (AM-ITC-0106952), CX-0895C (AM-ITC-0106960), CX-0896C (AM-ITC-0106962); and
> (3) redacted communications ***after*** the alleged conception – CX-0892C (AM-ITC-0106947), CX-0894C (AM-ITC-0106957), CX-0897C (AM-ITC-0106965). *See* RX-1171C (Raabe Reb. Rpt.) ¶ 117.

[redacted]

With respect to the first category, the document authored by Ms. Raisa Grigorieva cannot be contemporaneous with the alleged conception by December 2005 because the document was authored in 2006. Namely, the cover page bears a date range of March 1, 2006 to August 31, 2006. CX-0891C (AM-ITC-0102350) (Cover page in French). Moreover, the document references events after December 2005, including the ratification of a merger between Arcelor and Mittal that occurred in June 2006. CX-0890C (AM-ITC-0102285) at AM-ITC-0102287. Moreover, Ms. Raisa Grigorieva, its sole author, did not perform work associated with the report until mid-2006. RX-1282C (Drillet Tr.) at 142:22-24, 145:6-146:21.

Further, testimony from Dr. Pascal Drillet, ArcelorMittal's corporate witness on the issues of conception and reduction to practice casts further doubt that CX-0890C (AM-ITC-0102285) demonstrates the alleged conception by inventors of the Asserted Patents. In particular, Dr. Drillet testified that Figure 1 of the Asserted Patents, which according to ArcelorMittal's expert, Dr. Raabe, is the invention of the Asserted Patents (RX-1289C (Raabe Tr.) at 116:21-117:4), originated from outside ArcelorMittal's customer as a complaint to issues with ArcelorMittal's USIBOR 1500 product. RX-1282C (Drillet Tr.) at 102:2-105:24. Notably, as Dr. Drillet testified, Figure 1 of the Asserted Patents was created by [redacted] and not ArcelorMittal, and is evidence of [redacted] creating the claimed four-layer coating ***before*** the alleged invention of the Asserted Patents. CX-0683C (report re after-sale service claim by [redacted] (AM-ITC-0102170) at 2174 (Fig. 1 image); RX-1282C (Drillet Tr.) at 104:2-105:3.



[redacted]

Q. Is there an interfacial interdiffusion layer illustrated on the micrograph on page 5 of Exhibit 5?
A. Yes, you do see the interfacial interdiffusion layer very clearly.
Q. And then there's a darker region which represents one additional layer on top of the interdiffusion layer?
A. Mm-hmm.
Q. And would you agree that there's a lighter region which represents an additional layer on top of the darker layer and the interdiffusion layer?
A. Yes.
Q. Is there -- the material at the surface, is that also a layer?
A. Unless micro, it is indeed close to a layer.
Q. So it's close to a layer, but it is not a layer?
A. It is a layer.
Q. Is this an example of a hot stamper randomly creating a coating that has four layers?
A. Yeah.
Q. And this occurred before – this occurred in 2005. Correct?
A. Yes, at the end of the '25, yeah -- 2005, sorry.

RX-1282C (Drillet Tr.) at 106:5-107:8. As such, the reuse of such figures in CX-0890C (AM-ITC-0102285) of a [redacted] hot-stamped product cannot and should not be used as evidence of conception. *See e.g.*, CX-0890C at 2321.

With respect to the second and third categories, due to heavy redactions, none of the documents provide any information as to what the document is about, much less corroborating evidence that enables one skilled in the art to make the invention. Further, many of these documents postdate the alleged priority date and thus are also not contemporaneous of the alleged invention. *See e.g.*, CX-0896C (AM-ITC-0106962) (dated January 31, 2006); CX-0892C (AM-ITC-0106947) (printed September 27, 2006); CX-0894C (AM-ITC-0106957) (printed July 31, 2006); CX-0897C (AM-ITC-0106965) (printed October 2, 2006). Finally, many of the documents involve individuals who are not inventors to the Asserted Patents but are other ArcelorMittal employees and inventors of other ArcelorMittal patents. For example, the document CX-0893C (AM-ITC-0106952) indicates attendees of a meeting includes [redacted]. The list of

[redacted]

attendees casts doubt that the meeting pertained to the alleged conception of the Asserted and DI Claims. Missing from the meeting is the third alleged inventor Ronald Kefferstein. In addition, the list includes additional individuals that were involved with other patents at ArcelorMittal including [redacted] (inventor of U.S. 6,296,805) and possibly [redacted].

In addition, separate from not being able to establish conception, ArcelorMittal has failed provided the requisite evidence to establish reduction to practice. In particular, ArcelorMittal's validity expert, Dr. Raabe, has not analyzed of any of the documents identified by ArcelorMittal to determine whether a reduction to practice has been shown. As such, without expert analysis, ArcelorMittal is at best left with unsubstantiated attorney argument, which is legally insufficient to demonstrate a reduction to practice. *Glaverbel Societe Anonyme v. Northlake Mktg. & Supply, Inc.*, 45 F.3d 1550, 1562 (Fed. Cir. 1995) ("There must be sufficient substance, other than attorney argument, to show that the issue requires trial."); *see also Am. Airlines, Inc. v. United States*, 204 F.3d 1103, 1112 (Fed. Cir. 2000).

2. Overview of the Prior Art

i. [redacted] DI Direct Product

[redacted] one of the subpoenaed Tier 1 manufacturers of the DI Direct Product, performed hot stamping since [redacted] to supply [redacted] with hot-stamped precoated USIBOR 1500 products:

[redacted]

[redacted]

RX-0056C (EBM-ITC_00030) at 030 (annotated). [redacted] corporate representative, [redacted] testified, the control plan above was for [redacted] RX-1277C ([redacted] ([redacted] Tr.) at 133:7-13; *id.* at 133:22-24.

The [redacted] hot stamping for the [redacted] part was performed [redacted]. RX-0056C (EBM-ITC_00030) at 030; RX-1277C ([redacted] ([redacted] Tr.) at 136:3-10.

The hot stamping performed by [redacted] RX-1277C ([redacted] ([redacted] Tr.) at 171:5-172:2. The [redacted]

[redacted]

RX-0056C ([redacted] at EBM-ITC_00030.

[redacted] part is prior art under 35 U.S.C. § 102(a) because the alleged invention was "known or used by others in this country" before the earliest alleged priority date of December 2005, and under 35 U.S.C. § 102(b) because the alleged invention was "in public use" and "on sale" in the United States since [redacted] Even under the later [redacted] part is prior art under 35 U.S.C.

[redacted]

§ 102(a), because ArcelorMittal failed to establish a priority date earlier than the October 30, 2006 filing date of the priority application to the Asserted Patents.

ii. 2006 Volkswagen Passat

The 2006 Volkswagen Passat made use of pre-coated hot stamped steel, a fact that was widely known in the industry. CX-0084C (Brown Rpt.) ¶¶ 71-74.

> The following assemblies are manufactured from ultra-high-strength, hot-formed steel panels:
>
> - The front bumper cross member
> - The cross members in the footwell area
> - Inner sills
> - The centre tunnel
> - The A-pillar/roof frame area
> - The B-pillar

RX-0008 (AM-ITC-0011678-11753) (The Passat 2006 Service Training) at 1687.

> Thanks to its many advantages (corrosion, no shot-blasting, no protective atmosphere in the furnaces, no post-coating…), the precoated solution, Usibor 1500 P, is more and more specified and used in the new European and US cars. For example, Usibor 1500 P is used for the pillars and sills of the new VW Passat (Figure 9 and Figure 10) and of the Mercedes Class S, for A-pillars of Landrover cars, bumper-beams of the Ford Mustang… A similar trend can be observed in Japan.

Figure 9. Hot-stamped parts made in Usibor 1500 P in the VW Passat (source: VW)

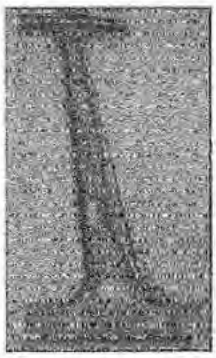
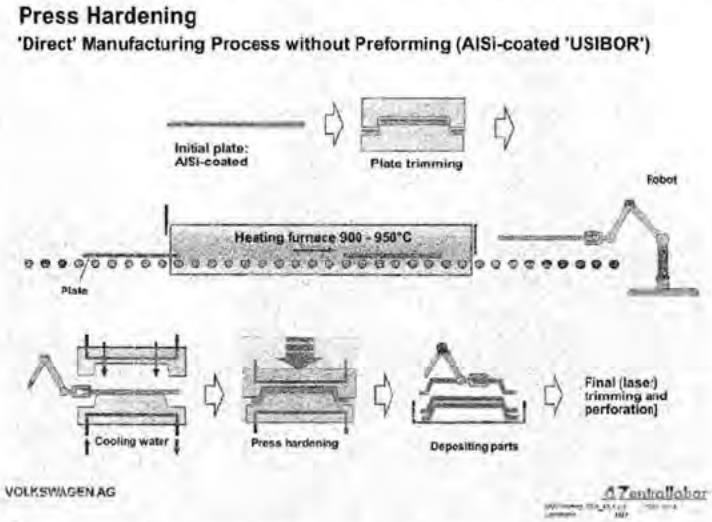


Figure 10. B-pillar of the VW Passat

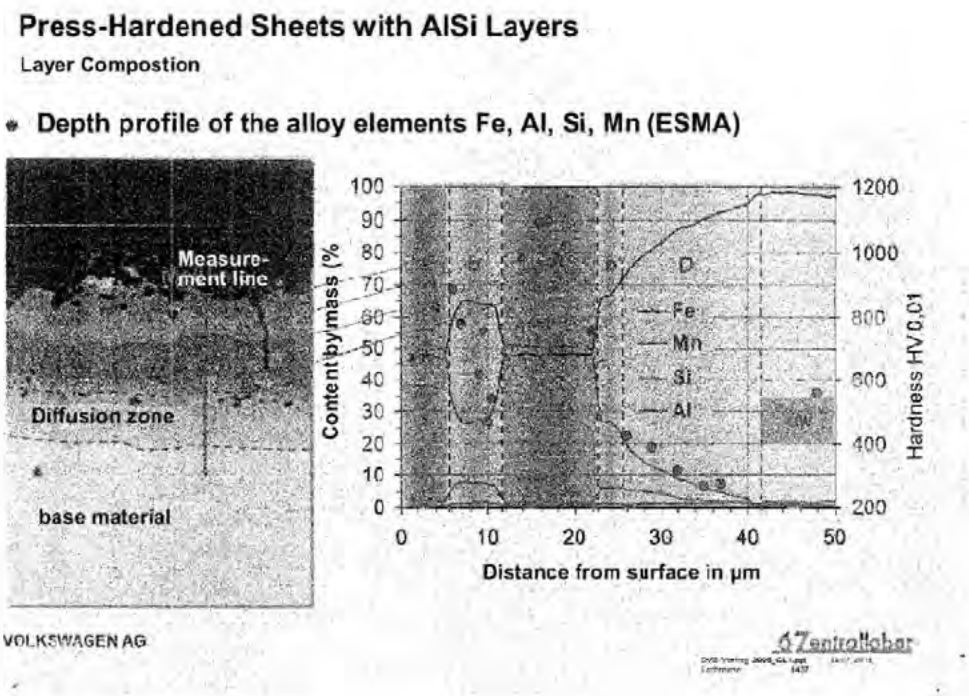
RX-0013 (AM-ITC-0013127) (New Developments in Sheet Forming (2006)) at 13131.

[redacted]

Dr. Carstein Lachmann of Volkswagen also presented on the hot stamping process in a lecture on January 18, 2005. RX-0005 (AM-ITC-0010992) at 10993; RX-0062 (AM-ITC-0019466) at 19467. In particular, as reflected by the presentation slides, the lecture covered the hot stamping of USIBOR 1500 precoated with aluminum and silicon. RX-0005 (AM-ITC-0010992) at 10995; RX-0062 (AM-ITC-0019466) at 19469.



Importantly, it is notable that Dr. Lachmann's lecture discussed the layers formed during the hot stamping process:

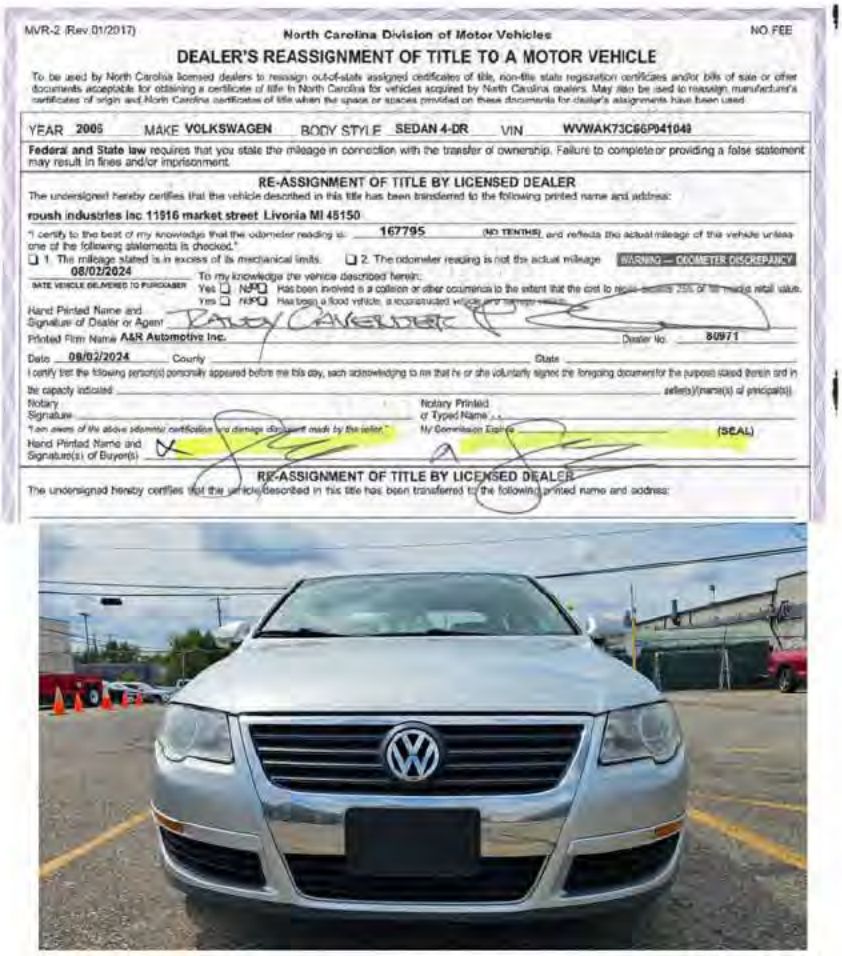


RX-0005 (AM-ITC-0010992) at 10998-99; RX-0062 (AM-ITC-0019466) at 19472-73.

VinFast's independent analysis of a B-pillar of a 2006 Volkswagen Passat demonstrates that the B-pillar of the 2006 VW Passat is a hot stamped steel meeting every limitation of the

[redacted]

claims at issue. CX-0084C (Brown Rpt.) ¶¶ 75-81. VinFast purchased a 2006 Volkswagen Passat bearing VIN WVWAK73C66P041049 ("Passat 1049" or "2006 Passat"). CX-0084C (Brown Rpt.) ¶ 75; RX-0085 (VINFAST1402-00003542) (Bartosek declaration) at 3543.



MVR-2 (Rev.01/2017) North Carolina Division of Motor Vehicles NO FEE

DEALER'S REASSIGNMENT OF TITLE TO A MOTOR VEHICLE

To be used by North Carolina licensed dealers to reassign out-of-state assigned certificates of title, non-title state registration certificates and/or bills of sale or other documents acceptable for obtaining a certificate of title in North Carolina for vehicles acquired by North Carolina dealers. May also be used to reassign manufacturer's certificates of origin and North Carolina certificates of title when the space or spaces provided on these documents for dealer's assignments have been used.

YEAR 2005 MAKE VOLKSWAGEN BODY STYLE SEDAN 4-DR VIN WVWAK73C66P041049

Federal and State law requires that you state the mileage in connection with the transfer of ownership. Failure to complete or providing a false statement may result in fines and/or imprisonment.

RE-ASSIGNMENT OF TITLE BY LICENSED DEALER

The undersigned hereby certifies that the vehicle described in this title has been transferred to the following printed name and address:

roush industries inc 11916 market street Livonia MI 48150

"I certify to the best of my knowledge that the odometer reading is: 167795 (NO TENTHS) and reflects the actual mileage of this vehicle unless one of the following statements is checked."

☐ 1. The mileage stated is in excess of its mechanical limits. ☐ 2. The odometer reading is not the actual mileage WARNING — ODOMETER DISCREPANCY

08/02/2024 DATE VEHICLE DELIVERED TO PURCHASER

To my knowledge the vehicle described herein:

Yes ☐ No ☐ Has been involved in a collision or other occurrence to the extent that the cost to repair exceeds 25% of the vehicle retail value.

Yes ☐ No ☐ Has been a flood vehicle, a reconstructed vehicle and salvage vehicle.

Hand Printed Name and Signature of Dealer or Agent

Printed Firm Name A&R Automotive Inc. Dealer No. 80971

Date 08/02/2024 County State

I certify that the following person(s) personally appeared before me this day, each acknowledging to me that he or she voluntarily signed the foregoing document for the purpose stated therein and in the capacity indicated seller(s)/(name(s) of principal(s))

Notary Signature Notary Printed or Typed Name

"I am aware of the above attorney certification re damage disclosure made by the seller." My Commission Expires (SEAL)

Hand Printed Name and Signature(s) of Buyer(s)

RE-ASSIGNMENT OF TITLE BY LICENSED DEALER

The undersigned hereby certifies that the vehicle described in this title has been transferred to the following printed name and address:

The Passat 1049 is prior art under 35 U.S.C. § 102(b), having been first offered for sale in the United States on August 18, 2005 by the Riverbank Volkswagen dealer located in Stamford, Connecticut, which is more than 1 year before the filing date of the priority application PCT/IB2006/004019 on Oct. 30, 2006. CX-0084C (Brown Rpt.) ¶76. The Passat 1049 also qualifies as prior art under 35 U.S.C. § 102(b), having been serviced by the Riverbank Volkswagen dealer on August 19, 2005, which is more than 1 year before the filing date of the priority

[redacted]

application PCT/IB2006/004019 on Oct. 30, 2006. CX-0084C (Brown Rpt.) ¶ 77; RX-0059 (VINFAST1402-00001716) at 1717.

The Passat 1049 further qualifies as prior art under 35 U.S.C. § 102(b), having been leased in the United States to its first owner on October 4, 2005 by the Riverbank Volkswagen dealer located in Stamford, Connecticut, which is more than 1 year before the filing date of the priority application PCT/IB2006/004019 on Oct. 30, 2006. ArcelorMittal's validity expert, Dr. Raabe, takes no position regarding the on-sale date of the Passat 1049. RX-1171C (Raabe Reb. Rpt.) ¶ 125 ("I take no position on the date of when the Passat 1049 was first sold in the United States."); RX-0059 (VINFAST1402-00001716) at 1717.

VinFast worked with reputable automotive engineering company called Roush Industries, Inc. ("Roush") to extract test coupons from the left-side B-pillar of the Passat 1049 vehicle. RX-0085 (Bartosek declaration) (VINFAST1402-00003542) ¶ 7. VinFast's testing expert, Dr. John Bradley, performed various analyses on the extracted Passat 1049 coupons which showed all the limitations of the claims at issue are met by the Passat 1049. *See* generally CX-0083C (Bradley Passat Rpt.).

iii. Engels

Engels is a conference paper from the "New Developments in Sheet Metal Forming Technology" conference held in May 2006. RX-0063 (Engels) (VINFAST1402-00002279). Engels ("*Controlling and Monitoring of the Hot-Stamping Process of Boron-Alloyed Heat-Treated Steels*") provides an overview of hot-stamping as applied to "boron-alloyed steels." *Id.* at 136. For example, Engels describes that "blanks" having an "Al-Si-coating" are "austenitized at temperatures between 900 ˚C and 950 ˚C," "stamped," and "systematically cooled down under

[redacted]

pressure." *Id.* at 137. A POSITA would have understood that the "Al-Si-coating" is a "pre-coating" that is transformed, via the hot-stamping process, into a coating found in a final hot-stamped part. CX-0084C (Brown Rpt.) ¶ 82. "Systematically cooled down under pressure" in this context refers to "quenching," which in a hot-stamping process is performed directly in the stamping die. *Id.*

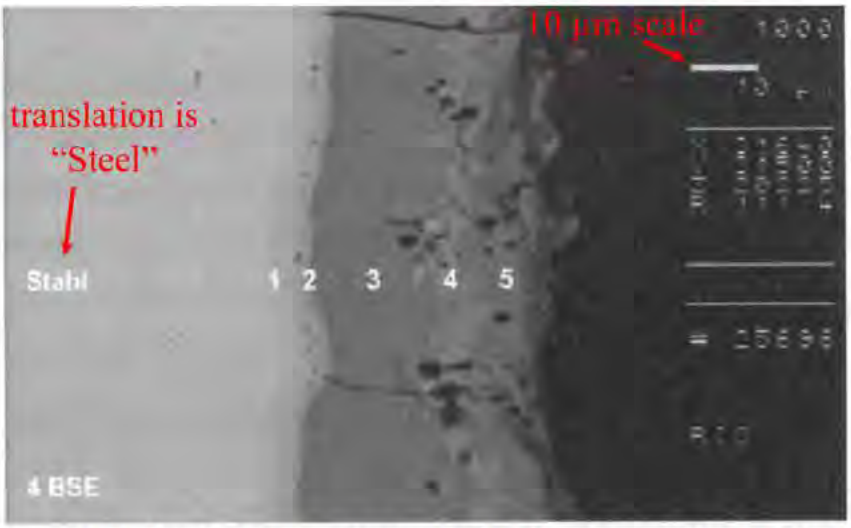
Engels describes that, as a result of this hot-stamping process, a "diffusion layer" (coating) forms. RX-0063 (Engels) at 142. Engels comments that "it is crucial to look for a correctly shaped diffusion layer with regard to layer thickness, porosity and roughness, as this layer will decisively impact the corrosion and welding properties of the hot stamped parts." *Id.* As parameters "which have to be taken into account when setting the temperature profile," Engels notes "heating rate," "total processing time," "maximum austenitizing temperature," and "material thickness." *Id.*

Engels FIG. 5 shows a "cross-section polish of the diffusion layer of a hot-dip aluminum coated boron steel." *Id.* at 142. Engels describes that "[f]ive phases which differ in their layer thickness and chemical composition can easily be distinguished." *Id.* These phases and their compositions and thicknesses are shown in Engels FIG. 5 and a corresponding table (reproduced below).

phase number	layer thickness, µm	Al	Fe	Si	Cr	Mn
		Volume-%				
1	5 – 9	7,2	89,2	1,9	0,3	1,4
2	< 1µm	unmeasurable				
3	11 – 18	51,4	45,9	1,9	0,1	0,7
4	3 – 8	33,9	54,3	10,6	0,3	0,9
5	5 - 11	53,2	44,1	1,9	0,2	0,6

Id. at 143 ("Engels Table").

[redacted]



Id. at FIG. 5 (annotated); RX-0098 (Engels translation by Magee) (VINFAST1402-00004283); CX-0084C (Brown Rpt.) ¶ 84.

Engels is prior art at least under § 102(a) with respect to the October 30, 2006 priority date listed on the face of the Asserted Patents. As explained in the Declaration of Prof. Mathias Liewald, Engels was available in printed form as of May 9, 2006 based on public distribution at the "New Developments in Sheet Metal Forming" conference (*see* excerpt from "New Developments in Sheet Metal Forming" (2006)). RX-0099 (Liewald Declaration) (VINFAST1402-00004290). Prof. Liewald explains that these documents were printed beforehand in the collected conference proceedings "New Developments in Sheet Metal Forming" (*see* excerpt from "New Developments in Sheet Metal Forming" (2006)) and distributed to conference attendees without restriction. *Id.* The conference was publicly advertised and open to any interested researchers. *Id.* Engels was also catalogued and publicly available at the German National Library no later than August 1, 2006. RX-0100 (Wohlstein declaration).

iv. Cornette

Cornette, a technical paper titled "High Strength Steels for Automotive Safety Parts," describes "mechanical testing and different design solutions associated with" certain steel grades.

[redacted]

RX-0019 (Cornette) (AM-ITC-0014498) at 3. For example, Cornette "deals with a ultra high tensile strength pre-coated boron steel for hot forming." *Id.* "[H]ot forming" here refers to "hot stamping," and a POSITA would have interpreted these terms as equivalent to one another.

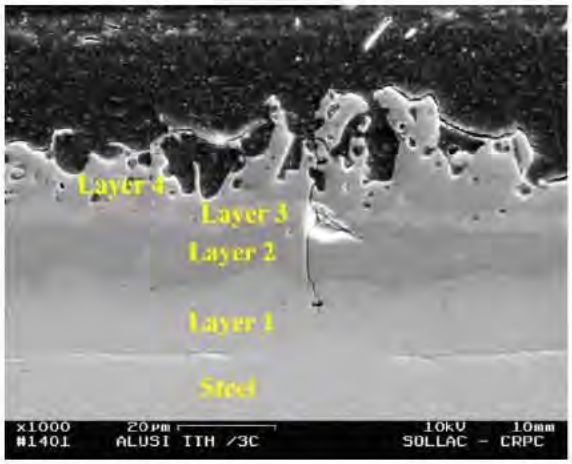
Cornette describes the use of "USIBOR 1500" steel in a hot-stamping process. *Id.* at 9. In the hot-stamping process, a "hot dipped" aluminum-silicon pre-coating with average thickness 25 µm is applied to the steel. The pre-coated steel is heated at "generally 900˚C [for] 5 minutes" and hot-stamped to obtain, via an "alloying reaction between substrate [] and the coating," an "Fe-Al-Si layer [] at the steel surface" that is "typically about 40 µm." *Id.* at 9. The resulting product has "good results" for "spot weldability" that is "better than Zinc EG-coating," does not require phosphatization to "achieve acceptable paint adherence," "good corrosion resistance," and "corrosion resistance" that is "compatible with most care makers requirements." *Id.* at 10-11.

FIG. 22 of Cornette, reproduced below, shows the coating (a "multiphase alloy layer"). *Id.* Four distinct layers are visible and identifiable based on differential brightness/shading. A POSITA would recognize that these four layers constitute the "Fe-Al-Si" coating, with an indicated base steel region underneath. CX-0084C (Brown Rpt.) ¶ 90.

The U.S. Patent and Trademark office has reviewed the Cornette reference as part of an *inter partes* review for U.S. Patent No. 9,708,683 ("'683 Patent"). The '683 Patent is the parent patent to the Asserted Patents in this Investigation. *See* RX-0113. The PTAB concluded Cornette's coating forms part of a hot-stamped product. RX-0114 (Final Written Decision for IPR2019-01275 for '683 patent) (VINFAST1402-00004805) at 32-35. In the Final Written Decision in that case, the Board found that Cornette FIG. 22 specifically depicts a hot-stamped product. *Id.* In making this determination, the Board cited the context of Cornette FIG. 22 and

[redacted]

corresponding disclosure in Vaissiere (described below) that described "quenching" (which is performed in conjunction with, or as part of, hot-stamping). *Id.* RX-0019 (Cornette) at FIG. 22 (annotated); CX-0084C (Brown Rpt.) ¶ 91.



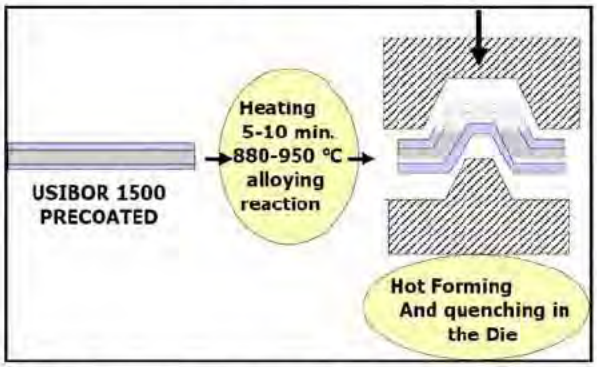
Cornette is prior art at least under §§ 102(a) and 102(b) with respect to the October 30, 2006 priority date listed on the face of the Asserted Patents. Cornette is also prior art under at least § 102(a) with respect to the December, 2005 date asserted by ArcelorMittal. As explained in the Declaration of Mel DeSart (reproduced from IPR2019-01275), Cornette was publicly available at the Engineering Library at the University of Washington "within a few weeks of March 13, 2001." RX-0103 (Declaration of Mel DeSart) (VINFAST1402-00004378). Mr. Paul Belanger also confirmed that the SAE 2001 Transactions, Journal of Materials & Manufacturing Section 5 in which Cornette was published was circulated and publicly available around 2001 and 2002. RX-1286C (Belanger Tr). at 68:22-69:18, 669:21-70:5, 70:17-71:5, RX-1314 (AM-ITC-0052336).

v. Vaissiere

Vaissiere, a technical paper titled "Development of Pre-Coated Boron Steel for Applications on PSA Peugeot Citroën and RENAULT Bodies in White," describes "development of the pre-coated boron steel associated with the hot stamping." RX-0081 (Vaissiere) (VINFAST1402-00003251) at 3. In order to obtain an "increase of the mechanical properties," Vaissiere describes that "[t]he critical [minimum] quenching speed enabling a completely martensitic structure [] is 27˚C/s." *Id.* at 3, 6. Using this quenching speed, "[t]he pre-coated USIBOR 1500, optimized for the stability of its quenchability, is transformed, at the end of forming, into pure martensite thus giving very high mechanical characteristics to then finished

[redacted]

part: YS~1000MPa, TS~1500MPa." *Id.* at 9. Vaissiere FIG. 18 illustrates the hot forming (hot-stamping) process including quenching. *Id.* at FIG. 18.



Vaissiere is prior art at least under §§ 102(a) and 102(b) with respect to the October 30, 2006 priority date listed on the face of the Asserted Patents. Vaissiere is also prior art under at least § 102(a) with respect to the December 2005 date asserted by ArcelorMittal. As explained in the Declaration of June Munford, an identical version of this document was catalogued and publicly available at the Library of Congress by shortly after 10/31/2003. RX-0108 (Munford Declaration #1) (VINFAST1402-00004459). Vaissiere also was cited in the proceedings of the 2004 conference of the Iron and Steel Institute of Japan, demonstrating its public availability prior to December 2005. *Id.*

vi. Laurent

Laurent (U.S. 6,296,805) describes "steel sheet[s]" having compositions that "ensur[e] a very high mechanical resistance after thermal treatment." RX-0109 (Laurent '805) at 1:47-62. Laurent discusses elemental components of the steel and links those components to improved performance of hot-stamped parts formed from the steel. *Id.* at 4:18-33. Laurent's compositions "allow hardening in the stampers" and the "mechanical characteristics [] of the sheet [] allow [] a deep stamping." *Id.* at 2:50, 4:30. A POSITA would have understood this disclosure to indicate that the steels of Laurent are well-suited for hot-stamping processes. CX-0084C (Brown Rpt.) ¶ 95.

Because Laurent is a U.S. patent issued on October 2, 2001, Laurent is prior art under §§ 102(a) and 102(b) with respect to the October 30, 2006 priority date listed on the face of the

[redacted]

Asserted Patents, and that Laurent is also prior art under at least §§ 102(a) with respect to the December 2005 date asserted by ArcelorMittal.

vii. Takagi

Takagi (U.S. Patent Application Publication No. 2004/0009366) describes steel parts having "Al-Si-Fe alloy layer[s]." RX-0104 (Takagi) at [0005]. Takagi discloses that "a heat resisting hot-dip aluminum-coated steel sheet containing Si in a coating layer is heated at a rate of 1-10° C./sec to a temperature in the temperature range of 900-950° C and held at that raised temperature for a holding time (or duration) of 2-8 minutes." *Id.* at [0026]. "After the heat treatment for holding in the abovementioned temperature range, the steel sheet is carried from a heating furnace to a forming press." *Id.* at [0027]. "The forming operation into a desired shape is started in the temperature range of 700-800° C. After the forming operation, the shaped sheet is cooled rapidly." *Id.* at [0028]. A POSITA would have understood that this process, which includes heating, forming while hot, and rapid cooling (also referred to as quenching), is a hot-stamping process as disclosed in the Asserted Patents. CX-0084C (Brown Rpt.) ¶ 97.

Takagi describes the physical processes underlying formation of a multi-layer coating, disclosing that "[d]uring 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, and offers advantages of formability, corrosion resistance and weldability." RX-0104 (Takagi) at [0016], [0028] ("The above-mentioned conditions of the heat treatment are adequate also for quench hardening of the steel base material, and hence effective for enhance the strength of the material."), [0050] ("Therefore, this production method can improve the corrosion resistance, paintability, weldability and formability."). Table 1 of Takagi provides manufacturing methods, compositions, and hardness

[redacted]

values for multiple layers of coatings obtained using five different combinations of temperature and hold time. No. 1 and 4 in Table 1 are coatings having five distinct layers, while No. 5 is a coating having four distinct layers. As shown in Table 1, these layers have various different concentrations of aluminum, silicon, and iron.

Coatings with five layers

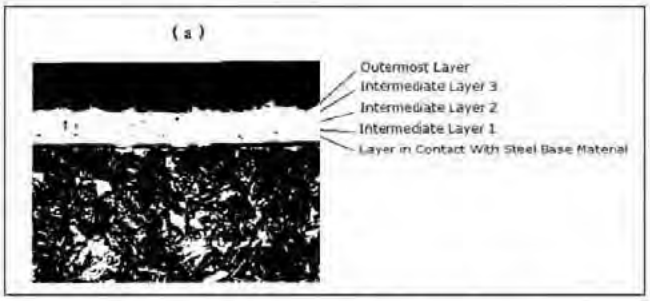
TABLE 1

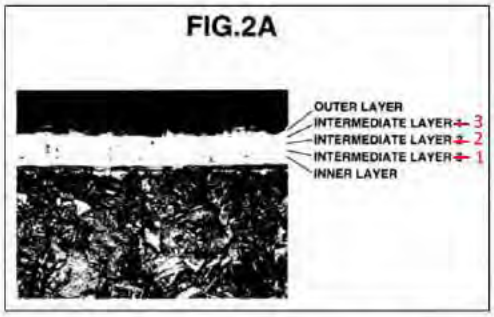
No.	PRODUCTION		COATING LAYER STRUCTURE & COMPOSITION (%)						STEEL BASE HARDNESS (Hv)	COATING LAYER HARDNESS (Hv)			OXIDE WEIGHT (mg/dm²)	FORMABILITY	CORROSION RESISTANCE	WELDABILITY
	RAISED TEMPERATURE (°C)	HOLD TIME (min.)	COMPONENT & HARDNESS	INNER	INTER 1	INTER 2	INTER 3	OUTER		SOFTEST	AVERAGE	SOFTER RANGE (%)				
1	920	3	Al	7.7	31.0	48.4	31.6	54.8	450	310	415	51	300	○	○	○
			Si	2.0	3.9	1.2	5.7	0.8								
			Fe	89.5	65.9	50.1	62.0	44.5								
			Hv	310	360	750	700	800								
2	909	2	Al	27.2	48.4	31.6		54.9	415	380	455	22	275	×	○	○
			Si	4.1	1.2	5.7	—	0.8								
			Fe	67.2	50.1	61.9		44.1								
			Hv	380	760	720	—	810								
3	930	10	Al	9.4				11.6	400	305	385	78	550	○	×	×
			Si	1.3	—	—	—	1.8								
			Fe	88.4				85.7								
			Hv	305	—	—	—	410								
4	950	5	Al	6.0	27.8	51.9	30.4	47.4	440	280	400	59	385	○	○	○
			Si	1.5	4.3	0.6	5.3	2.2								
			Fe	90.7	66.7	46.8	63.1	49.8								
			Hv	280	340	720	690	800								
5	900	4	Al	3.2	54.5	33.4		54.5	440	300	410	56	335	○	○	○
			Si	0.4	2.5	15.3	—	6.8								
			Fe	94.3	42.7	51.4		38.4								
			Hv	300	740	700	—	810								

RX-0104 (Takagi) at Table 1 (annotated); CX-0084C (Brown Rpt.) ¶ 98.

In Takagi Table 1, layers Inner, Inter 1, Inter 2, Inter 3, and Outer are arranged from the base steel outwards in that order. Takagi FIG. 2A, which illustrates the "layered structure," erroneously shows the opposite order for intermediate layers 1, 2, and 3. FIG. 2(a) of the original Japanese patent filing, JP3738754, shows the correct order, which accords with the order in which the layers are presented in Table 1 and with Takagi's discussion of the soft inner layer. *See* RX-0106 (Translation for portions of JP3738754) (VINFAST1402-00004417). Especially in view of descriptions in Takagi that relate to the soft inner layer, a POSITA would have recognized that the "Intermediate Layer" labels in Takagi FIG. 2A represent a clear error: Intermediate Layers 1, 2 and 3 are ordered from the inside out, not vice-versa. The translated drawing from the JP filing, along with a corrected version of the US publication, are shown below.

[redacted]





Left: RX-0106 (JP3738754 at FIG. 2(a) (translated)). Right: RX-0104 (Takagi at FIG. 2A (annotated with corrections)); CX-0084C (Brown Rpt.) ¶ 109.

Because Takagi is a U.S. patent application publication published on January 15, 2004, Takagi is prior art under §§ 102(a) and 102(b) with respect to the October 30, 2006 priority date listed on the face of the Asserted Patents, and that Takagi is also prior art under at least § 102(a) with respect to the December 2005 date asserted by ArcelorMittal.

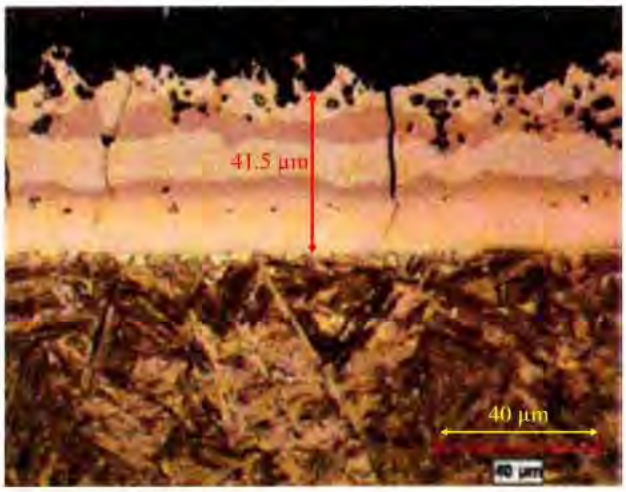
viii. Hein

Hein, like Engels, is a conference paper from the "New Developments in Sheet Metal Forming Technology" conference held in May 2006. RX-0013 (Hein) (AM-ITC-0013127). Hein, titled "Hot Stamping of USIBOR 1500 P: Part and Process Analysis Based on Numerical Simulation," discusses the use of "Usibor 1500 P," a "precoated boron steel, with a metallic coating of aluminium-silicon [] of approximately 25 µm/side," for hot stamping. RX-0013 (Hein) at 163-164. Hein provides process parameters to be used for the hot stamping. For example, according to Hein, the steel is "hot-stamp[ed]" by "heating blanks until complete austenitization (900°C to 950°C, during 4 to 10 minutes)" and "transferr[ing] very quickly on a press for the stamping." *Id.* at 163. "The quenching [] is carried out just after the forming, the heat being absorbed by the closed die (cooling speed between 50°C/s and 100°C/s). The total cycle time (transfer + stamping + cooling in the die) lies today between 15 s and 25 s." *Id.* at 164. "During the heat treatment in

[redacted]

the furnaces, this protective coating is transformed into an alloyed layer made of Fe-Al-Si, [] highly adherent on the substrate and with good corrosion properties." *Id.* at 165.

Hein FIG. 4 shows a "[s]tructure of the alloyed layer Al-Fe-Si after hot-stamping." *Id.* at 165.[3] Five layers in the alloyed layer are identified based on their respective colors/shadings. A total coating thickness of 41.5 µm is measured at a location of the coating. *Id.* at FIG. 4 (annotated); CX-0084C (Brown Rpt.) ¶ 102.



Hein, which was published alongside Engels in the collected conference proceedings "New Developments in Sheet Metal Forming," is prior art at least under § 102(a) with respect to the October 30, 2006 priority date listed on the face of the Asserted Patents, for the reasons discussed above for Engels.

ix. GMW14400

GMW14400 is a material specification published by General Motors. RX-0067 (GMW14400) (VINFAST1402-00002701). GMW14400 qualifies as prior art at least under § 102(a). As June Munford explains, and as supported by Shannon Schuster, GMW14400 was published and publicly available no later than December 1, 2005. RX-0112 (Munford Declaration #2) (VINFAST1402-00004571). As June Munford explains, GMW14400 would have been easily located using the search features provided on its distribution website, the IHS Standards Store. *Id.*

[3] Measurements and depictions of Hein FIG. 4 are drawn from Hein et al., "Pressharten von USIBOR 1500 P: Simulationsbasierte Bauteil- und Prozessanalyse," a higher-resolution color version of Hein, in German. RX-0107 (Hein German) (VINFAST1402-00004433).

[redacted]

x. Suehiro II

Suehiro II, a technical paper titled "Properties of Aluminum-Coated Steels for Hot-Forming," was published in July 2003 as part of Nippon Steel Technical Report No. 88. RX-0022 (Suehiro II) (AM-ITC-0014691) at 691. Suehiro II qualifies as prior art at least under §§ 102(a) and 102(b) based on the July 2003 publication date. CX-0084C (Brown Rpt.) ¶ 116.

Just like the Asserted Patents, Suehiro II is directed to "a forming method called die quenching, hot forming, hot stamping or hot pressing is employed for fabricating automobile structural members having a strength of 1,500 MPa or so." RX-0022 (Suehiro II) at 691. As part of a license agreement with Arcelor (a predecessor of ArcelorMittal) regarding Arcelor's "aluminized steel sheet product called USIBOR 1500," Nippon Steel Corporation "studied the production technologies and properties of the product" and issued Suehiro II to "report[] the results of the company's studies of the properties and characteristics that are required of aluminized steel sheet products." *Id.*

Suehiro II outlines the hot forming method that was "already a practical reality" and was the same as that of the Asserted Patents. *Id.* Referring to FIG. 1 (reproduced below), the method starts with "heat[ing] a steel sheet to a temperature in the austenite temperature range, equal to or higher than … 850°C." "Heated steel sheet is extracted from a heating furnace, transferred to a pressing machine, formed into a prescribed shape using dies maintained at room temperature, and thus quenched." *Id.; see also id.* at 692 (below),

[redacted]

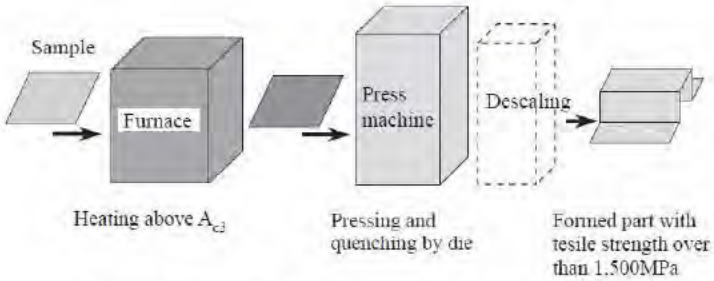


Fig. 1 Schematic illustration of hot forming process

Suehiro II also recognized the desirability of an aluminized steel sheet for "good hardenability" and "excellent [] heat resistance" and identified a high-level chemical composition of the aluminized steel. *Id.* at 692 ("Table 1").

Similar to the Asserted Patents, Suehiro II shows an example Fe-Al-Si alloy layer structure of the steel sheet product after hot forming. *Id.* at 694-95. In particular, Suehiro II's "Fig. 12 shows an alloy layer structure after retaining an aluminized steel sheet at 950°C for 0.5 min, and Fig. 13 [shows] the concentrations of Fe, Al and Si in the plating layer measured in the thickness direction by SEM-EDS." *Id.*[4]

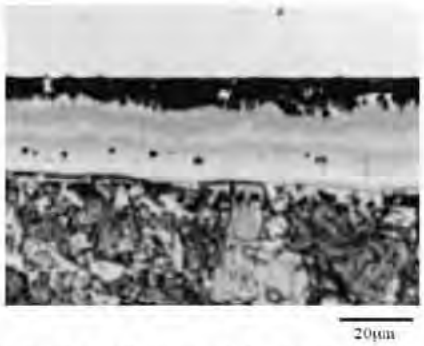


Fig. 12 Sectional optical micrograph showing plating layer structure after heated at 950°C for 30 s

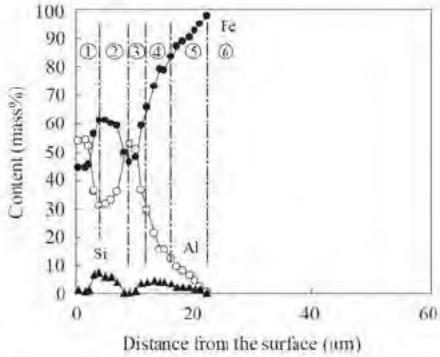


Fig. 13 Change of Fe, Al, and Si concentrations in thickness direction of sample corresponding to Fig. 12

[4] Suehiro II discusses the time (e.g., "0.5 min") for holding an aluminized steel at a predetermined temperature (e.g., "950°C"), separately from a heating phase, namely "[t]he time that is required for reaching a holding temperature in an electric furnace of normal furnace atmosphere," which is "about 2 min in the case of a 1.6-mm thick aluminized steel sheet." RX-0022 (Suehiro II) at 695.

[redacted]

Id. at 694. Suehiro II touts many benefits of the resulting alloyed coating layer, that the "steel with Fe-Al(-Si) surface layer showed good paintability even without phosphatized treatment," "good corrosion resistance," and "good spot weldability." *Id.* at 691 (abstract); *see also id.* at 695 ("paintability is good without the chemical treatment."), 696 ("no corrosion is observed"; "the consecutive spot weldability of the aluminized steel sheet product is excellent"; "Fe-Al alloy phase displays a better corrosion resistance than a steel sheet without surface treatment and almost equivalent corrosion resistance to a galvannealed steel sheet").

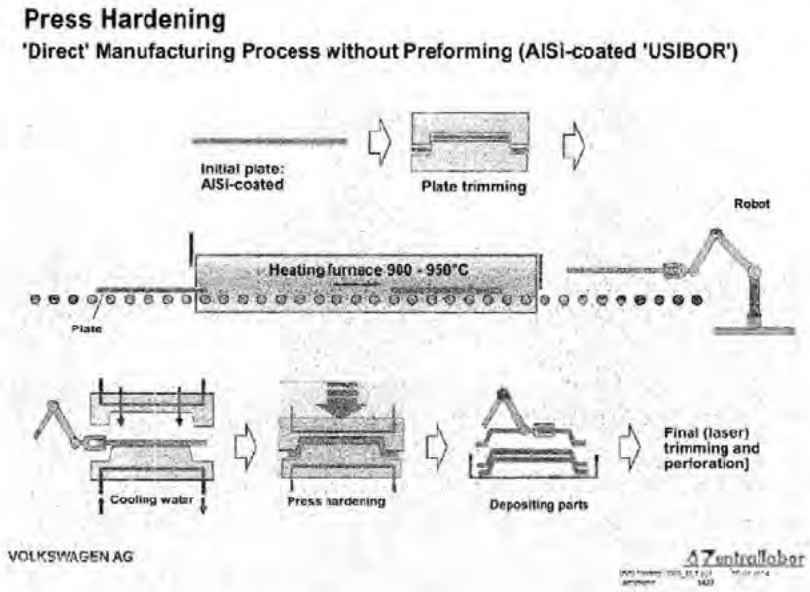
xi. Lachmann

Lachmann, titled "Entwicklungen hochfester Stahlblechqualitaten und fugetechnische Aspekte fur den Einsatz im Automobilbau" (or "Development of high strength sheet steel qualities and joining-related aspects for use in automotive construction" in the English version), is a lecture presented by Dr. Carstein Lachmann of Volkswagen on the hot stamping process on January 18, 2005. RX-0005 (AM-ITC-0010992) at 10993; RX-0062 (AM-ITC-0019466) at 19467.[5]

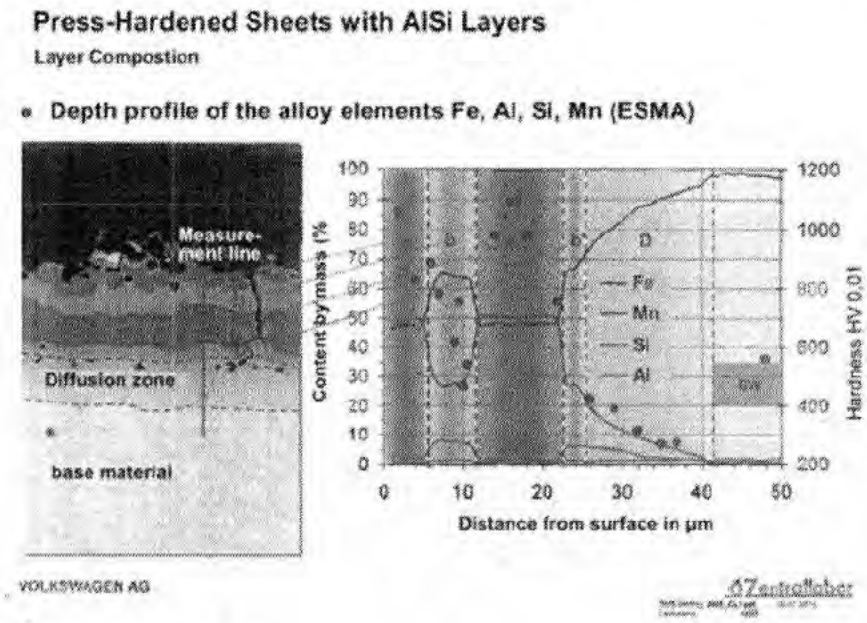
Lachmann is directed to the hot stamping of USIBOR 1500 with aluminum-silicon precoating.

[5] The English version of Lachmann RX-0062 (AM-ITC-0019466) is primarily relied on for ease of discussion while the German version of Lachmann RX-0005 (AM-ITC-0010992) is used for better quality pictures.

[redacted]



RX-0062 at 19469 (English version); RX-0005 at 10995 (German version). Similar to the Asserted Patents, Lachmann shows a Fe-Al-Si alloy layer structure of the steel after hot stamping.



RX-0062 at 19470; RX-0005 at 11026.

Lachmann is prior art at least under §§ 102(a) and 102(b) with respect to the October 30, 2006 priority date listed on the face of the Asserted Patents because it was presented by Dr. Carstein Lachmann of Volkswagen in a lecture on January 18, 2005. RX-0005 at 10993; RX-0062

[redacted]

at 19467. Lachmann is also prior art under at least § 102(a) with respect to the December 2005 date asserted by ArcelorMittal. CX-0084C (Brown Rpt.) ¶ 120.

3. Anticipation Under 35 U.S.C. § 102

As an initial matter, as explained below in Section § III.D.6, the claimed "layers" are indefinite because ArcelorMittal and its technical expert Dr. Fekete do not advance a standard from which the presence of the layers can be consistently determined by a POSITA. Furthermore, as explained above in Section § III.B.1.i, a presence of a claimed "layer" cannot be based on one isolated image, or even several images without more information such as the processing condition for the part. To the extent ALJ finds that "layer" is not indefinite and finds infringement based on insufficient information presented by ArcelorMittal, the grounds below discussed in this section and in Section § III.D.4 (Obviousness Under 35 U.S.C. § 103) discloses all of the Asserted Claims and DI Claims of the '602 patent.

i. The Asserted Patents are invalid because the preferred hot stamping processes and the alleged technical domestic industry hot stamping processes overlap with known prior art hot stamping

To the extent that the DI Direct Products satisfy the technical domestic prong, the Asserted Claims are invalid in view of the prior art. This is because in advancing its technical domestic industry case, ArcelorMittal runs into the well-established doctrine "[t]hat which infringes, if later, would anticipate, if earlier." *Peters v. Active Mfg. Co.*, 129 U.S. 530, 537 (1889).

Fundamentally, ArcelorMittal cannot resolve the tension between its incredibly broad technical domestic industry theories and its narrow validity theories. On one hand, for purposes technical domestic industry, ArcelorMittal relaxes what is required to show that the claims are satisfied. As discussed in Section § III.C.1, ArcelorMittal alleges an ***unknown number*** of products from an ***unknown number*** of third-party Tier 1 manufacturers satisfy the DI Claims. In doing so,

[redacted]

ArcelorMittal and its expert Dr. Fekete do not analyze any hot stamping process parameters for any DI Direct product.[6] Instead, ArcelorMittal relies on "performance characteristics" (*e.g.*, yield strength, weldability, paintability) found in hot-stamped steel from the prior art to conclude that all the DI Direct Products practice the DI Claims. On the other hand, when trying desperately to maintain validity, ArcelorMittal and its validity expert Dr. Raabe attempt to ignore the fact that the layers recited by the Asserted and DI Claims could be created by previously known hot stamping processes.[7] To do so, ArcelorMittal applies an analysis that requires knowing certain hot stamping process parameters (*e.g.*, heating rate) that are not claimed in the Asserted and DI Claims nor known and analyzed for purposes of infringement and technical domestic industry, to determine whether the Asserted and DI Claims are satisfied. But the evidence will demonstrate that ArcelorMittal conflicting theories are irreconcilable.

First, in broadly alleging that the [redacted] DI Direct Products satisfy the DI Claims ArcelorMittal cannot escape invalidity in view of [redacted] hot stamping performed prior to the Asserted Patents under §§ 102(a) and (b). In particular, [redacted] performed hot stamping since

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[6] As representatives of the Tier 1 manufacturers testified, [redacted] *See, e.g.*, RX-1278C ([redacted] ([redacted] Tr.) at 80:21-82:21; RX-1273C ([redacted] ([redacted] Tr.) at 118:18-119:9; RX-1279C ([redacted] ([redacted] Tr.) at 85:23-86:13; RX-1277C ([redacted] ([redacted] Tr.) at 171:10-172:2; RX-1280C ([redacted] ([redacted] Tr.) at 57:2-58:13.

[7] This is best demonstrated by the testimony of ArcelorMittal's corporate representative, Dr. Pascal Drillet, who testified that the layers recited in the claims of the Asserted Patents could be randomly created through hot stamping prior to the alleged invention. RX-1282C (Drillet Tr.) at 80:24-81:23, 83:7-19, 107:1-8. Notably, the "randomly created" layers include Figure 1 of the Asserted Patents. RX-1282C (Drillet Tr.) at 107:1-8; CX-0683C [redacted] (AM-ITC-0102170) at 2174. As the evidence demonstrates, Figure 1 was created by third-party [redacted] at some time prior to the alleged earliest priority of the Asserted Patents, and not by ArcelorMittal. *Id.* at 2170 (bearing a date of [redacted]), 2174 (showing Figure 1); RX-1282C (Drillet Tr.) at 107:1-8 (testifying that Figure 1 was randomly created by [redacted] *see also* RX-0005 (Lachmann) (AM-ITC-0010992) at 10998; RX-0062 (Lachmann) (AM-ITC-0019466) at 472.

[redacted] As shown by [redacted] below, [redacted] hot stamping involved use of ArcelorMittal's USIBOR 1500:

[redacted]

RX-0056C (EBM-ITC_00030) at 030 (annotated); RX-1277C ([redacted] ([redacted] Tr.) at 132:7-14. [redacted] corporate representative, [redacted], testified, [redacted] RX-1277C ([redacted] ([redacted] Tr.) at 133:7-13; *see also id.* at 133:22-24 [redacted] hot stamping predated the Asserted Patents:

[redacted]

[redacted]

RX-0056C (EBM-ITC_00030) at 030 (annotated); RX-1277C ([redacted] ([redacted] Tr.) at 136:3-10.

Further, the hot stamping performed by RX-1277C ((Tr.) at 171:5-172:2.

RX-0056C at EBM-ITC_00030. The same processing parameters are also shown in the

RX-1082C (EBM-ITC_00055) at EBM-ITC_00058.

Notably, ArcelorMittal's validity expert, Dr. Raabe, does not provide any substantive challenge that prior hot stamping would not result in the layers recited in the Asserted

[redacted]

and DI Claims. Nor could he, as any challenge or nitpicking of the [redacted] prior processing parameters would undermine ArcelorMittal's technical domestic industry analysis, which completely ignores the specific processing parameters used to create over [redacted] DI Direct Products.[8] Tellingly, Dr. Raabe's only response is based on an untenable distinction based on an alleged earlier priority date. RX-1171C (Raabe Reb. Rpt.) ¶¶ 694-99. But as discussed in Section § III.D.1, ArcelorMittal cannot establish an earlier priority date because it lacks the necessary corroborating evidence. Put differently, the August 22, 2006 revision date that Dr. Raabe takes issue with still demonstrates that Manga's hot stamping is prior art if ArcelorMittal fails in establishing an earlier priority.

As such, the evidence demonstrates that to the extent ArcelorMittal is able to establish technical domestic industry for over [redacted] DI Direct Products to which it does not know the hot stamping process parameters, [redacted] hot stamping for [redacted] prior to the Asserted Patent would anticipate the Domestic Industry Claims.

Separately, the Domestic Industry Claims are also anticipated under §§ 102(a) and (b) because of the overlapping hot stamping windows disclosed in the prior art and those used by the Tier 1 manufacturers. CX-0085C (Brown Reb. Rpt.) ¶¶ 84-96; CX-0084C (Brown Rpt.) ¶¶ 1048-51. Although ArcelorMittal did not obtain the exact hot stamping parameters for any single DI Direct Product, the evidence provided by the Tier 1 manufacturers reveal process windows for their hot stamping of USIBOR 1500. As shown below, the Tier 1 manufacturers use the following hot stamping process windows for the DI Direct Products:

[8] As discussed in Section § III.C.1, there at least [redacted] DI Direct Products from the subpoenaed third-party Tier 1 manufacturers and an unknown number of DI Direct Products from an unknown number of non-subpoenaed Tier 1 manufactures.

[redacted]

[redacted]

[redacted]

CX-0448C ([redacted] ([redacted] 000121-126) at 123; *see also* RX-1279C ([redacted] ([redacted] Tr.) at 85:23-86:13.

[redacted]

CX-0411C ([redacted] at [redacted] (red underlines added).

[redacted]

CX-0399C ([redacted] ([redacted]ITC_000001) at 000002 (red underlines added).

Significantly, these hot stamping process windows overlap with what was known in the prior art for the hot stamping of USIBOR 1500. For example, SAE 2001 Transactions (Journal of Materials and Manufacturing Section 5 Vol 110), which bears a 2002 copyright teaches the following hot stamping process using precoated USIBOR 1500 that is 1.5mm thick. *See* RX-1314 (AM-ITC-0052336) at 2348-2349; RX-0019 (Cornette) at 4506-4507 (same). Similar hot stamping parameters for precoated USIBOR 1500 were disclosed in 2003 in the publication Hot Forming and Casting Technologies for Lightweight Automobile Design:

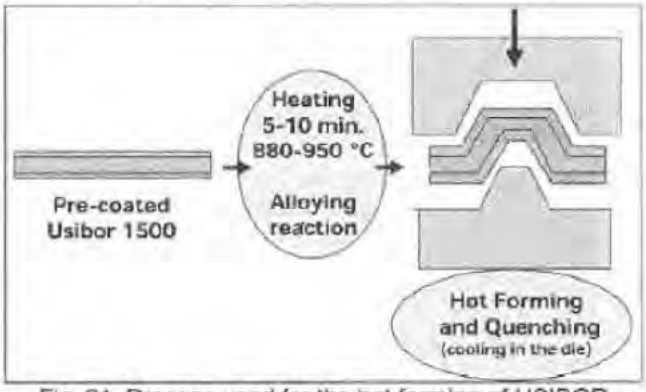
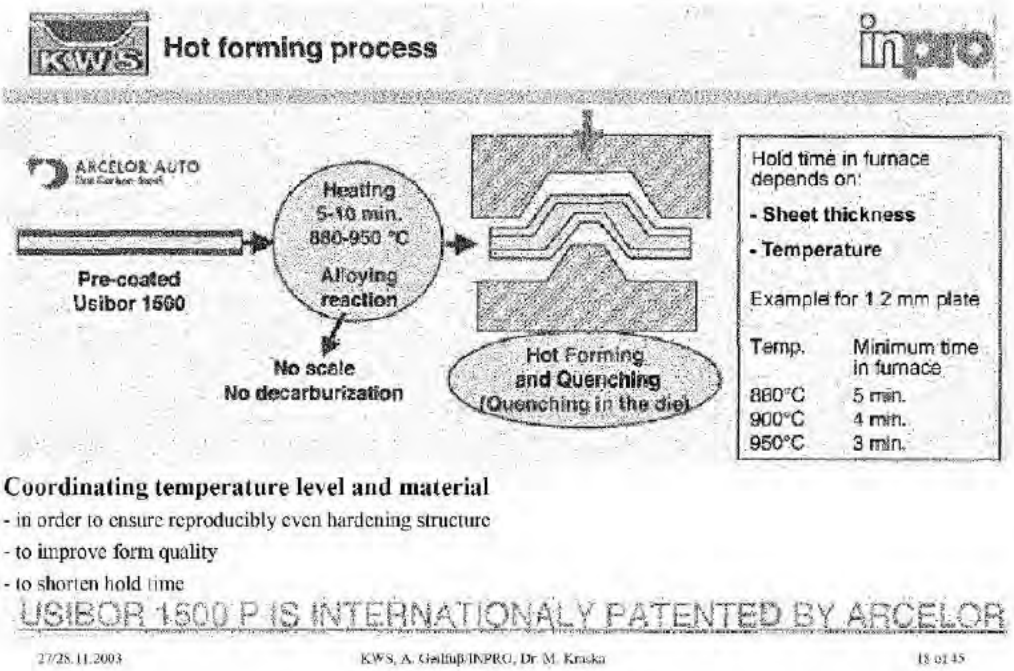
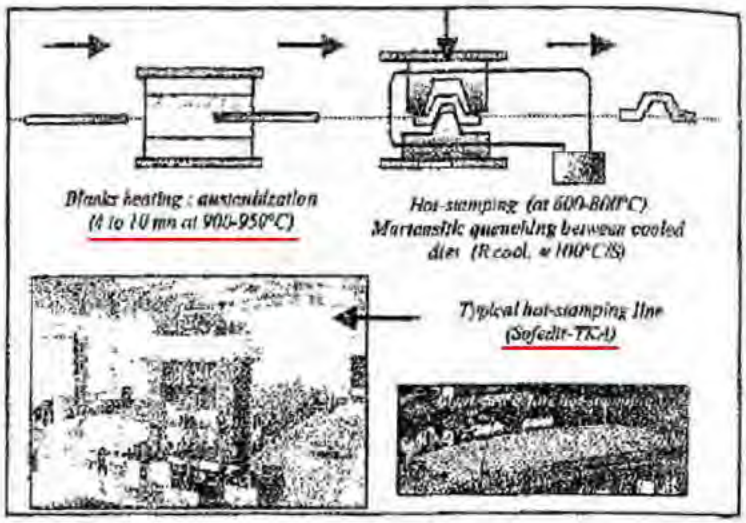


Fig. 21. Process used for the hot forming of USIBOR 1500 Pre-coated.

[redacted]



RX-0009 (AM-ITC-0011944) at 1955. And as a third example, ArcelorMittal and one of the named inventors, Ronald Kefferstein, published Development of Safety and Structural Automotive Parts by Hot-Stamping: the "USIBOR 1500" in 2004, disclosing the following stamping process window using pre coated USIBOR 1500:



HOT-STAMPING WITH DIE-QUENCHING

The metallurgy of hot-stamping is linked to the chemistry of quenchable boron steels (0,002 to 0,005% of Boron).
Hot-stamping consists in heating blanks, until the complete austenitization (900°C to 950°C, during 4 to 10 minutes). The blanks are then transferred very quickly on a press for the stamping. At high temperature (600 to 850°C), the material has an excellent formability, which makes it possible to obtain complex parts.
The martensitic quenching is carried out just after the forming, thanks to the contact with the cooled tools (cooling speed of about 100°C/s).
The total cycle time (transfer + stamping + cooling between the dies) is, today, between 15 and 25 seconds.
At the exit of the stamping line, the parts leave at approximately 50-80°C, with their final, repeatable and homogeneous mechanical properties: T_s of 1400-1600 MPa and Y_s of 900-1100 MPa.
Finally, hot-stamping eliminates the issue of springback, as well as offering increased formability and accuracy.

RX-0049 (AM-ITC-0078747) at 747 (red underlining added).

[redacted]

The overlap between the prior art hot stamping process and those used by the Tier 1 manufacturers is significant. By way of just one example, below is the processing window for [redacted] overlayed with the processing window discussed in Development of Safety and Structural Automotive Parts by Hot-Stamping: the "USIBOR 1500" (2004) (900-950C for 4-10 mins) (shown in blue), with the overlapping region in orange gradient:

[redacted]

As yet a second example, the figure below shows that the specific process parameters for [redacted] *see* CX-0458C ([redacted] 000224), with the processing window discussed in Development of Safety and Structural Automotive Parts by Hot-Stamping: the "USIBOR 1500" (2004) (900-950C for 4-10 mins):

[redacted]

As shown, [redacted] (depicting the process window disclosed by Development of Safety and Structural Automotive Parts by Hot-Stamping: the "USIBOR 1500" (2004)).

Critically, ArcelorMittal fails to offer any reasonable explanation as to why the prior art hot stamping process windows would not lead to the claimed layers while the process windows used by the Tier 1 manufacturers would. To the extent ArcelorMittal attempts to argue that other hot stamping parameters are critical to the formation of the layers, Figure 7 of the Asserted Patents contradicts ArcelorMittal's position. As shown, the process windows identified by Figure 7 show just three parameters—furnace temperature, dwell time, and thickness of the material[9]:

[9] It is worth noting that ArcelorMittal's corporate witness, Dr. Pascal Drillet, testified that the combination of furnace temperature, thickness, and furnace type determines the heating rate. RX-1282C (Drillet Tr.) at 17:21-19:11.

[redacted]

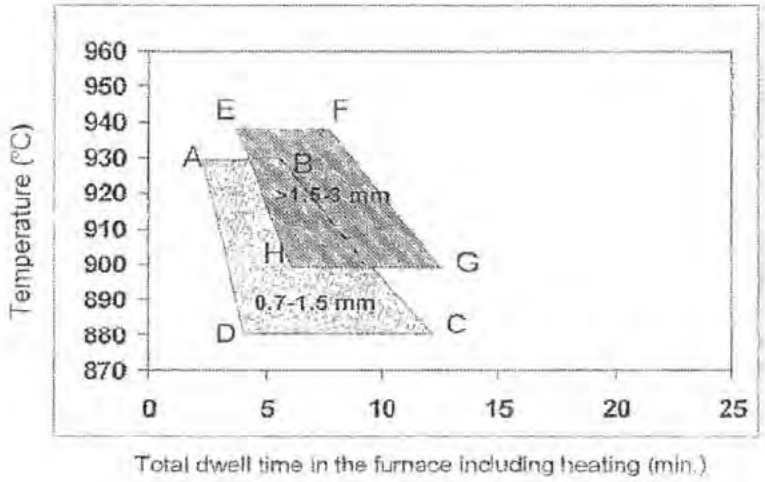
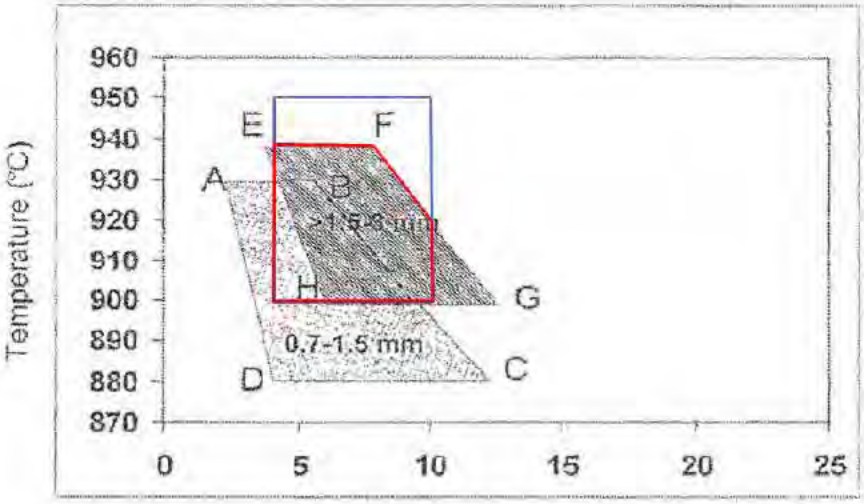


Fig. 7

JX-0002 ('602 patent) at Fig. 7; JX-0001 ('227 patent) at Fig. 7.

Much of the same information can be found in the prior art. As yet another example, the annotated Figure 7 below depicts the overlap between Figure 7 and the processing window disclosed by Development of Safety and Structural Automotive Parts by Hot-Stamping: the "USIBOR 1500" (2004), which discusses the stamping of 1.5mm USIBOR 1500:



Thus, based on the forgoing, to the extent ArcelorMittal successfully establishes technical domestic industry, its mappings of the DI Direct Products also demonstrate the prior art hot stamping processes would result in hot stamped steel that anticipate the Domestic Industry Claims.

[redacted]

ii. Passat 1049

ArcelorMittal has no actual substantive response to the Passat 1049. It was well known within the automotive industry that the Passat 1049 made use of hot stamped pre-coated USIBOR 1500. *See e.g.*, RX-0013 (New Developments in Sheet Forming (2006)) at -13131. Faced with these undeniable facts, ArcelorMittal chose not to request samples of the Passat 1049 and conduct any testing on the Passat 1049.

Rather than engage on the merits, ArcelorMittal and its validity expert claim that the Passat 1049 is not enabling prior art. ArcelorMittal's position, however, is incongruent with the state of the art at the time of the Passat 1049. As demonstrated by ArcelorMittal's own documentation, hot stamping existed in [redacted].

[redacted]

CX-0563C (AM-ITC-0093096) at 93099.

[redacted]

In addition, numerous companies were investigating hot stamping in the early 2000s, using very similar furnace temperatures and hold times. In fact, studies specifically investigated the layer structure that resulted from hot stamping. *See* discussion at §§ III.D.2.x (Suehiro II), III.D.2.xi (Lachmann); CX-0683C [redacted] (AM-ITC-0102170). Indeed, by the time of the Passat 1049, hot stamping was pervasive. *See* RX-0049 (AM-ITC-0078747) at 747 ("The huge majority of the car manufacturers are specifying hot-stamped parts for the new vehicles. New hot-stampers appear and several new lines are built throughout the world."); RX-0063 (Engels) at 2285 ("Due to steadily rising crash requirements to be met by modern automotive structures, the application of ultra-high strength materials has increased. Hot-stamping is an approach to produce these structural parts.").

a. Claim 1

Passat 1049 discloses limitation [1pre] of the '602 patent—a precoated steel product. Passat 1049 includes a B-pillar, which is a precoated steel product. CX-0084C (Brown Rpt.) ¶¶ 574-75. As discussed above in the overview at § III.D.3.i, it was well known in the industry that Passat 1049 made use of pre-coated hot stamped steel. *Id.* ¶ 575.

Thanks to its many advantages (corrosion, no shot-blasting, no protective atmosphere in the furnaces, no post-coating…), the precoated solution, Usibor 1500 P, is more and more specified and used in the new European and US cars. For example, Usibor 1500 P is used for the pillars and sills of the new VW Passat (Figure 9 and Figure 10) and of the Mercedes Class S, for A-pillars of Landrover cars, bumper-beams of the Ford Mustang… A similar trend can be observed in Japan.

Figure 9. Hot-stamped parts made in Usibor 1500 P in the VW Passat (source: VW)

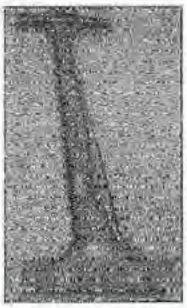
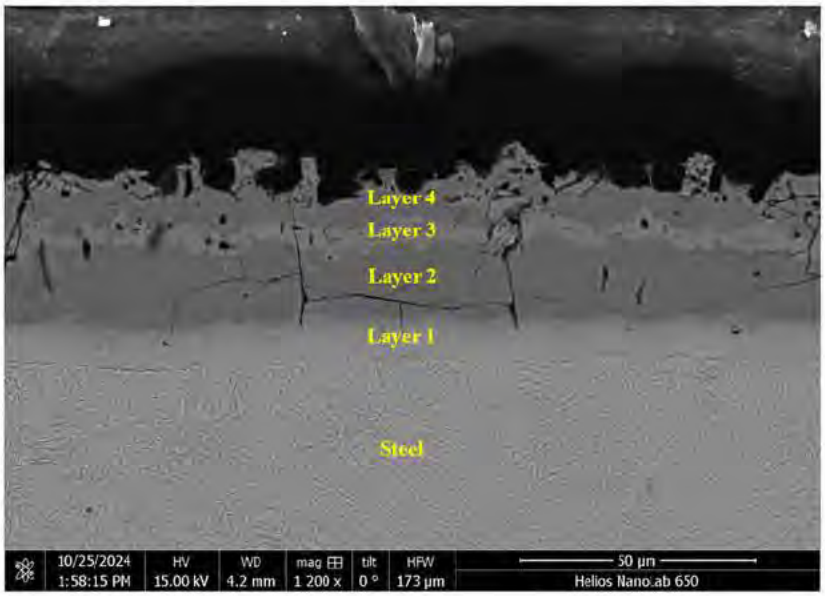


Figure 10. B-pillar of the VW Passat

[redacted]

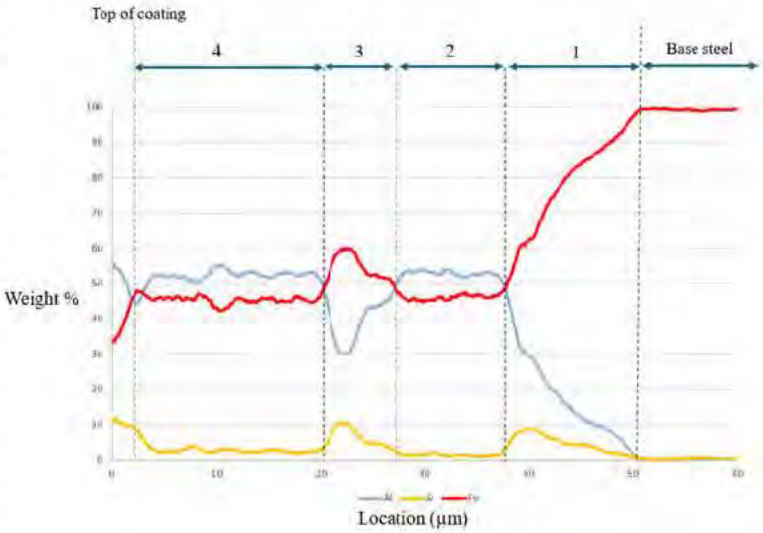
RX-0013 (AM-ITC-0013127) (New Developments in Sheet Forming (2006)) at 13131; RX-0008 (AM-ITC-0011678) (The Passat 2006 Service Training) at 1687.

Passat 1049 discloses limitation [1a] of the '602 patent—a strip of base steel. As evidenced by the cross-sectional SEM micrograph, Passat 1049 B-pillar includes a strip of base steel. CX-0084C (Brown Rpt.) ¶ 576; CX-0083C (Bradley Passat Rpt.) ¶¶ 24, 32.



RX-0086 (VINFAST1402-00003562) (annotated).

Passat 1049 discloses limitation [1b] of the '602 patent—a coating on the base steel. As evidenced by the cross-sectional SEM micrograph, Passat 1049 B-pillar includes a coating on the base steel. CX-0084C (Brown Rpt.) ¶¶ 577-78; CX-0083C (Bradley Passat Rpt.) ¶ 32. Elemental composition line scan shows that the coating results from interdiffusion between



the base steel and an aluminum or aluminum alloy pre-coating. CX-0084C (Brown Rpt.) ¶¶ 578; CX-0083C (Bradley Passat Rpt.) ¶ 40; RX-0173 (VINFAST1402-00003552).

Passat 1049 discloses limitation [1c] of the '602 patent—an interdiffusion layer having a first mean iron composition. Under ArcelorMittal's infringement theory, the cross-sectional SEM micrograph of the Passat 1049 B-pillar shows a coating with an interdiffusion layer. CX-0084C (Brown Rpt.) ¶¶ 579-80; CX-0083C (Bradley Passat Rpt.) ¶¶ 32, 38-39. EDS elemental composition analysis result shows that the B-pillar's interdiffusion layer has a first mean iron composition of 83.3 % by weight. CX-0083C (Bradley Passat Rpt.) ¶¶ 38-39; RX-0173 (VINFAST1402-00003552).

Passat 1049 discloses limitation [1d] of the '602 patent—an intermediate layer having a second mean iron composition different from the first mean iron composition. Under ArcelorMittal's infringement theory, the cross-sectional SEM micrograph of the Passat 1049 B-pillar shows a coating with an intermediate layer. CX-0084C (Brown Rpt.) ¶¶ 581-82; CX-0083C (Bradley Passat Rpt.) ¶¶ 32, 38-39. EDS elemental composition analysis result shows that the B-pillar's intermediate layer has a second mean iron composition of 45.6 % by weight. CX-0083C (Bradley Passat Rpt.) ¶¶ 38-39; RX-0173 (VINFAST1402-00003552). This second mean iron composition is different from the first mean iron composition of 83.3 %. CX-0084C (Brown Rpt.) ¶ 582.

Passat 1049 discloses limitation [1e] of the '602 patent—an intermetallic layer having 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. Under ArcelorMittal's infringement theory, the cross-sectional SEM micrograph of the Passat 1049 B-pillar shows a coating with an intermetallic layer. CX-0084C (Brown Rpt.) ¶¶ 583-84; CX-0083C

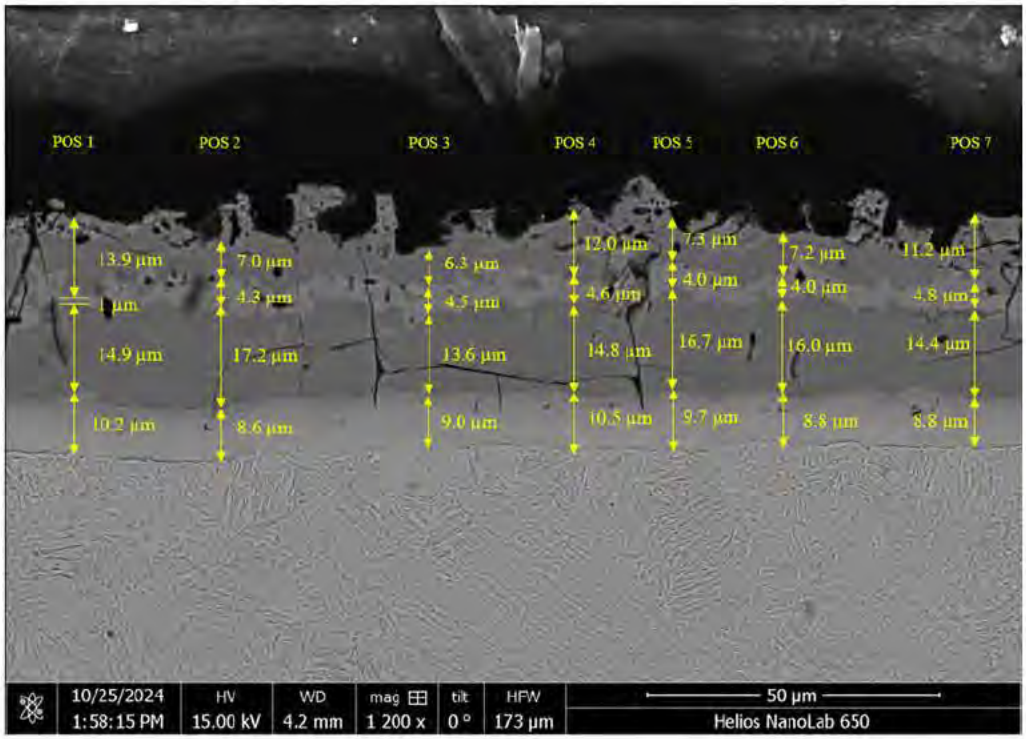
[redacted]

(Bradley Passat Rpt.) ¶¶ 32, 38-39. EDS elemental composition analysis result shows that the B-pillar's intermetallic layer has a third mean iron composition of 61.5 % by weight. CX-0083C (Bradley Passat Rpt.) ¶¶ 38-39; RX-0173 (VINFAST1402-00003552). This third mean iron composition is higher than the second mean iron composition of 45.6 %. CX-0084C (Brown Rpt.) ¶ 584.

Passat 1049 discloses limitation [1f] of the '602 patent—a superficial layer having a fourth mean iron composition different from the third mean iron composition. Under ArcelorMittal's infringement theory, the cross-sectional SEM micrograph of the Passat 1049 B-pillar shows a coating with a superficial layer. CX-0084C (Brown Rpt.) ¶¶ 585-86; CX-0083C (Bradley Passat Rpt.) ¶¶ 32, 38-39. EDS elemental composition analysis result shows that the B-pillar's superficial layer has a fourth mean iron composition of 45.0 % by weight. CX-0083C (Bradley Passat Rpt.) ¶¶ 38-39; RX-0173 (VINFAST1402-00003552). This fourth mean iron composition is different from the third mean iron composition of 61.5 %. CX-0084C (Brown Rpt.) ¶ 586.

Passat 1049 discloses limitation [1g] of the '602 patent—coating thickness greater than 30 µm. Under ArcelorMittal's infringement theory, the cross-sectional SEM micrograph of the Passat 1049 B-pillar shows a coating with an average thickness of 37.9 µm, which is greater than 30 micrometers. CX-0084C (Brown Rpt.) ¶¶ 587.

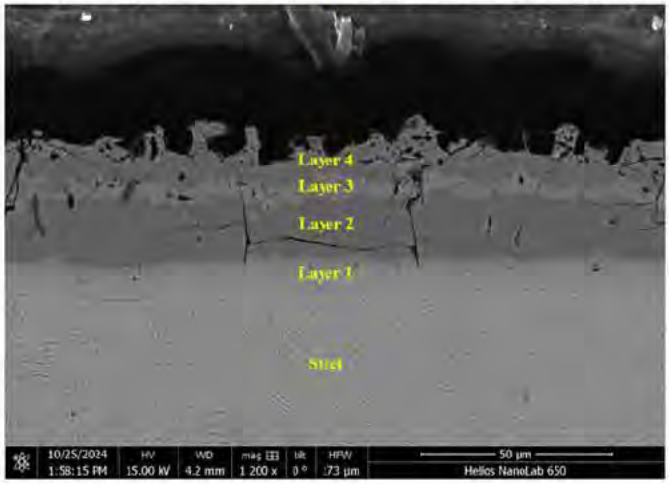
[redacted]



RX-0086 (VINFAST1402-00003562) (annotated); CX-0083C (Bradley Passat Rpt.) ¶¶ 33-34.

b. Claim 2

Passat 1049 discloses claim 2 of the '602 patent—intermetallic and superficial layers are quasi continuous by occupying at least 90% of a level corresponding to each of the intermetallic and superficial layers and wherein less than 10% of intermetallic layer is present at an extreme surface of the product. As explained above in Section § III.B.2, ArcelorMittal's expert Dr. Fekete does not offer any analysis as to what the claimed "level" is, and how layers (c) and (d) occupies at least 90% of this undefined level. To the extent ALJ finds infringement of claim 2 based on insufficient information presented by ArcelorMittal, Passat 1049 discloses claim 2, as "Layer 3" corresponding to the claimed



[redacted]

layer (c), and "Layer 4" corresponding to the claimed layer (d) appear similarly continuous as the layers (c) and (d) shown in ArcelorMittal's technical domestic industry contentions above (§ III.C.2). CX-0084C (Brown Rpt.) ¶ 589. Similarly, Layer 3 is covered by Layer 4 to a similar degree as in AM's tech DI contentions above. CX-0083C (Bradley Passat Rpt.) ¶ 32; RX-0086 (VINFAST1402-00003562).

c. Claim 3

Passat 1049 discloses claim 3 of the '602 patent—base steel chemical composition. As evidenced by the elemental composition testing result, the base steel of the Passat 1049 B-pillar has composition that meets the claim limitation: "0.15%<carbon<0.5%; 0.5%<manganese<3%; 0.1%<silicon<0.5%; 0.01%<chromium<1%; titanium<0.2%; aluminum<0.1%; phosphorus<0.1%; sulfur<0.05%; 0.0005%<boron<0.08%; and further comprises iron and impurities inherent in processing." CX-0084C (Brown Rpt.) ¶ 590; CX-0083C (Bradley Passat Rpt.) ¶ 44; RX-0087 (VINFAST1402-00003594) at 3595.

d. Claim 4

Passat 1049 discloses claim 4 of the '602 patent—base steel chemical composition. As evidenced by the elemental composition testing result, the base steel of the Passat 1049 B-pillar has composition that meets the claim limitation: "0.20%<carbon<0.5%; 0.8%<manganese<1.5%; 0.1%<silicon<0.35%; 0.01%<chromium<1%; titanium<0.1%; aluminum<0.1%; phosphorus<0.05%; sulfur<0.03%; 0.0005%<boron<0.01%; and further comprises iron and impurities inherent in processing." CX-0084C (Brown Rpt.) ¶ 591; CX-0083C (Bradley Passat Rpt.) ¶ 44; RX-0087 (VINFAST1402-00003594) at 3595.

e. Claim 7

Passat 1049 discloses claim 7 of the '602 patent—base steel titanium to nitrogen ratio. As evidenced by the elemental composition testing result, the base steel of the Passat 1049 B-pillar

has a titanium to nitrogen ratio of 6.17 in the base steel, which meets the claim limitation: "ratio of titanium to nitrogen in the base steel in weight % is in excess of 3.42." CX-0084C (Brown Rpt.) ¶ 594; CX-0083C (Bradley Passat Rpt.) ¶ 44; RX-0087 at 3595.

f. Claim 8

Passat 1049 discloses claim 8 of the '602 patent. *See* § III.D.3.ii.e (claim 7).

g. Claim 9

Passat 1049 discloses claim 9 of the '602 patent—interdiffusion layer thickness less than 15 micrometers. Under ArcelorMittal's infringement theory, the cross-sectional SEM micrograph of the Passat 1049 B-pillar shows a coating with interdiffusion layer average thickness of 9.4 µm, which is less than 15 micrometers. CX-0084C (Brown Rpt.) ¶ 596; CX-0083C (Bradley Passat Rpt.) ¶¶ 33-34; RX-0086 (VINFAST1402-00003562).

h. Claim 10

Passat 1049 discloses claim 10 of the '602 patent—interdiffusion layer thickness less than 10 micrometers. *See* § III.D.3.ii.g (claim 9).

i. Claim 18

Passat 1049 discloses claim 18 of the '602 patent—interdiffusion layer thickness between 1 micron and 15 microns. *See* § III.D.3.ii.g (claim 9).

j. Claim 20

Passat 1049 discloses claim 20 of the '602 patent—fourth mean iron composition lower than third mean iron composition. EDS elemental composition analysis result shows that Passat 1049 B-pillar superficial layer has a fourth mean iron composition of 45.0 %, which is lower than the third mean iron composition of 61.5 %. CX-0084C (Brown Rpt.) ¶ 600; CX-0083C (Bradley Passat Rpt.) ¶¶ 38-39; RX-0173 (VINFAST1402-00003552).

[redacted]

k. Claim 21

Passat 1049 discloses limitations [21pre]-[21g] of the '602 patent. *See* § III.D.3.ii.a analyzing claim 1 limitations [1pre]-[1g]. CX-0084C (Brown Rpt.) ¶¶ 601-09. With respect to limitation [21f], EDS elemental composition analysis result shows that the Passat 1049 B-pillar superficial layer has a fourth mean iron composition of 45.0 % by weight, which is different from the first mean iron composition of 83.3 %, the second mean iron composition of 45.6 %, and third mean iron composition of 61.5 %. CX-0084C (Brown Rpt.) ¶ 608; CX-0083C (Bradley Passat Rpt.) ¶¶ 38-39; RX-0173.

l. Claim 22

Passat 1049 discloses claim 22 of the '602 patent—fourth mean iron composition lower than third mean iron composition. EDS elemental composition analysis result shows that Passat 1049 B-pillar superficial layer has a fourth mean iron composition of 45.0 %, which is lower than the third mean iron composition of 61.5 %. CX-0084C (Brown Rpt.) ¶ 610; CX-0083C (Bradley Passat Rpt.) ¶¶ 38-39; RX-0173.

m. Claim 24

Passat 1049 discloses limitations [24pre]-[24g] of the '602 patent. *See* § III.D.3.ii.a analyzing claim 1 limitations [1pre]-[1g]. CX-0084C (Brown Rpt.) ¶¶ 611-22. With respect to the aluminum composition limitations of [24c]-[24f], EDS elemental composition analysis result shows that the Passat 1049 B-pillar interdiffusion layer has a first mean aluminum composition of 12.6 % by weight. CX-0084C (Brown Rpt.) ¶ 615; CX-0083C (Bradley Passat Rpt.) ¶¶ 38-39; RX-0173. The intermediate layer has a second mean aluminum composition of 53.0 % by weight, which is different from the first mean aluminum composition of 12.6 %. *Id.* ¶ 617. The intermetallic layer has a third mean aluminum composition of 29.2 % by weight, which is different from the first and second mean aluminum compositions of 12.6 % and 53.0 %, respectively. *Id.* ¶

[redacted]

619. The superficial layer has a fourth mean aluminum composition of 52.4 % by weight, which is different from the first, second and third mean aluminum compositions of 12.6 %, 53.0 %, and 29.2 %, respectively. *Id.* ¶ 621. Furthermore, the second mean aluminum composition of 53.0 % is greater than the third mean aluminum composition of 29.2 %. *Id.*

n. Claim 26

Passat 1049 discloses claim 26 of the '602 patent—interdiffusion layer has a thickness less than 15 micrometers. *See* § III.D.3.ii.g (claim 9).

iii. Cornette

a. Claim 1

Cornette discloses limitation [1pre] of the '602 patent—a precoated steel product.

Cornette discloses this preamble. ArcelorMittal's validity expert does not dispute that Cornette discloses this limitation. RX-1171C (Raabe Rpt) ¶ 307. Cornette refers to "hot stamping" throughout the reference and Cornette FIG. 22 illustrates a hot-stamped product. RX-0019 (Cornette) at 10-11. As explained in the overview of Cornette above, the PTAB has previously concluded that Cornette's coating forms part of a hot-stamped product. RX-0114 (Final Written Decision for IPR2019-01275 for '683 patent) (VINFAST1402-00004805) at 32-35.

Cornette discloses limitation [1a] of the '602 patent—a strip of base steel.

Cornette discloses this limitation. ArcelorMittal's validity expert does not dispute that Cornette discloses this limitation. RX-1171C (Raabe Rpt) ¶ 307. Cornette describes the presence of a "base material" or "substrate" of "boron steel." RX-0019 (Cornette) at 9. Specifically, Cornette discloses the hot-stamping of Usibor 1500—which is one of the bases steels ArcelorMittal relies on to

CHEMICAL COMPOSITION OF THE BASE MATERIAL

USIBOR 1500 is a carbon-manganese steel microalloyed with boron.

Table III. Chemical composition of pre-coated boron steel in thousandths of percent

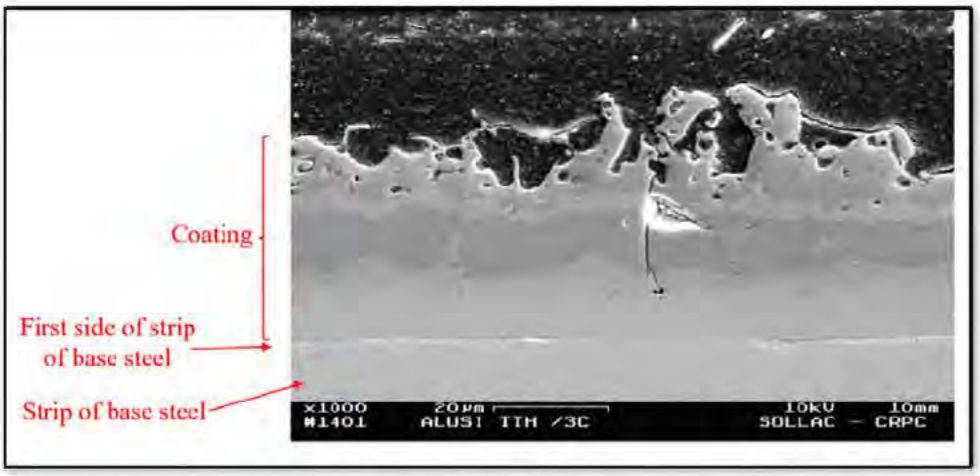
	C	Mn	Si	S	Cr	Al	B	Ti
Min.	200	1100	150		150	20	2	20
Max.	250	1350	350	8	300	60	4	50

[redacted]

establish technical domestic industry. RX-1282C at 91:13-92:5, 92:19-25, 95:13-96:1. Cornette equates the "BASE MATERIAL" with "USIBOR 1500" when describing the its chemical composition as shown (right). RX-0019 (Cornette) at 9.

Cornette discloses limitation [1b] of the '602 patent—a coating on the base steel.

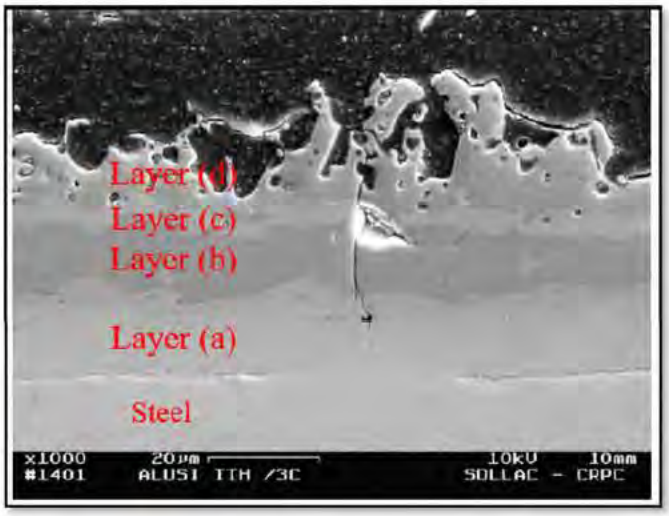
Cornette discloses this limitation. ArcelorMittal's validity expert does not dispute that Cornette discloses this limitation. RX-1171C (Raabe Rpt) ¶ 307. For example, the Cornette includes the recited coating, which is illustrated in Cornette FIG. 22.



RX-0019 (Cornette) at FIG. 22 (annotated). Cornette describes an "alloying reaction between substrate (iron) and the coating (aluminum – silicon) which leads to a hard multiphase alloy layer." RX-0019 (Cornette) at 9.

[redacted]

Cornette discloses limitation [1c] of the '602 patent—an interdiffusion layer having a first mean iron composition. Under ArcelorMittal's infringement theory, the cross-sectional SEM micrograph illustrated in Cornette's Figure 22 shown in the limitation above shows a coating with an interdiffusion layer. RX-0019 (Cornette) at FIG. 22 (annotated). The interdiffusion layer is layer (a) in the annotation. Cornette describes an "alloying reaction between substrate (iron) and the coating (aluminum – silicon) which leads to a hard multiphase alloy layer." RX-0019 (Cornette) at 9. Dr. Brown will testify that a POSITA would have understood this "alloying reaction" to be equivalent to or involve interdiffusion.



ArcelorMittal's validity expert does not dispute that Cornette discloses an interdiffusion layer as this limitation requires, only that Cornette does not disclose "mean iron composition[s]" as this limitation and the following limitations require. RX-1171C (Raabe Rpt) ¶ 307. And to be precise, Dr. Raabe does not concluded that Cornette does not have mean iron compositions as this limitation and the following limitations require, instead Dr. Raabe criticizes Dr. Brown for failing to explain how the different colors on the SEM micrograph relate to iron composition. RX-1171C (Raabe Rpt) ¶ 309.

The evidence will show that the different colors in the SEM micrograph in Cornette's Figure 22 correspond to different mean iron compositions. Dr. Drillet testified that the different colors in the SEM images flows from the different chemical composition:

> Q. Is there a different concentration of iron and aluminum in each of these layers?

[redacted]

A. It has been obtained at the same of electron microscope with scattering mode. This mode is used in order to highlight the composition of the phase. So as you have different kind of colors -- sorry for my accent -- that means that there are differences in the composition.

Q. So because the colors are different, we know that there's different amounts of aluminum in each of the layers. Is that correct?
A. What that says is this kind of analysis allows you to see differences in composition from one phase to the next. But it doesn't necessarily tell you differences in concentration between one particular element and another.

See RX-1282C (Drillet Tr.) at 108:5-109:5 (cleaned up). Further, ArcelorMittal's own testing of the same base material—Usibor 1500— in the domestic industry products results in a first interdiffusion layer have a first mean composition as Cornette's Figure 22 shows. Likewise, ArcelorMittal's testing of Usibor 1500 under similar conditions long before this Investigation confirms the layers contain different amounts of iron as demonstrated in the EDS profile below. The amount of iron content in blue (FeK) over the length of the coating varies over the length of the coating generating identifiable phases corresponding to layers. CX-0890C (AM-ITC-0102285) at 2338, 2308-311 (identifying Usibor 1500P as the subject material). This pre-Investigation testing remains reliable despite the passage of time because if similar process conditions are used, the same results will follow. *See, e.g.*, RX-1277C (Webb Tr.) at 190:6-191:12; RX-1281C (Thirion Tr.) at 111:18-113:25.

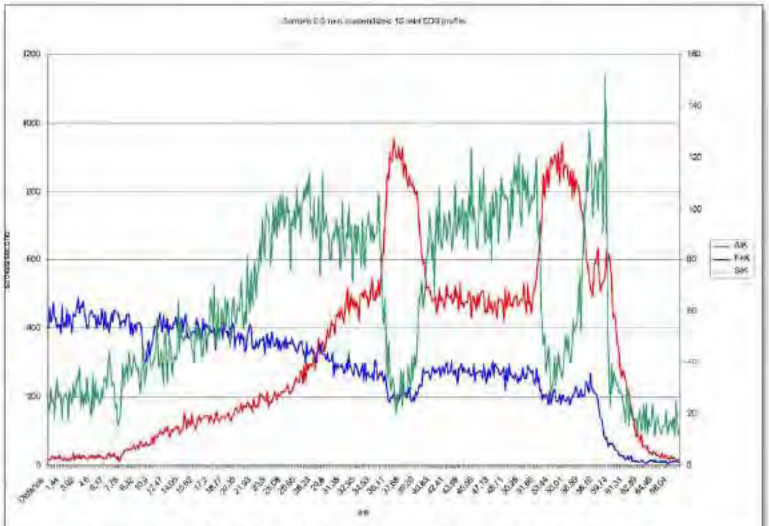


Figure 47: EDS profile of the 2.3 mm thick sample austenitized at 950°C for 15 minutes

Cornette discloses limitation [1d] of the '602 patent—an intermediate layer having a

[redacted]

second mean iron composition different from the first mean iron composition. Under ArcelorMittal's infringement theory, Cornette discloses this limitation. Cornette's intermediate layer is the layer labeled (b) in annotated Figure 22 discussed above. RX-0019 (Cornette) at Fig. 22. The brightness for layer of layer (b) is different than layer (a), which confirms they have a different chemical composition. *See* RX-1282C (Drillet Tr.) at 108:5-109:5. Further, ArcelorMittal's own testing of the same base material—Usibor 1500—both in its technical domestic industry allegations and pre-Investigation testing confirms the intermediate layer in Cornette's Figure 22 has a second mean iron composition different from the first mean iron composition as this limitation requires. *See also* CX-0890C (AM-ITC-0102285) at 2338, 2308-311; RX-1277C (Webb Tr.) at 190:6-191:12; RX-1281C (Thirion Tr.) at 111:18-113:25.

Cornette discloses limitation [1e] of the '602 patent—an intermetallic layer having 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. Under ArcelorMittal's infringement theory, Cornette discloses this limitation. Cornette's intermetallic layer is the layer labeled (c) in annotated Figure 22 discussed above. RX-0019 (Cornette) at Fig. 22. The brightness of layer (c) is different than layers (a) and (c), which confirms they have a different chemical composition. *See* RX-1282C (Drillet Tr.) at 108:5-109:5. Further, ArcelorMittal's own testing of the same base material—Usibor 1500—both in its technical domestic industry allegations and pre-Investigation testing confirms the intermetallic layer in Cornette's Figure 22 has a mean iron composition (the 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 as this limitation requires. *See also* CX-0890C (Drillet Ex. 8 - AM-ITC-0102285) at 2338, 2308-311; RX-1277C (Webb Tr.) at 190:6-191:12; RX-1281C

[redacted]

(Thirion Tr.) at 111:18-113:25.

Cornette discloses limitation [1f] of the '602 patent—a superficial layer having a fourth mean iron composition different from the third mean iron composition. Under ArcelorMittal's infringement theory, Cornette discloses this limitation. Cornette's superficial layer is the layer labeled (d) in annotated Figure 22 discussed above. RX-0019 (Cornette) at Fig. 22. The brightness of layer (d) is different than layer (c), which confirms they have a different chemical composition. *See* RX-1282C (Drillet Tr.) at 108:5-109:5. Further, ArcelorMittal's own testing of the same base material—Usibor 1500—both in its technical domestic industry allegations and pre-Investigation testing confirms the superficial layer in Cornette's Figure 22 has a mean iron composition (the fourth mean iron composition) different from third mean iron composition as this limitation requires. *See also* CX-0890C (AM-ITC-0102285) at 2338, 2308-311; RX-1277C (Webb Tr.) at 190:6-191:12; RX-1281C (Thirion Tr.) at 111:18-113:25.

Cornette discloses limitation [1g] of the '602 patent—coating thickness greater than 30 µm. Under ArcelorMittal's infringement theory, Cornette discloses this limitation. Cornette's coatings have a thickness of about 40 µm, satisfying the recitation of "greater than 30 micrometers" as shown in Cornette's annotated FIG. 22. Based on the scale included in that drawing, the thickness of that coating, for at least one measurement position, is approximately 32.3 µm. RX-0019 (Cornette) at Fig. 22 (annotated).

[redacted]

b. Claim 2

Cornette discloses claim 2 of the '602 patent—intermetallic and superficial layers are quasi continuous by occupying at least 90% of a level corresponding to each of the intermetallic and superficial layers and wherein less than 10% of intermetallic layer is present at an extreme surface of the product. As explained above in Section § III.B.2, ArcelorMittal's expert Dr. Fekete does not offer any analysis as to what the claimed "level" is, and how layers (c) and (d) occupies at least 90% of this undefined level. To the extent ALJ finds infringement of claim 2 based on insufficient information presented by ArcelorMittal, Cornette discloses claim 2, as layer (c) and (d) appear similarly continuous as the layers (c) and (d) shown in ArcelorMittal's technical domestic industry contentions above (§ III.C.2). CX-0084C (Brown Rpt.) ¶¶ 304-05. Similarly, layer (c) is covered by layer (d) 4 to a similar degree as in AM's tech DI contentions above. *Id.* ArcelorMittal's validity expert does not dispute that Cornette discloses the specific limitation of claim 2. RX-1171C (Raabe Rpt.) ¶ 312.

c. Claim 3

Cornette discloses claim 3 of the '602 patent—base steel chemical compositions. Cornette discloses this limitation through its disclosure of the chemical composition of Usibor 1500. RX-0019 (Cornette) at 9 ("Chemical Composition of the Base Material"); *see also* CX-0669C (AM-ITC-0101925) at 926; RX-0081 (VINFAST1402-00003251) at 254; RX-0044 (AM-ITC-0023464) at 483; RX-0048 (AM-ITC-0053159); CX-0890C (AM-ITC-0102285) at 309. ArcelorMittal's validity expert does not dispute that Cornette discloses the specific limitation of claim 3. RX-1171C (Raabe Rpt.) ¶ 313.

d. Claim 4

Cornette discloses claim 4 of the '602 patent—base steel chemical compositions. Cornette discloses this limitation through its disclosure of the chemical composition of Usibor

[redacted]

1500. RX-0019 (Cornette) at 9. ArcelorMittal's validity expert does not dispute that Cornette discloses the specific limitation of claim 4. RX-1171C (Raabe Rpt.) ¶ 314).

e. Claim 7

Cornette discloses claim 7 of the '602 patent—base steel titanium to nitrogen ratio. Cornette discloses this limitation through its disclosure of the chemical composition of Usibor 1500. RX-0019 (Cornette) at 9 ("Chemical Composition of the Base Material"); *see also* CX-0669C (AM-ITC-0101925) at 926 ("Usibor® 1500 AluSi Global product file – reflecting (Ti (max) to N is 0.05/.0.01 = 5); RX-0044 (AM-ITC-0023464) at 483 ("Thesis: Thermo-mechanical study and numerical modeling of the hot stamping of the Usibor 1500" (Ti (Maxi) of 0.05 / N of 0.009 = 5.55).; RX-0048 (AM-ITC-0053159); CX-0890C (AM-ITC-0102285) at 309 (Report of Dr. Grigorieva in 2006 during the alleged invention (English Version) – Ti (Max) of 500 / N of 90 = 5.55). ArcelorMittal's validity expert does not dispute that Cornette discloses the specific limitation of claim 7. RX-1171C (Raabe Rpt.) ¶ 319.

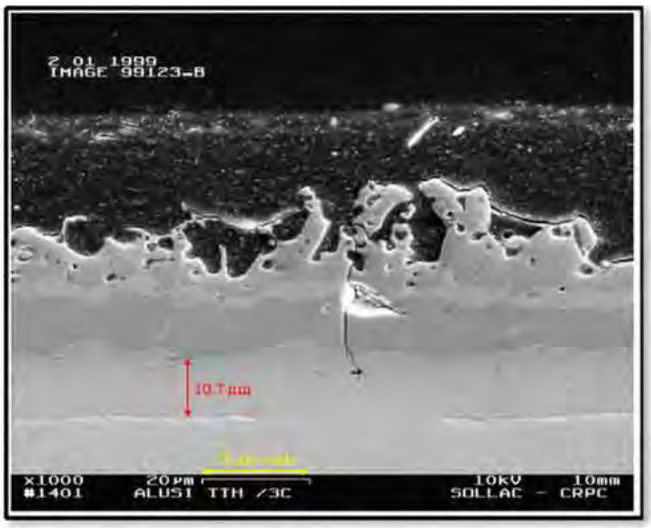
f. Claim 8

Cornette discloses claim 8 of the '602 patent— base steel titanium to nitrogen ratio. Cornette discloses this limitation for the same reasons as stated in claim 2 and 7 above. ArcelorMittal's validity expert does not dispute that Cornette discloses the specific limitation of claim 8. RX-1171C (Raabe Rpt.) ¶ 320.

[redacted]

g. Claim 9

Cornette discloses claim 9 of the '602 patent—interdiffusion layer thickness less than 15 micrometers. Under ArcelorMittal's infringement theory, the cross-sectional SEM micrograph of Cornette's Figure 22 shows this limitation. ArcelorMittal's validity expert does not dispute that Cornette discloses the specific limitation of claim 9. RX-1171C (Raabe Rpt.) ¶ 321. RX-0019 (Cornette) at FIG. 22 (annotated).



h. Claim 10

Cornette discloses claim 10 of the '602 patent—interdiffusion layer thickness less than 10 micrometers. Under ArcelorMittal's infringement theory, Layer (a) of Cornette's coating has a thickness of less than 10 micrometers as shown in Cornette FIG. 22. Based on the scale included in that drawing, the thickness of layer (a) for at least one measurement position, is approximately less than 10 micrometers as shown in the limitation above. ArcelorMittal's own documentation will show that the thickness of layer (a) is "directly" related to the temperature of the furnace and dwell time in the furnace. Thus, the thickness of the interdiffusion layer (a) is nothing more than a design choice that would be well within the capabilities of a POSITA. CX-0617C (AM-ITC-0094851) at 874; *see also* RX-1282C (Drillet Tr.) at 115:18-22 ("When you say the time and temperature are used to define the maximum interdiffusion layer, do you mean the thickness of the interdiffusion layer? Yes, the thickness.").

[redacted]

i. Claim 18

Cornette discloses claim 18 of the '602 patent—interdiffusion layer thickness between 1 micron and 15 microns. As shown in claim 9 above, Cornette discloses this limitation under ArcelorMittal's infringement theory.

j. Claim 20

Cornette discloses claim 20 of the '602 patent—fourth mean iron composition lower than third mean iron composition. As shown in claim 1[c] above, Cornette discloses this limitation under ArcelorMittal's infringement theory. ArcelorMittal's testing of Usibor 1500 confirms that when the four layers are formed, the mean iron composition of layer (d) is lower than the third mean iron composition (of layer (c)). CX-0890C (AM-ITC-0102285) at 2338, 2308-311 (identifying Usibor 1500P as the subject material); *see, e.g.*, RX-1277 (Webb Tr.) at 190:6-191:12; RX-1281C (Thirion Tr.) at 111:18-113:25.

k. Claim 21

Cornette discloses claim 21 of the '602 patent. *See* § III.D.3.iii.a analyzing claim 1 limitations [1pre]-[1g] for Cornette. With respect to limitation [21f], the varying brightness of the layers (a)–(d) confirms the superficial layer has a different mean iron compositions different from the first, second, and third mean iron compositions as this limitation requires. ArcelorMittal's testing of Usibor 1500 confirms that when the four layers are formed, the mean iron composition of the layers is different as this limitation requires. CX-0890C (AM-ITC-0102285) at 2338, 2308-311 (identifying Usibor 1500P as the subject material); *see, e.g.*, RX-1277 (Webb Tr.) at 190:6-191:12; RX-1281C (Thirion Tr.) at 111:18-113:25.

l. Claim 22

Cornette discloses claim 22 of the '602 patent. *See* § III.D.3.iii.j analyzing '602 patent claim [20].

[redacted]

m. Claim 24

Cornette discloses claim 24 of the '602 patent. *See* § III.D.3.iii.a analyzing claim 1 limitations [1pre]-[1g] for Cornette. With respect to the aluminum composition limitations of [24c]-[24f], the varying brightness of the layers (a)–(d) confirms the composition of the layers are different as these limitation requires. ArcelorMittal's testing of Usibor 1500 confirms that when the four layers are formed, the mean aluminum composition of the layers is different as this limitation requires. CX-0890C (AM-ITC-0102285) at 2338, 2308-311 (identifying Usibor 1500P as the subject material); *see, e.g.*, RX-1277 (Webb Tr.) at 190:6-191:12; RX-1281C (Thirion Tr.) at 111:18-113:25.

n. Claim 26

Cornette discloses claim 26 of the '602 patent—interdiffusion layer has a thickness less than 15 micrometers. *See* § III.D.3.iii.g (claim 9).

iv. Lachman

Under ArcelorMittal's infringement and technical domestic industry analysis, which is based on limited SEM photographs and elemental readings, Lachmann discloses each of the limitations the Asserted Claims. ArcelorMittal has no real substantive dispute that Lachman does not disclose specific claimed elements. RX-1171C (Raabe Reb. Rpt.) ¶¶ 495-96. Contrary to the ArcelorMittal's attempt to feign ignorance, RX-1171C (Raabe Reb. Rpt.) ¶ 496 ("Lachmann depicts various pictures on different slides with no description of how these pictures relate to each other"), it is clear from Lachman that it relates to Volkswagen's hot stamping of USIBOR 1500 prior to January 2005. The presentation begins with introduction to the hot stamping process. RX-0062 (AM-ITC-0019466) at 19469 (English Version); RX-0005 (AM-ITC-0010992) at 10995 (German Version). It is then followed by explanation of the changes that occur due to hot stamping. RX-0062 (AM-ITC-0019466) at 19470-72; RX-0005 (AM-ITC-0010992) at 10996-98.

[redacted]

These changes include the performance characteristics such as tensile strength. *Id.* It also includes investigation into the resulting layer structure and the compositions of the layers. *Id.*

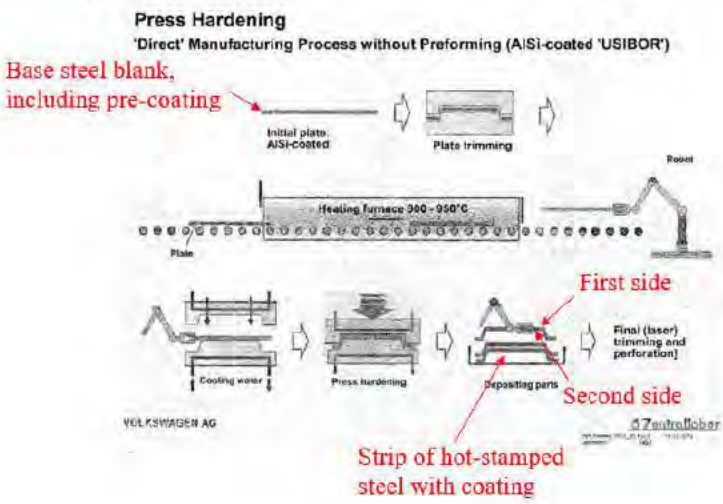
Further, ArcelorMittal cannot legitimately fault Lachmann for not disclosing highly specific process parameters needed to reliably obtain the layer structure of the Asserted Claims. RX-1171C (Raabe Reb. Rpt.) ¶ 493 ("While Lachmann provides some examples, this is not the same as providing the process parameters to obtain a beneficial coating microstructure encompassed in the Asserted Claims in a repeatable, consistent, and robust manner."). Notably, ArcelorMittal's infringement and technical domestic analysis is completely devoid of analysis concerning whether the process parameters used to hot stamp the products alleged to practice the claims will reliably lead to the recited layer structure. See §§ III.B-C and IV.B-C. Thus, to the extent a showing of process parameters "to obtain a beneficial coating microstructure encompassed in the Asserted Claims in a repeatable, consistent, and robust manner" is needed, there cannot be infringement or technical domestic industry under ArcelorMittal analysis for validity.

a. Claim 1

Lachmann discloses limitation [1pre] of the '602 patent—a precoated steel product. CX-0084C (Brown Rpt.) ¶ 628. Lachmann describes "[p]ress hardening of AlSi-coated USIBOR which is involves "[h]eating furnace" at "900 - 950°C." RX-0062 (AM-ITC-0019466) at 19469. Lachmann further describes that "Al-Fe-Si Alloylayer" on a base material ("USIBOR") as a "[f]inished material." RX-0062 (Lachmann) at 19470. A POSITA would have readily understood that Lachmann's "[f]inished material" corresponds to a "precoated steel product" as described in the '602 patent. *Id.* at 19469-70.

Lachmann discloses limitation [1a] of the '602 patent—a strip of base steel. CX-0084C (Brown Op. Rpt) ¶ 629. For example, in its description of the hot stamping process, Lachmann illustrates blanks having first sides and second sides, as shown in annotations below.

[redacted]

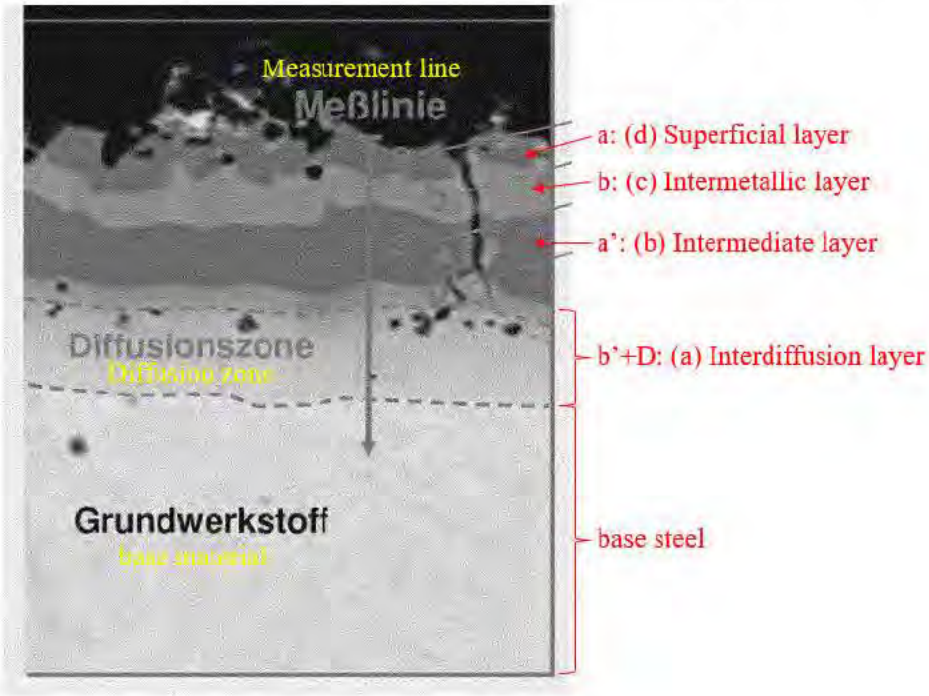


RX-0062 (Lachmann) at 19469.

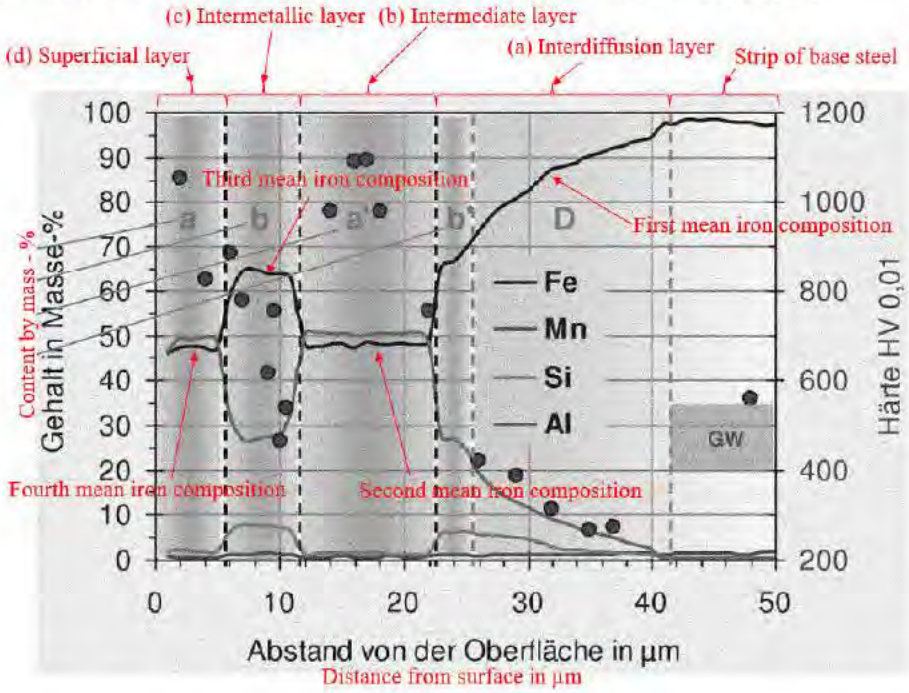
Lachmann discloses limitation [1b] of the '602 patent—a coating on the base steel. RX-0084C (Brown Op. Rpt) ¶¶ 630-33. By Lachmann's lecture in 2005, it was well known that USIBOR 1500 has an aluminum pre-coating on the base steel. Lachmann confirms this, noting that the materials used is "AlS-coated (hot-dip aluminised) rawmaterial ("USIBOR")." RX-0062 (Lachmann) at 19471.

Lachmann discloses limitations [1c]-[1f] of the '602 patent. CX-0084C (Brown Op. Rpt) ¶¶ 634-638. Under ArcelorMittal's infringement and technical domestic industry theory, Lachmann discloses a cross-sectional and compositional analysis. As shown below, Lachmann's hot stamped USIBOR 1500 products includes a 4-layers:

[redacted]



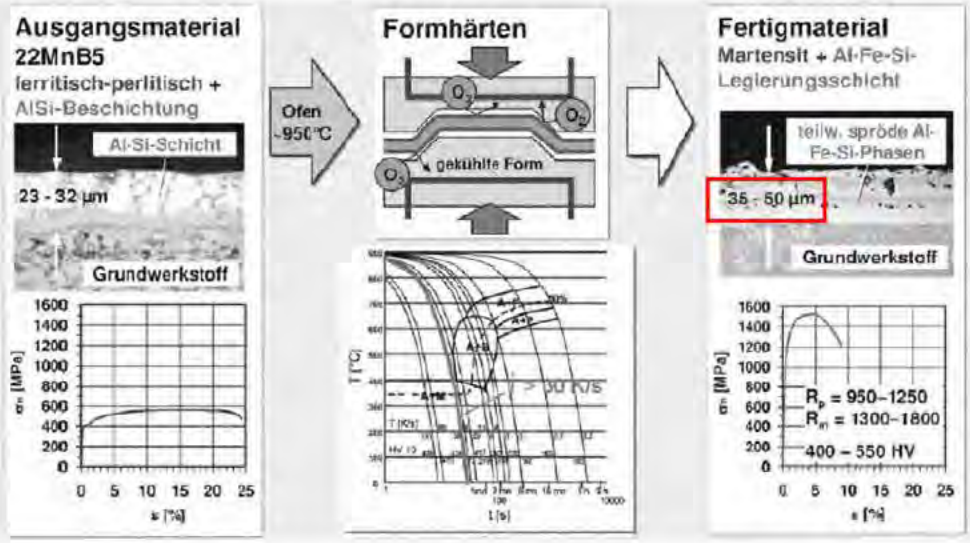
RX-0062 (AM-ITC-0010992) at 19472 (English Version); RX-0005 (AM-ITC-0010992) at 11031 (German Version). Lachmann also presented elemental compositional analysis that demonstrates that the 4 layers have the recited compositions recited in limitations [1c]-[1f]:



RX-0005 (AM-ITC-0010992) at 11031; RX-0062 (AM-ITC-0019466) at 19472.

[redacted]

Lachmann discloses limitation [1g] of the '602 patent—coating thickness greater than 30 µm. As shown below, Lachmann discloses that the thickness of the coating to be greater than 30 µm. CX-0084C (Brown Op. Rpt) ¶ 639.



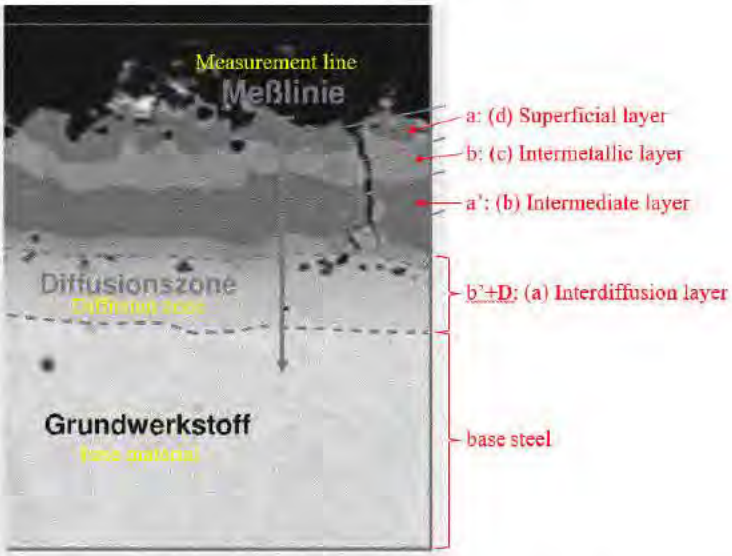
RX-0005 (AM-ITC-0010992) at 11026 (German Version); RX-0062 (AM-ITC-0019466) at 19470 (English Version).

b. Claim 2

Lachmann discloses claim 2 of the '602 patent—intermetallic and superficial layers are quasi continuous by occupying at least 90% of a level corresponding to each of the intermetallic and superficial layers and wherein less than 10% of intermetallic layer is present at an extreme surface of the product. CX-0084C (Brown Op. Rpt) ¶¶ 640-43. As explained above in Section § III.B.2, ArcelorMittal's expert Dr. Fekete does not offer any analysis as to what the claimed "level" is, and how layers (c) and (d) occupies at least 90% of this undefined level. To the extent ALJ finds infringement of claim 2 based on insufficient information presented by ArcelorMittal, Lachmann discloses claim 2. For example, with respect to "the layers (c) and (d) are quasi continuous by occupying at least 90% of a level corresponding to each of the layers (c) and (d)," Lachmann illustrates that each of sub-layer b and a (corresponding to layers (c) and

[redacted]

(d)) extends continuously with only a few small discontinuities (e.g. pore, slit, etc.) across the entire SEM image. RX-0005 (AM-ITC-0010992) at 11031 (annotated). For "less than 10% of layer (c) is present at an extreme surface of the product," Lachmann shows that essentially none of sub-layer b (corresponding to layer (c)) is present at the extreme surface of Lachmann's coating. CX-0084C (Brown Rpt.) ¶ 642.



c. Claim 3

Lachmann discloses claim 3 of the '602 patent—base steel chemical compositions. CX-0084C (Brown Op. Rpt) ¶¶ 644-46. Lachmann discloses use of pre-coated USIBOR 1500. RX-0005 (AM-ITC-0010992) at 11035; RX-0062 (AM-ITC-0019466) at 19469-19471. This is the same base steel that ArcelorMittal relies on for technical domestic industry. And the chemical composition of USIBOR 1500 falls within the recited composition range. CX-0669C (AM-ITC-0101925) at 926; RX-0081 (Vaissiere) (VINFAST1402-00003251) at 254; RX-0044 (AM-ITC-0023464) at 483. ArcelorMittal's validity expert does not dispute that Lachmann discloses the specific limitation of claim 3. RX-1171C (Raabe Rpt.) ¶ 501.

d. Claim 4

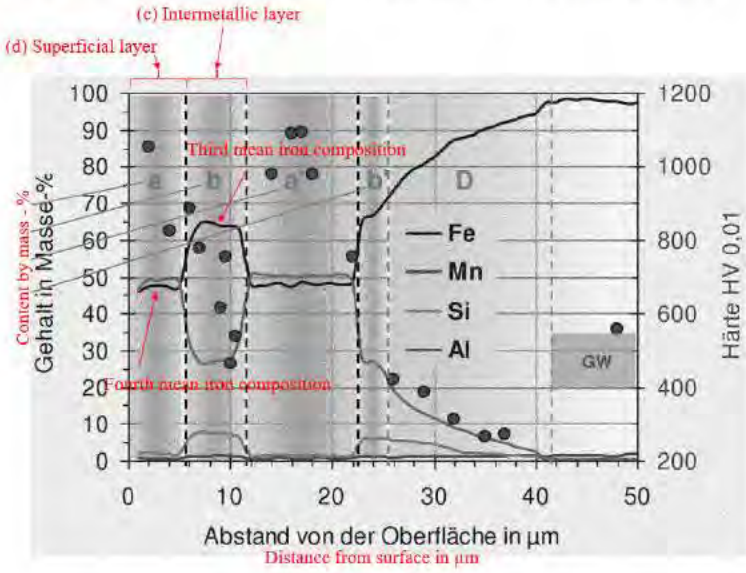
Lachmann discloses claim 4 of the '602 patent—base steel chemical compositions. *See* claim 3. CX-0084C (Brown Op. Rpt) ¶¶ 647-48. Lachmann discloses this limitation through its use of USIBOR 1500. RX-0005 (AM-ITC-0010992) at 11035; RX-0062 (AM-ITC-0019466) at

[redacted]

19469-19471. ArcelorMittal's validity expert does not dispute that Lachmann discloses the specific limitation of claim 4. RX-1171C (Raabe Rpt.) ¶ 502.

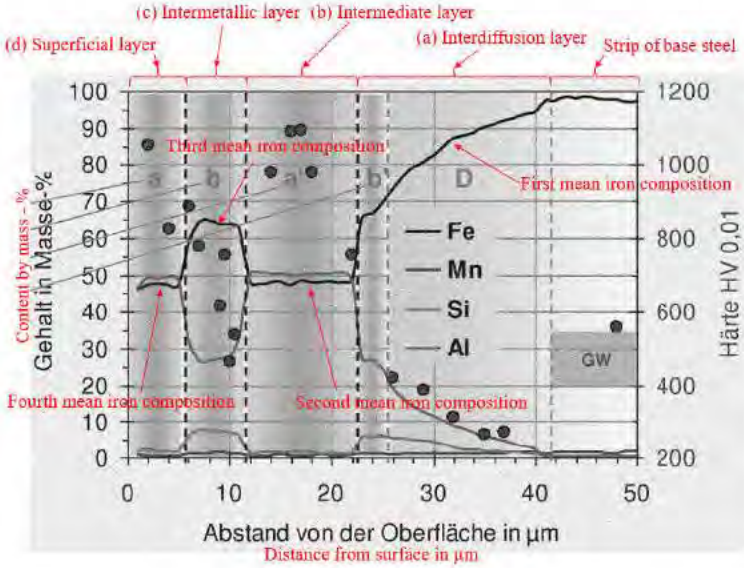
e. Claim 20

Lachmann discloses claim 20 of the '602 patent—fourth mean iron composition lower than third mean iron composition. CX-0084C (Brown Op. Rpt) ¶ 654. As demonstrated in Lachmann's composition graphs, the mean iron composition of sub-layer a, which corresponds to the "fourth mean iron composition" of layer (d) (superficial layer), is lower than the mean iron composition of sub-layer b, which corresponds to the "third mean iron composition" of layer (c) (intermetallic layer). RX-0005 (AM-ITC-0010992) at 11031 (annotated).



f. Claim 21

Lachmann discloses claim 21 of the '602 patent. *See* § III.D.3.iv.a analyzing claim 1 limitations [1pre]-[1g] for Lachmann. With respect to limitation [21f], the mean iron composition of sub-layer (1), which corresponds to the "fourth mean iron composition" of layer a (superficial layer), is different from each of the mean iron compositions of sub-layer



[redacted]

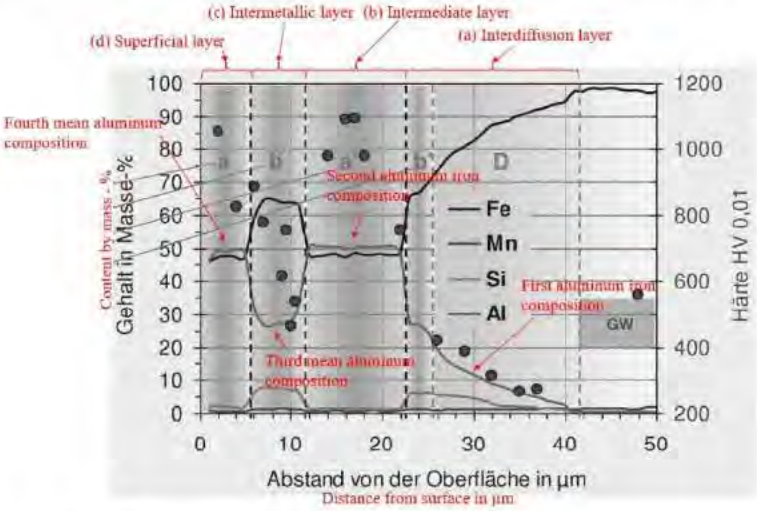
b'+D, a', and b, which correspond to the first, second, and third mean iron compositions, respectively. RX-0005 (AM-ITC-0010992) at 11031 (annotated).

g. Claim 22

Lachmann discloses claim 22 of the '602 patent. *See* § III.D.3.iv.e analyzing '602 patent claim [20] for Lachmann.

h. Claim 24

Lachmann discloses claim 24 of the '602 patent. CX-0084C (Brown Op. Rpt) ¶¶ 666-76. *See* § III.D.3.iv.a analyzing claim 1 limitations [1pre]-[1g] for Lachmann. With respect to the aluminum composition limitations of [24c]-[24f], Lachmann discloses or renders obvious that layers (a), (b), (c), and (d) have the recited mean aluminum compositions. Lachmann's composition graph provides elemental compositions for each of sub-layers b'+D, a', b, and a, which correspond to layers (a)-(d), respectively. Each of these sub-layers has a different mean aluminum composition from one another. RX-0005 (AM-ITC-0010992) at 11031 (annotated).



Further, as shown in Lachmann's composition graph above, Lachmann's sub-layer a' (corresponding to layer (b)) has a mean aluminum composition greater than the mean aluminum composition of sub-layer b (corresponding to layer (c)).

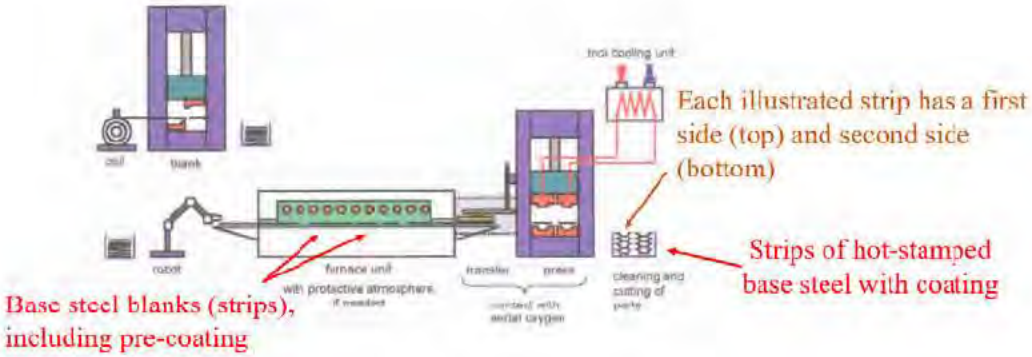
[redacted]

v. Engels

a. Claim 1

Engels discloses limitation [1pre] of the '602 patent—a precoated steel product. CX-0084C (Brown Rpt.) ¶¶ 470-77. Engels FIG. 5 depicts a precoated steel product, showing a "diffusion layer" (coating) on underlying "boron steel" ("Stahl") that has undergone hot-stamping. RX-0063 (Engels) at 142-43. In view of Engels' disclosure of continuous, unified process that includes immediate transfer from heating to a die for stamping, a POSITA would have understood Engels FIG. 5 to illustrate a part that has undergone the entirety of that process, including stamping. *Id.* at 143; CX-0084C (Brown Rpt.) ¶¶ 471-77.

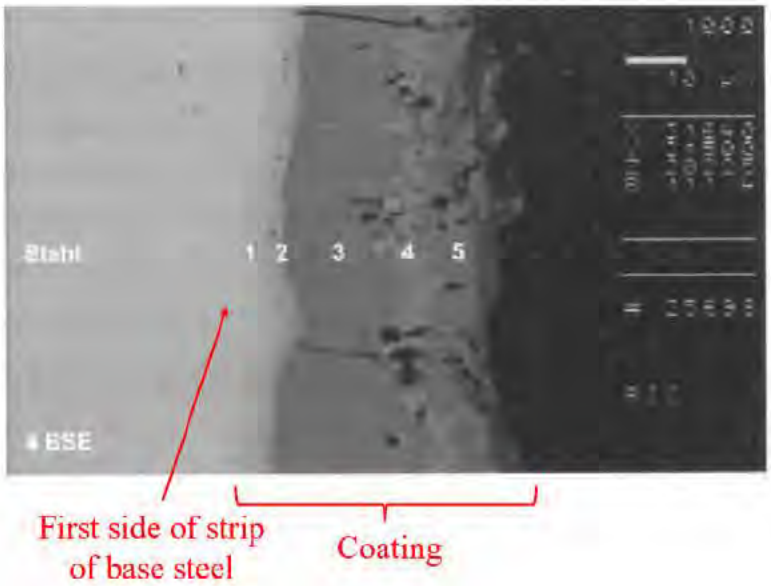
Engels discloses limitation [1a] of the '602 patent—a strip of base steel. CX-0084C (Brown Rpt.) ¶ 478. In its description of the hot stamping process, Engels illustrates blanks having first sides and second sides, as shown in annotated Engels FIG. 1 below. RX-0063 (Engels) at 137. A POSITA would have understood these blanks as being strips (as, indeed, they are illustrated in FIG. 1) composed of base steel with a pre-coating, which Engels refers to as an "Al-Si-coating." *Id.*



RX-0063 (Engels) at FIG. 1 (annotated).

[redacted]

Engels discloses limitation [1b] of the '602 patent—a coating on the base steel. CX-0084C (Brown Rpt.) ¶¶ 479-88. The coating is a "diffusion layer" having five phases, as shown in annotated Engels FIG. 5 below. RX-0063 (Engels) at 142-43.



RX-0063 (Engels) at FIG. 5 (annotated).

Notably, phase 2 of Engels is a less distinct layer, as reflected in Engels' disclosure that this layer is very thin and has an "unmeasurable" composition. RX-0063 (Engels) at 143. This is a common characteristic of the coatings of hot-stamped steels: in some cases, a less distinct layer is found adjacent to the innermost layer of the coating, depend on the exact thermal process to which the coating was subjected. *See, e.g.*, RX-0104 (Takagi) at Table 1; RX-0022 (Suehiro II) at FIG. 12; JX-0002 ('602 patent) at 12:46; CX-0084C (Brown Rpt.) ¶¶ 480-86.

Engels also discloses that the coating results from interdiffusion between the base steel and an aluminum or aluminum alloy pre-coating. Engels describes that the "diffusion layer" (coating) is formed by heat treatment of "hot-dip aluminum coated boron steels." RX-0063 (Engels) at 141-142. A POSITA would have understood Engels to describe specifically an aluminum-silicon pre-coating, based on the descriptions of "an Al-Si-coating" and an "22MnB5+AS diffusion layer,"

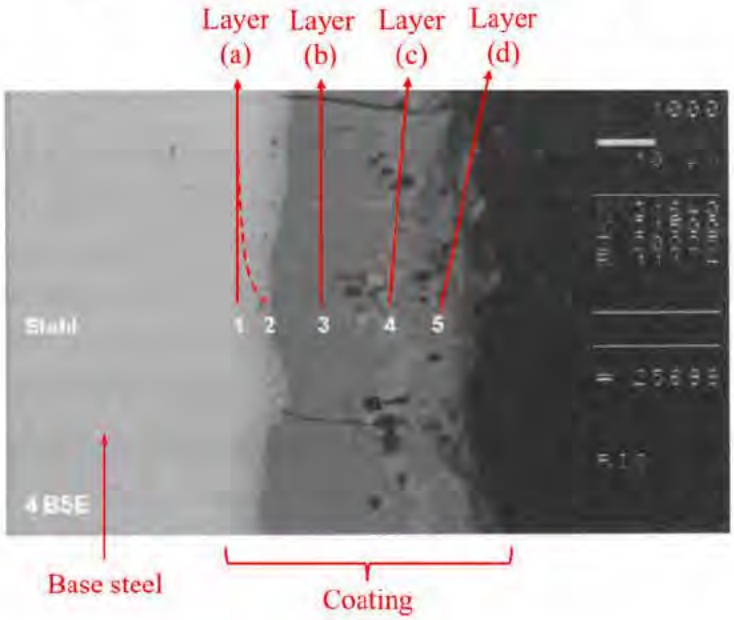
where "AS" would have been understood by a POSITA as referring to "aluminum-silicon." RX-0063 (Engels) at 138, 141. The thermal treatment described by Engels (e.g., "heating rate," "total processing time," and "austenitizing temperature," such as "temperatures between 900 °C and 950 °C") then causes "diffusion" between the material(s) of the pre-coating and the base steel. RX-0063 (Engels) at 136, 142. As a result, Engels' coating includes various phases composed of varying degrees of iron, aluminum, and silicon. *Id*. at 143. Based on these compositions and Engels' use of the term "diffusion," a POSITA would have understood that the coating was formed by "interdiffusion" between the iron of the base steel and the aluminum and silicon of the "AS" or "Al-Si" pre-coating.

Engels discloses limitation [1c]-[1f] of the '602 patent. CX-0084C (Brown Rpt.) ¶¶ 489-98. Under ArcelorMittal's infringement theory, Engels describes that the coating includes "five phases which differ in their layer thickness and chemical composition." RX-0063 (Engels) at 142. As shown in Engels FIG. 5, each of at least phases 1 or 1+2 and 3-5 constitutes a layer and satisfies the foregoing limitation of claim 1 according to the following mappings:

- Phase 1 or 1+2 teaches layer (a) (the "interdiffusion layer"). As shown in FIG. 5, phase 1 is arranged directly on the underlying steel.
- Phase 3 teaches layer (b) (the "intermediate layer").
- Phase 4 teaches layer (c) (the "intermetallic layer").
- Phase 5 teaches layer (d) (the "superficial layer").

These phases are included in the coating ("diffusion layer") and "proceed[] from the base steel outwards."

[redacted]



RX-0063 (Engels) at FIG. 5 (annotated).

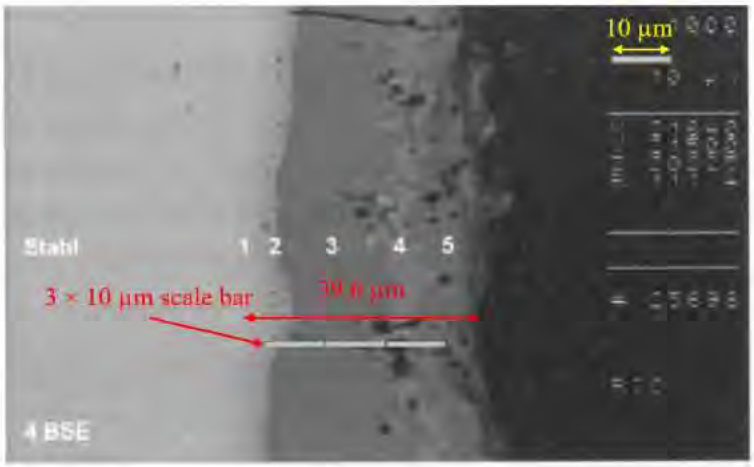
Engels' Table, reproduced below, shows that layer (a), corresponding to Phase 1 or Phases 1+2, has a first mean iron composition of or similar to 89.2%. Phase 3, corresponding to layer (b), has a second mean iron composition of 45.9% that is different from the first mean iron composition. *See* discussion at '602 patent claim element [1c]. Phase 4, corresponding to layer (c), has a third mean iron composition of 54.3% that is different from the first and second mean iron compositions and higher than the second mean iron composition. Phase 5, corresponding to layer (5), has a third mean iron composition of 44.1% that is different from the third mean iron composition.

	phase number	layer thickness, µm	Al	Fe	Si	Cr	Mn
			~~Volume-%~~ Mass-%				
Layer (a)	1	5 – 9	7,2	89,2	1,9	0,3	1,4
[Layer (a)]	2	< 1µm	unmeasurable				
Layer (b)	3	11 – 18	51,4	45,9	1,9	0,1	0,7
Layer (c)	4	3 – 8	33,9	54,3	10,6	0,3	0,9
Layer (d)	5	5 - 11	53,2	44,1	1,9	0,2	0,6

RX-0063 (Engels) at 143 (annotated).

[redacted]

Engels discloses limitation [1g] of the '602 patent—coating thickness greater than 30 µm. CX-0084C (Brown Rpt.) ¶¶ 499-502. Under ArcelorMittal's infringement theory, the included 10 µm scale of Engels FIG. 5 can be used to measure the coating thickness of the Engels FIG. 5 coating. The shadings in the image can be used to distinguish different phases. Based on the annotated FIG. 5 below, the measured thickness is of 39.6 µm, well beyond the recited 30 µm threshold value. RX-0063 (Engels) at FIG. 5 (annotated). Further, Engels provides that the coating has a thickness greater than 30 µm based on the disclosed thickness ranges in Engels' Table. Many combinations of the disclosed ranges result in a total coating thickness (sum of the individual phase thicknesses) greater than 30 µm. RX-0063 (Engels) at 143; CX-0084C (Brown Rpt.) ¶¶ 500-501.

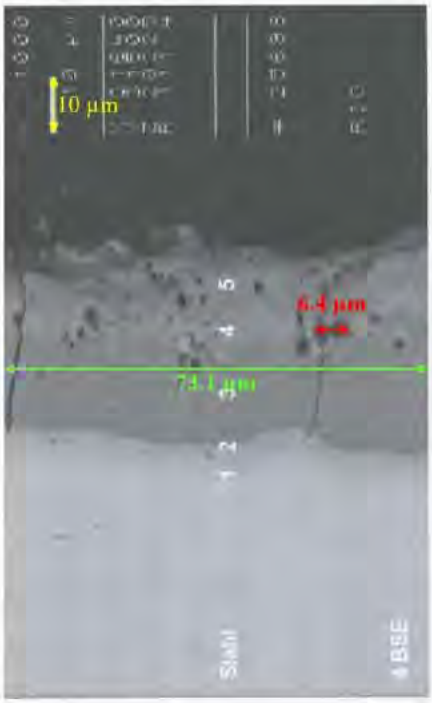


b. Claim 2

Engels discloses claim 2 of the '602 patent—intermetallic and superficial layers are quasi continuous by occupying at least 90% of a level corresponding to each of the intermetallic and superficial layers and wherein less than 10% of intermetallic layer is present at an extreme surface of the product. CX-0084C (Brown Op. Rpt) ¶¶ 504-05. As explained above in Section § III.B.2, ArcelorMittal's expert Dr. Fekete does not offer any analysis as to what the claimed "level" is, and how layers (c) and (d) occupies at least 90% of this undefined level. To the extent ALJ finds infringement of claim 2 based on insufficient information presented by ArcelorMittal, Engels' phases 4 and 5, corresponding to layers (c) and (d), extend continuously

[redacted]

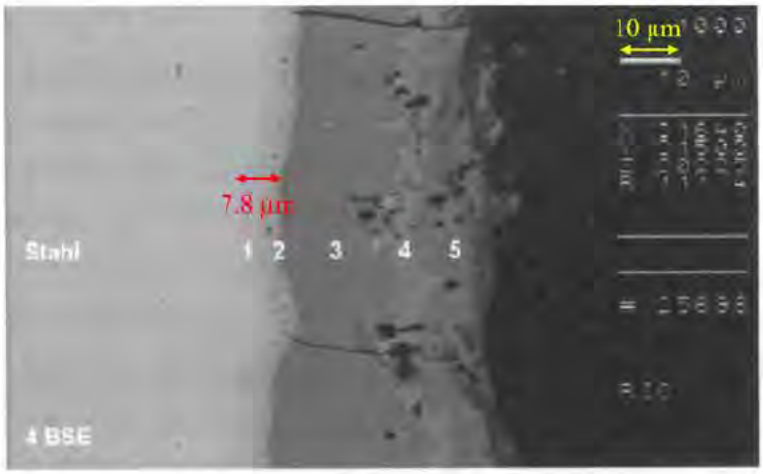
or essentially continuously across the entire image (as shown above), except possibly for one segment of phase 4 indicated in red below. A POSITA would have considered the layer to be continuous or essentially continuous (or quasi continuous) despite this pore. To the extent that this pore is considered to make the layer discontinuous, the indicated segment occupies only about 9% of the total width of FIG. 5, such that phase 4 is "quasi-continuous." RX-0063 (Engels) at FIG. 5 (annotated). Further, Engels FIG. 5 shows that essentially none of phase 4 (corresponding to layer (c)) is present at the extreme surface of Engels' coating. Engels at FIG. 5. This is evident by an examination of Engels FIG. 5, in which the lighter-shaded phase 4 is entirely or essentially entirely covered by the darker phase 5.



c. Claim 9

Engels discloses claim 9 of the '602 patent—interdiffusion layer thickness less than 15 micrometers. Under ArcelorMittal's infringement theory, Engels' Table shows that phase 1 (corresponding to layer (a)) has a thickness in a range from 5-9 µm, such that all thicknesses satisfy this claim. RX-0063 (Engels) at 143. Any marginal thickness contributed by phase 2 would not substantively alter this reasoning in the case where layer (a) is mapped to phases 1+2. This thickness range is supported by a measured thickness of 7.8 µm for phase 1 or phase 1+2 thickness in Engels FIG. 5, as shown below.

[redacted]



RX-0063 (Engels) at FIG. 5.

d. Claim 10

Engels discloses claim 10 of the '602 patent—interdiffusion layer thickness less than 10 micrometers. Under ArcelorMittal's infringement theory, as discussed in claim 9 above, both the disclosed thickness range of 5-9 µm and the measured thickness of 7.8 µm satisfy the recited range. RX-0063 (Engels) at 143, FIG. 5.

e. Claim 18

Engels discloses claim 18 of the '602 patent—interdiffusion layer thickness between 1 micron and 15 microns. As shown in claim 9 above, Engels discloses this limitation under ArcelorMittal's infringement theory.

f. Claim 20

Engels discloses claim 20 of the '602 patent—fourth mean iron composition lower than third mean iron composition. As shown in [1e]-[1f] above, Engels' Table discloses Fe% of 44.1% and 54.3% for these respective values, where the fourth mean iron composition (layer (d)) corresponds to phase 5 and the third mean iron composition (layer (c)) corresponds to phase 4. RX-0063 (Engels) at 143.

[redacted]

g. Claim 21

Engels discloses claim 21 of the '602 patent. *See* § III.D.3.v.a analyzing claim 1 limitations [1pre]-[1g] for Engels. With respect to limitation [21f], he fourth mean iron composition disclosed by Engels (corresponding to the iron composition of phase 5) is 44.1%, which is different from the values of 89.2%, 45.9%, and 54.3% disclosed for the other phases/layers. RX-0063 (Engels) at 143.

h. Claim 22

Engels discloses claim 22 of the '602 patent. *See* § III.D.3.v.f analyzing '602 patent claim [20].

i. Claim 24

Engels discloses claim 24 of the '602 patent. *See* § III.D.3.v.a analyzing claim 1 limitations [1pre]-[1g] for Engels. With respect to the aluminum composition limitations of [24c]-[24f], Engels' phase 1 or phase 1+2, corresponding to layer (a), has a first mean aluminum composition of or similar to 7.2%. Engels' phase 3, corresponding to layer (b), has a second mean aluminum composition of or similar to 51.4%, different from the first mean aluminum composition. Engels' phase 4, corresponding to layer (c), has a third mean aluminum composition of or similar to 33.9%, different from the first and second mean aluminum compositions. Engels' phase 5, corresponding to layer (d), has a fourth mean aluminum composition of 53.2%, different from the first, second, and third mean aluminum compositions and higher than the third mean aluminum composition (33.9%). RX-0063 (Engels) at 143.

j. Claim 26

Engels discloses claim 26 of the '602 patent—interdiffusion layer has a thickness less than 15 micrometers. *See* § III.D.3.v.c (claim 9).

4. Obviousness Under 35 U.S.C. § 103

[redacted]

i. Level of Skill of a Person of Ordinary Skill in the Art

As discussed in Section III.A.1, the Parties' positions are the same under either definition of a POSITA.

ii. Takagi Grounds

a. Takagi in combination with Cornette

1.) Motivation to combine

To the extent that Takagi does not explicitly disclose the post hot-stamping coating thickness, a POSITA would have expected Takagi's post hot-stamping coating thickness to be 30 µm or more. CX-0084C (Brown Rpt.) ¶¶ 124-32. For example, Takagi discloses a pre-coating thickness of 10-20 µm. RX-0104 (Takagi) at [0035]. Cornette discloses post hot-stamping coating thickness greater than 30 µm. RX-0019 (Cornette) at 9. A POSITA would have found it obvious to incorporate the teachings of Cornette into Takagi's hot-stamping process for a number of reasons. It would have been obvious to a POSITA to focus on the pre-coating thickness and the thickness of the coating after hot-stamping as parameters to be varied and optimized.

For example, various prior art documents attest to the importance of layer thickness for determining its properties and effectiveness. RX-0019 (Cornette) at 9; RX-0119 (JP2004244704A – "Maki") (VINFAST1402-00005014) at [0013]; RX-0067 (GMW14400) (VINFAST1402-00002701) at 7. 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 pre-coating thickness to a "typical" thickness of the alloyed "Fe-Al-Si" layer of "about 40 µm at the steel surface." RX-0019 (Cornette) at 9. JP2004-244704 ("Maki") notes that "[a] thickness of 20 µm or more is preferred because a thicker layer responsible for corrosion resistance results in greater overall corrosion resistance and a longer material life. Although there are no particular restrictions on the upper limit, the plating thickness is preferably no more than 60 µm due to the upper limit

[redacted]

on plating thickness that can be stably produced using the hot-dip plating method." RX-0119 (Maki) at [0013]. Further, GMW14400 requires a coating thickness of ">35" µm in order to provide vehicle parts to General Motors. RX-0067 (GMW14400) (VINFAST1402-00002701) at 7; CX-0084C (Brown Rpt.) ¶ 125.

Indeed, when the prior art recognizes a certain parameter as result-effective, it would have been obvious to a POSITA to optimize that parameter. CX-0084C (Brown Rpt.) ¶ 126. A parameter is "result-effective" when its variation or adjustment achieves a recognized result. Here, the references identified above demonstrate that a POSITA would have found it obvious to try varying and experimenting with different coating thicknesses in order to obtain a thickness recognized by the art as beneficial. *Id.* For example, it would have been obvious for a POSITA to seek to obtain a coating thickness of "about 40 µm" by using a pre-coating thickness of "25 µm" as taught by Cornette, in order to achieve "the best compromise between corrosion protection and weldability." RX-0019 (Cornette) at 9. Further reinforcing the obvious of this combination, these values of Cornette are within the ranges specified as desirable by Maki and GMW14400. RX-0119 (Maki) (VINFAST1402-00005014) at [0013], RX-0067 (GMW14400) (VINFAST1402-00002701) at 7.

A POSITA would have had a reasonable expectation of success in combining Takagi with Cornette to obtain thicker coatings, e.g., coatings of about 40 µm. CX-0084C (Brown Rpt.) ¶ 127. Cornette's pre-coating thickness of 25 µm represents only a 25% difference compared to the 20 µm pre-coating thickness described by Takagi, a relatively small change. And the efficacy of adjusting pre-coating thickness to modify coating thickness is corroborated by FR2833504 ("FR Laurent"), which describes that alloying of a pre-coating "generally corresponds to a 50% increase" in thickness for the resulting coating. RX-0111 (FR Laurent) (VINFAST1402-

[redacted]

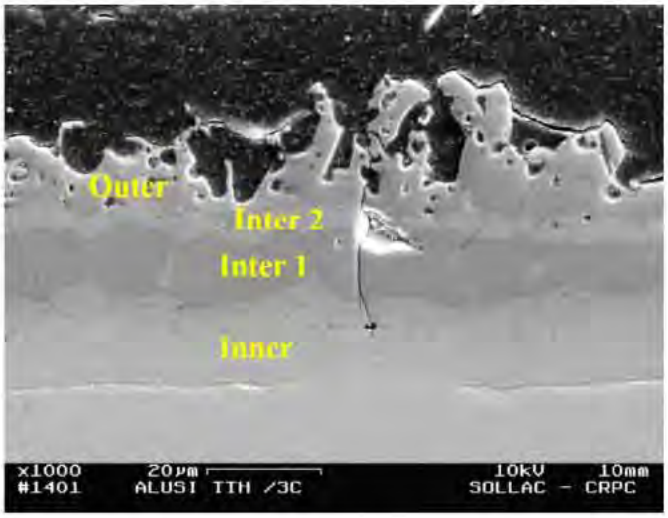
00004549) at 5:17-20. Notably, this general rule matches the relationship reported by Cornette, as an increase of 50% compared to Cornette's 25 µm pre-coating thickness is 37.5 µm, or "about 40 µm." RX-0019 (Cornette) at 9. As such, obtaining the desired coating thickness would have entailed nothing more than applying Cornette's known techniques and parameters to Takagi to obtain a predictable result. CX-0084C (Brown Rpt.) ¶ 127.

It would also have been obvious to experiment by modifying other aspects of Takagi's hot-stamping process based on Cornette's disclosure. CX-0084C (Brown Rpt.) ¶ 128. For example, it would have been obvious to try using, as the base steel, the USIBOR 1500 steel noted by Cornette, which provides "excellent mechanical properties of the material after the press hardening process with good corrosion protection." RX-0019 (Cornette) at 9. And the POSITA would have found it obvious to try varying the various heating parameters described by Takagi, e.g., within the thermal process window ("Heating 5-10 min. 880-950˚C" or "generally 900°C, 5 minutes") described by Cornette. *Id.* For example, Takagi recognizes each of heating rate, heating temperature, rate of primary cooling, forming temperature, and quenching rate as result-effective. RX-0104 (Takagi) at [0019] and [0026]-[0037]. In experimenting and/or modifying Takagi based on Cornette, a POSITA would have been motivated by Cornette's disclosure that these process parameters (represented, for example, by Cornette's FIG. 22 coating) provide "good results" for weldability, have "good capacity" for corrosion resistance, and are offer desirable paint adherence. RX-0019 (Cornette) at 10-11. A POSITA would have had a reasonable expectation that these modifications would be successful: for example, Cornette's heating temperatures and times are within Takagi's disclosed ranges. RX-0104 (Takagi) at [0047]; CX-0084C (Brown Rpt.) ¶ 128.

As a result, based on the foregoing routine experimentation, a POSITA would have arrived at various coatings with layers having various thicknesses and compositions. For example, a

[redacted]

POSITA would have arrived at "Takagi-Cornette coatings No. 1, 4, and 5" having, for each of their four or five layers, the layer composition described for Takagi's No. 1, 4, or 5 coatings (or similar composition), and having a total coating thickness of "about 40 µm." CX-0084C (Brown Rpt.) ¶ 129. For example, as discussed above in this section, it would have been obvious to achieve this coating thickness by using a pre-coating thickness of about 25 µm, as taught by Cornette. Further, in view of their similar four-layer structures, a POSITA would have arrived at the Takagi-Cornette No. 5 coating such that the coating would have the layer thicknesses and morphologies shown in Cornette FIG. 22 (or similar thicknesses and morphologies). This correspondence of the layer thicknesses/morphologies for the Takagi-Cornette No. 5 coating is shown in annotated Cornette FIG. 22. RX-0019 (Cornette) at FIG. 22 (annotated).



Indeed, obtaining the foregoing compositions and coating thickness (and, in the case of the Takagi-Cornette No. 5 coating, the layer thicknesses/morphologies of Cornette FIG. 22) would require experimentation and some degree of trial and error, within the finite number of possible experimental values for some or all of the foregoing thermal treatment parameters and within reasonable expected variation for the relationship between pre-coating thickness and coating thickness. CX-0084C (Brown Rpt.) ¶130. However, given (i) the relatively small increase in pre-coating thickness associated with a modification of Takagi based on Cornette's pre-coating thickness (only from 20 µm to 25 µm), (ii) the art's recognition that layer characteristics (e.g., hardness and corrosion resistance, as discussed by Takagi) depend directly on layer composition,

[redacted]

(iii) the art's clear recognition of the most relevant process parameters for modifying layer compositions and thicknesses, and (iv) in the case of the Takagi-Cornette No. 5 coating, the fact that both Takagi's No. 5 coating and Cornette's coating include four layers, the manufacture of the modified coatings would have been obvious. *Id.*; RX-0104 (Takagi) at [0019]-[0026].

As a result, the Takagi-Cornette coatings No. 1, 4, and 5 are members of a wide class of coatings that are rendered obvious by Takagi in view of Cornette. CX-0084C (Brown Rpt.) ¶ 131. For example, insofar as any aspects of the coating layers described in the '602 patent may be the result of specific heating parameters or pre-coating parameters, a POSITA would have arrived at such layers by routine experimentation. The values in Takagi and Cornette are generally identical or very similar to the values disclosed in the '602 patent. Further, the '602 patent includes no disclosure to suggest an unexpected criticality in any of these parameters that would place any of the claimed layer parameters outside the bounds of routine experimentation. When comparing the '602 patent to the prior art, a POSITA would have seen very similar processes being applied to very similar steel parts. CX-0084C (Brown Rpt.) ¶ 131.

Parameter	'602 patent	'602 patent Example 2	Takagi	Cornette
Pre-coating thickness (μm)	20 – 33	---	10 – 20	25
Heating rate (˚C/s)	4 - 12	10	8; 1-10	---
Temperature (˚C)	880 - 940	920	900, 920, 950	880-950; 900
Hold time (min)	< 3 – 13	< 6	3, 4, 5; 2-8; 2-10	<[10] 5 – 10; 5
Cooling rate (˚C/s)	> 30, or > 50		20 – 100; 30	---

JX-0002 ('602 patent) at 5:17-18, 6:63-67, 7:1, 7:10-14, 7:41-45, 11:11-14, 12:32-40; RX-0104 (Takagi) at [0026], [0028], [0037], Table 1; RX-0019 (Cornette) at 9. Thus, a POSITA would

[10] "<" here indicates that the disclosed time includes both the heating ramp-up time and the hold time.

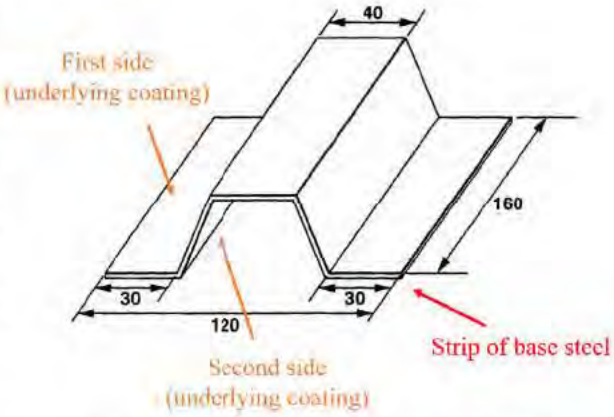
[redacted]

have had a reasonable expectation that Cornette's and Takagi's teachings could be combined to obtain coatings having the 40 μm thickness of Cornette. CX-0084C (Brown Rpt.) ¶ 132.

2.) Claim 1

Takagi discloses and renders obvious limitation [1pre] of the '602 patent—a precoated steel product. CX-0084C (Brown Rpt.) ¶ 134. The modified Takagi parts are "precoated steel product[s]" or "precoated steel stamped blanks."[11] *Id.* Takagi describes that, in the "[t]est [p]rocedure" used for producing Takagi's samples, "[f]rom the [] hot-dip aluminum-coated steel sheet, a flat plate [] was cut out, heat-treated [] and formed into a shape shown in FIG. 1." RX-0104 (Takagi) at [0036]. "Form[ing]" refers to stamping, because the blanks are "formed" into a part by the stamping. Further, as discussed above in the overview of Cornette, Cornette throughout refers to "hot stamping," and Cornette FIG. 22 illustrates a hot-stamped product. RX-0019 (Cornette) at 10-11.

Takagi discloses and renders obvious limitation [1a] of the '602 patent—a strip of base steel. CX-0084C (Brown Rpt.) ¶ 135. For example, the Takagi-Cornette parts No. 1, 4, and 5 include a strip of base steel having a first side and a second side. These sides are shown, for example, in Takagi FIG. 1, which illustrates the "shape" of the hot-stamped parts of Takagi No. 1, 4, and 5. RX-0104 (Takagi) at FIG. 1 (annotated). This shape is obtained by "form[ing]" a "flat plate." *Id.* at [0036]. A POSITA would have understood that the "base steel" of the FIG. 1 part, and its two sides, would be underneath a coating, the coating formed by "hot-dip[ping]," e.g., "immersing a strip continuously in a bath of molten aluminum" (or aluminum-silicon).



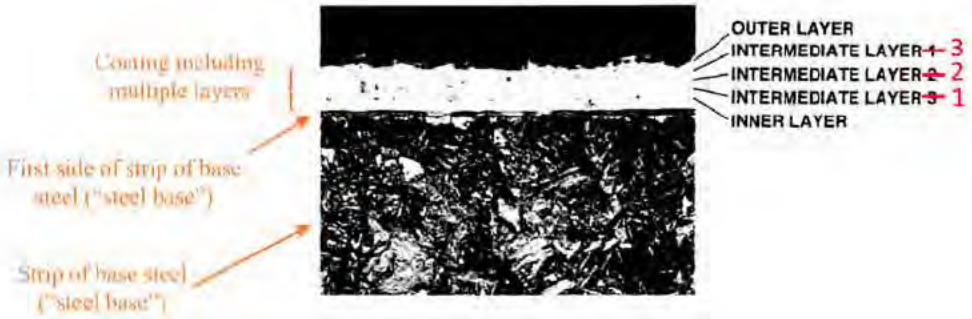
[11] Drawing upon the definition of "product" provided in the '602 patent. JX-0002 at 14:56.

[redacted]

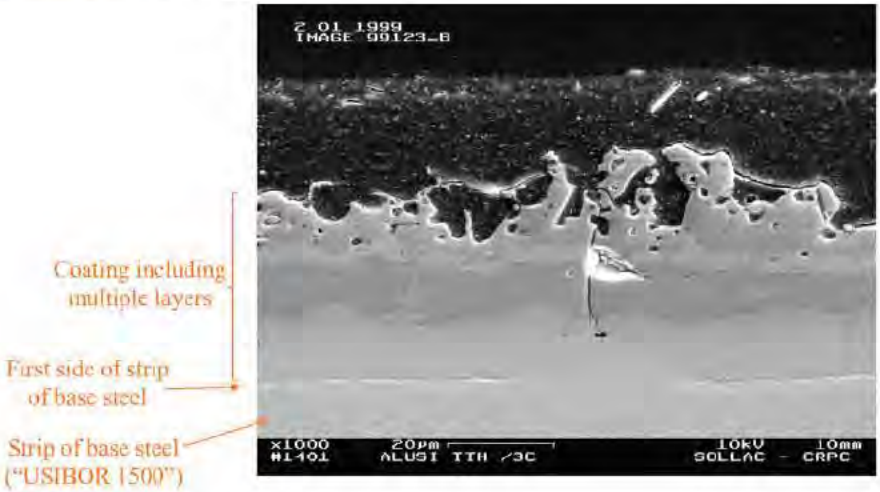
Id. at [0013]. In FIG. 1, the visible surfaces are surfaces of the coating, but a POSITA would have understood that a strip of base steel with two sides was under the coating. This is corroborated by Cornette, which describes the presence of a "base material" or "substrate" of "boron steel." RX-0019 (Cornette) at 9.

Takagi discloses and renders obvious limitation [1b] of the '602 patent—a coating on the base steel. CX-0084C (Brown Rpt.) ¶¶ 136-137. The Takagi-Cornette parts include the recited coating, as illustrated, for example, in Takagi FIG. 2A and in Cornette FIG. 22. As discussed above, the Cornette FIG. 22 coating corresponds to the Takagi No. 5 coating.

FIG.2A



RX-0104 (Takagi) at FIG. 2A (annotated and corrected).



[redacted]

RX-0019 (Cornette) at FIG. 22 (annotated).

These coatings result from interdiffusion between the base steel, and an aluminum or aluminum alloy pre-coating. For example, Takagi describes that "[d]uring 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." RX-0104 (Takagi) at [0016]. Similarly, Cornette describes an "alloying reaction between substrate (iron) and the coating (aluminum – silicon) which leads to a hard multiphase alloy layer." RX-0019 (Cornette) at 9. A POSITA would have understood this "alloying reaction" to be equivalent to or involve interdiffusion.

Takagi discloses and renders obvious limitations [1c]-[1f] of the '602 patent. CX-0084C (Brown Rpt.) ¶¶ 138-45. Under ArcelorMittal's infringement theory, Takagi discloses (a) an interdiffusion layer, (b) an intermediate layer, (c) an intermetallic layer, and (d) a superficial layer, with the recited mean iron compositions.

Claim 1 of the '602 patent recites layers (a)-(d). In one example, as shown in annotated Takagi FIG. 2A below, a POSITA would have understood that the Inner, Inter 2, Inter 3, and Outer layers of each of the Takagi-Cornette No. 1 and 4 coatings would teach the recited layers (a), (b), (c), and (d), respectively. In another example, a POSITA would have understood that the Inner, Inter 1, Inter 2, and Outer layers of the Takagi-Cornette No. 5 coating (which lacks an Inter 3 layer) would teach the recited layers (a), (b), (c), and (d), respectively. These mappings are summarized in the table below. A POSITA would have understood that other mappings would also possible.

[redacted]

Takagi layer	No. 1 and 4 mapping	No. 5 mapping
Outer	Layer (d)	Layer (d)
Inter 3	Layer (c)	--
Inter 2	Layer (b)	Layer (c)
Inter 1	--	Layer (b)
Inner	Layer (a)	Layer (a)

The compositions and thickness/morphology of the Takagi-Cornette coatings' layers, in association with the corresponding layers of the '602 Patent, are shown in the annotated Takagi Table 1 below.

Corresponding layers of '602 patent

(a) (b) (c) (d)

TABLE 1

No.	PRODUCTION		COATING LAYER STRUCTURE & COMPOSITION (%)						STEEL BASE HARDNESS (Hv)	COATING LAYER HARDNESS (Hv)			OXIDE WEIGHT (mg/dm²)	FORMABILITY	CORROSION RESISTANCE	WELDABILITY
	RAISED TEMPERATURE (°C)	HOLD TIME (min.)	COMPONENT & HARDNESS	INNER	INTER 1	INTER 2	INTER 3	OUTER		SOFTEST	AVERAGE	SOFTER RANGE (%)				
1	920	3	Al	7.7	31.0	48.4	31.6	54.8	450	310	415	51	300	○	○	○
			Si	2.0	3.9	1.2	5.7	0.8								
			Fe	89.5	65.9	50.1	62.0	44.5								
			Hv	310	360	750	700	800								
2	900	2	Al	27.2	48.4	31.6	–	54.9	415	380	455	22	275	×	○	○
			Si	4.1	1.2	5.7		0.8								
			Fe	67.2	50.1	61.9		44.1								
			Hv	380	760	720	–	810								
3	930	10	Al	9.4	–	–	–	11.6	400	305	385	78	550	○	×	×
			Si	1.3				1.8								
			Fe	88.4				85.7								
			Hv	305	–	–	–	410								
4	950	5	Al	6.0	27.8	51.9	30.4	47.4	440	280	400	59	385	○	○	○
			Si	1.5	4.3	0.6	5.3	2.2								
			Fe	90.7	66.7	46.8	63.1	49.8								
			Hv	280	340	720	690	800								
5	900	4	Al	3.2	54.5	33.4	–	54.5	440	300	410	56	335	○	○	○
			Si	0.4	2.5	15.3		6.8								
			Fe	94.3	42.7	51.4		38.4								
			Hv	300	740	700	–	810								

(a) (b) (c) (d)

RX-0104 (Takagi) at Table 1 (annotated).

The "interdiffusion layer" corresponds to the Inner layer of the Takagi-Cornette No. 1, 4, and 5 coatings of Takagi. According to Takagi's Table 1, this Inner layer has first mean iron compositions of 89.6%, 90.7%, and 94.3% in the Takagi-Cornette No. 1, 4, and 5 coatings, respectively. CX-0084C (Brown Rpt.) ¶ 140.

[redacted]

The layer corresponding to the intermediate layer (Inter 2 for the No. 1 and 4 coatings and Inter 1 for the No. 5 coating) has second mean iron compositions of 50.1%, 46.8%, and 42.7%, respectively. These second mean iron compositions are different from the corresponding first mean iron compositions of the interdiffusion layer. CX-0084C (Brown Rpt.) ¶ 143.

The layer corresponding to the intermetallic layer (Inter 3 for the No. 1 and 4 coatings, and Inter 2 for the No. 5 coating) has third mean iron compositions of 62.0%, 63.1%, and 51.4%, respectively. These third mean iron compositions are different from the corresponding first and second mean iron compositions, and are also higher than the corresponding second mean iron compositions. CX-0084C (Brown Rpt.) ¶ 144.

The Outer layer, which corresponds to the superficial layer, has fourth mean iron compositions of 44.5%, 49.8%, and 38.4% for the No. 1, 4, and 5 coatings, respectively. These fourth mean iron compositions are different from the corresponding third mean iron compositions. CX-0084C (Brown Rpt.) ¶ 145.

Based on Takagi's description that the percentages in Table 1 are "percent by mass," a POSITA would have understood that these percentages refer to "mean" compositions. RX-0104 (Takagi) at [0020]. A POSITA would have understood that, in the field of steel metallurgy (and material science more generally), a disclosure of a composition for a material, phase, or layer implicitly is, and would have been understood as, a disclosure of a mean composition of the material, phase, or layer. Absent a statement or suggestion otherwise – which Takagi does not provide – a POSITA would have understood Takagi's disclosures of compositions to be disclosures of mean compositions, thereby satisfying the claim elements. CX-0084C (Brown Rpt.) ¶¶ 141-42.

Takagi in combination with Cornette renders obvious limitation [1g] of the '602

[redacted]

patent—coating thickness greater than 30 µm. CX-0084C (Brown Rpt.) ¶ 146. Under ArcelorMittal's infringement theory for thickness, it would have been obvious to a POSITA that the Takagi-Cornette No. 1, 4, and 5 coatings would be modified to have thicknesses of about 40 µm, satisfying the recitation of "greater than 30 micrometers." *Id.* ¶ 146. For example, based on Cornette, it would have been obvious to a POSITA to try varying process parameters such as thermal parameters and/or pre-coating thickness, as a matter of routine experimentation, to arrive at a coating having the thickness of the coating shown in Cornette FIG. 22. Based on the scale included in that drawing, the thickness of that coating, for at least one measurement position, is approximately 32.3 µm. This measurement is shown in the annotated drawing below. RX-0019 (Cornette) at FIG. 22 (annotated). In fact, this relationship is corroborated by FR2833504 ("FR Laurent"), which describes that alloying of a pre-coating "generally corresponds to a 50% increase" in thickness for the resulting coating, which would result in a 30 µm coating thickness if applied to Takagi's 20 µm pre-coating thickness. RX-0111 (FR Laurent) (VINFAST1402-00004549), 5:17-20.

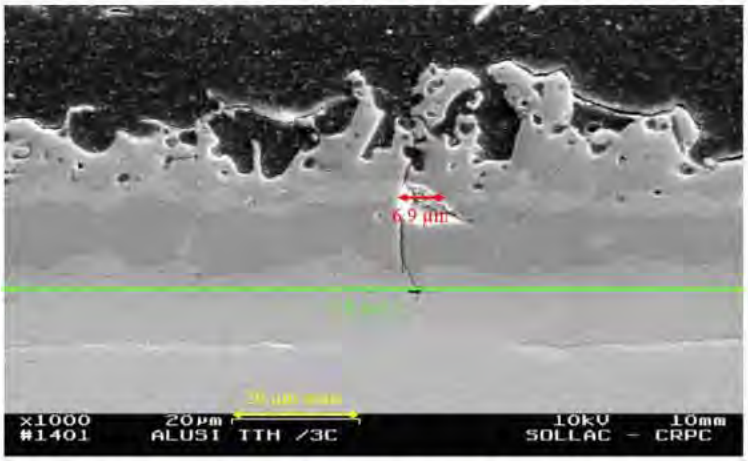
3.) Claim 2

Takagi in combination with Cornette renders obvious claim 2 of the '602 patent—intermetallic and superficial layers are quasi continuous by occupying at least 90% of a level corresponding to each of the intermetallic and superficial layers and wherein less than 10% of intermetallic layer is present at an extreme surface of the product. CX-0084C (Brown Rpt.) ¶¶ 147-150. As explained above in Section § III.B.2, ArcelorMittal's expert Dr. Fekete does not offer any analysis as to what the claimed "level" is, and how layers (c) and (d) occupies at least

[redacted]

90% of this undefined level. To the extent ALJ finds infringement of claim 2 based on insufficient information presented by ArcelorMittal, Takagi as modified by Cornette renders obvious claim 2. CX-0084C (Brown Rpt.) ¶¶ 148-49.

In Cornett Fig. 22, layers (c) and (d) extend continuously or essentially continuously across the entire image as shown below. A POSITA would have considered the layers to be continuous or essentially continuous (or quasi continuous) despite this segment. To the extent that this segment is considered to make the layer discontinuous, the segment occupies only about 6% (6.9 µm/116 µm) of the total width of FIG. 22. Therefore, layer (c) in Cornette FIG. 22 is "quasi-continuous" even if the indicated red section is interpreted as a discontinuity. CX-0084C (Brown Rpt.) ¶¶ 148-49, 393. RX-0019 (Cornette) at FIG. 22 (annotated); CX-0084C (Brown Rpt.) ¶¶ 148-49.

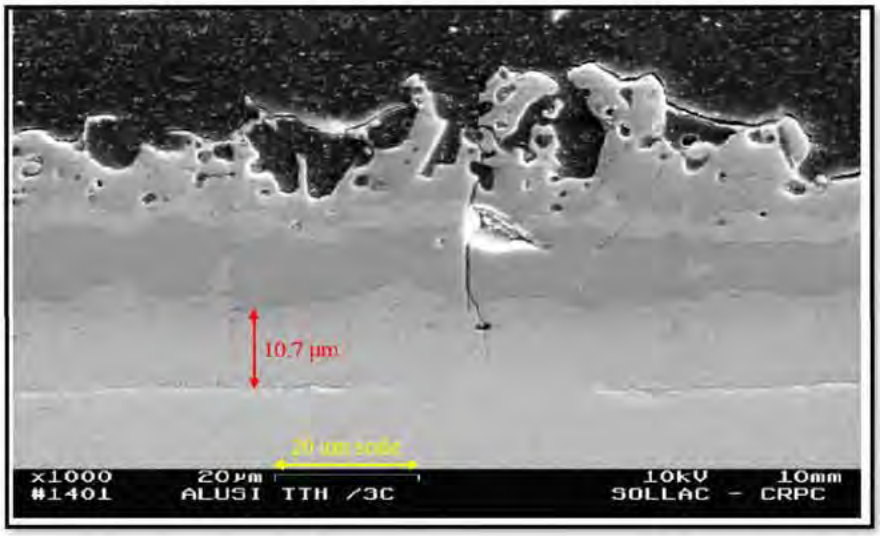


Further, Cornette FIG. 22 illustrates, based on visual inspection and the relative shadings of different layers, that essentially none of the second-highest layer (corresponding to layer (c) of the Takagi-Cornette No. 5 coating) is present at the extreme surface of the coating. CX-0084C (Brown Rpt.) ¶ 150.

4.) Claim 9

Takagi in combination with Cornette renders obvious claim 9 of the '602 patent—interdiffusion layer thickness less than 15 micrometers. CX-0084C (Brown Rpt.) ¶ 153. Based on ArcelorMittal's analysis for thickness, the layer of Cornette's coating that is adjacent the base steel (which corresponds to layer (a) of the '602 Patent) has a measured thickness of 10.7 µm.

[redacted]



RX-0019 (Cornette) at Fig. 22 (annotated).

5.) Claim 10

Takagi in combination with Cornette renders obvious claim 10 of the '602 patent—interdiffusion layer thickness less than 10 micrometers. CX-0084C (Brown Rpt.) ¶¶ 154-58. As discussed above in relation to claim 9, Cornette's coating that is adjacent the base steel (which corresponds to layer (a) of the '602 Patent) has a thickness of 10.7 µm. The thickness of layer (a) is "directly" related to the temperature of the furnace and dwell time in the furnace, and the thickness of the interdiffusion layer (a) is nothing more than a design choice that would be well within the capabilities of a POSITA. *See* CX-0617C (AM-ITC-0094851) at 874; RX-1282C (Drillet Tr.) at 115:18-22; CX-0084C (Brown Rpt.) ¶¶ 158, 404. A POSITA would have found it obvious to experiment with the coating thickness to arrive at the claimed less than 10 µm. CX-0084C (Brown Rpt.) ¶ 154. In fact, Takagi also describes that the layer can be tuned "by controlling the raised temperature of the heating and the holding time at the raised temperature." RX-0104 (Takagi) at [0019], [0037]; RX-0019 (Cornette) at 9; CX-0084C (Brown Rpt.) ¶ 158. Also, the 0.7 µm difference between 10.7 µm and 10 µm would have been less than manufacturing tolerances for layer thicknesses of coatings on hot-stamped steel parts. RX-0067 (GMW14400) at

[redacted]

3; CX-0084C (Brown Rpt.) ¶ 155. This is corroborated by Passat where the cross-sectional SEM micrograph of the Passat 1049 B-pillar shows a coating with interdiffusion layer average thickness of 9.4 µm based on two measurements slightly greater than 10 µm (*i.e.*, 10.2 µm and 10.5 µm) and five measurement less than 10 µm. RX-0086 (VINFAST1402-00003562) (annotated); CX-0083C (Bradley Passat Rpt.) ¶¶ 33-34. And a POSITA would not have recognized the "10 micrometers thick" characteristic as providing any notable benefit. *Id.* ¶ 156. A POSITA would have been motivated to try adjusting its thickness as a matter of routine optimization. *Id.* ¶ 157; RX-0104 (Takagi) at [0017].

6.) Claim 18

Takagi in combination with Cornette renders obvious claim 18 of the '602 patent—interdiffusion layer thickness between 1 micron and 15 microns. CX-0084C (Brown Rpt.) ¶ 164. *See* discussion above at '602 patent claim 9 of Cornette disclosing interdiffusion layer thickness of 10.7 µm.

7.) Claim 20

Takagi in combination with Cornette renders obvious claim 20 of the '602 patent—fourth mean iron composition lower than third mean iron composition. CX-0084C (Brown Rpt.) ¶ 165. *See* discussion above at '602 patent claim elements [1e]-[1f]. The fourth mean iron compositions of the Takagi-Cornette No. 1, 4, and 5 coatings are 44.5%, 49.8%, and 38.4%, respectively, which are lower than the third mean iron compositions of 62.0%, 63.1%, and 51.4%, respectively. RX-0104 (Takagi) at Table 1.

8.) Claim 21

Takagi in combination with Cornette renders obvious claim 21 of the '602 patent. CX-0084C (Brown Rpt.) ¶¶ 166-74. *See* § III.D.4.ii.2 analyzing claim 1 limitations [1pre]-[1g]. With respect to limitation [21f], the fourth mean iron compositions disclosed by Takagi

[redacted]

(corresponding to the iron compositions of the Outer layers of the No. 1, 4, and 5 coatings) are 44.5%, 49.8%, and 38.4%, respectively, which are different from the iron compositions disclosed for the other layers of those coatings. RX-0104 (Takagi) at Table 1.

9.) Claim 22

Takagi in combination with Cornette renders obvious claim 22 of the '602 patent—fourth mean iron composition lower than third mean iron composition. CX-0084C (Brown Rpt.) ¶ 175. *See* discussion above at § III.D.4.ii.7 ('602 patent claim 20) of Takagi disclosing fourth mean iron composition lower than third mean iron composition.

10.) Claim 24

Takagi in combination with Cornette renders obvious limitations [24pre]-[24g] of the '602 patent. CX-0084C (Brown Rpt.) ¶¶ 176-85. *See* § III.D.4.ii.2 analyzing claim 1 limitations [1pre]-[1g]. With respect to the aluminum composition limitations of [24c]-[24f], Takagi discloses that layers (a), (b), (c), and (d) have the recited mean aluminum compositions. CX-0084C (Brown Rpt.) ¶¶ 179-84. According to Takagi's Table 1, the Inner layer, corresponding to the interdiffusion layer of the Takagi-Cornette No. 1, 4, and 5 coatings, has first mean aluminum compositions of 7.7%, 6.0%, and 3.2%, respectively. CX-0084C (Brown Rpt.) ¶ 179. The layer corresponding to the intermediate layer (Inter 2 for the No. 1 and 4 coatings and Inter 1 for the No. 5 coating) has second mean aluminum compositions of 48.4%, 51.9%, and 54.5%, respectively. These second mean aluminum compositions are different from the corresponding first mean aluminum compositions of the interdiffusion layer. CX-0084C (Brown Rpt.) ¶ 180.

The layer corresponding to the intermetallic layer (Inter 3 for the No. 1 and 4 coatings and Inter 2 for the No. 5 coating) has third mean aluminum compositions of 31.6%, 30.4%, and 33.4%, respectively. These third mean aluminum compositions are different from the corresponding first and second mean aluminum compositions. CX-0084C (Brown Rpt.) ¶ 181.

[redacted]

The Outer layer, which corresponds to the superficial layer, has fourth mean aluminum compositions of 54.8%, 47.4%, and 54.5% for the No. 1, 4, and 5 coatings, respectively. These fourth mean aluminum compositions are different from the corresponding first, second, and third mean aluminum compositions for the No. 1 and 4 coatings. CX-0084C (Brown Rpt.) ¶ 182. For the No. 5 coating, the fourth mean aluminum composition is different from the first and third mean aluminum compositions but matches the second mean aluminum composition (54.5%). However, it would have been obvious, as a matter of routine experimentation, to try varying the second and/or fourth aluminum compositions. CX-0084C (Brown Rpt.) ¶¶ 183, 159-62. For example, a POSITA would have noted Takagi's extensive discussion of the importance of Al% for corrosion resistance and layer hardness and would have found it obvious to experiment with the Al% to optimize these characteristics (e.g., by modifying the thermal parameters discussed by Takagi as result-effective). RX-0104 (Takagi) at [0019]-[0037]. As a result of this experimentation, it would have been obvious to arrive at second and fourth mean aluminum compositions that are at least slightly different from one another, thereby satisfying this claim limitation for the Takagi-Cornette No. 5 coating. Further, for each of the No. 1, 4, and 5 coatings, the second mean aluminum composition (48.4%, 51.9%, and 54.5%, respectively) is greater than the third mean aluminum composition (31.6%, 30.4%, and 33.4%, respectively). CX-0084C (Brown Rpt.) ¶ 184.

11.) Claim 26

Takagi in combination with Cornette renders obvious claim 26 of the '602 patent—interdiffusion layer has a thickness less than 15 micrometers. CX-0084C (Brown Rpt.) ¶ 188. *See* discussion above at § III.D.4.ii.4 ('602 patent claim 9) of Cornette disclosing interdiffusion layer thickness of 10.7 μm, which is less than 15 micrometers.

[redacted]

b. Takagi in combination with Cornette and Laurent

1.) Motivation to combine

A POSITA would have been motivated to combine Laurent with Takagi and Cornette. CX-0084C (Brown Rpt.) ¶¶ 190-92. Laurent describes "steel sheet[s]" having compositions that "ensur[e] a very high mechanical resistance after thermal treatment." RX-0109 (Laurent '805) at 1:47-62. A POSITA would have found it obvious to try using these steel compositions in the hot stamping processes described by Takagi and Cornette. This would have constituted no more than substitution of one element (the Laurent steel) for another (the "steel base material" of Takagi or the USIBOR 1500 steel of Cornette) known in the field. RX-0104 (Takagi) at [0043]; RX-0019 (Cornette) at 9. A POSITA would have been motivated at least by Laurent's discussion of the advantages of such a steel and, more particularly, the specified advantages associated with the particular elements and concentrations of the elements of the steel. CX-0084C (Brown Rpt.) ¶ 191.

Further, as shown in the table below, Laurent's steel and the USIBOR 1500 steel disclosed by Cornette have generally similar compositions, such that the substitution of one for the other would have constituted a minor modification within the general conditions of what was already in use.

[redacted]

Element	USIBOR 1500 composition (%) in Cornette	Laurent Composition (%)
C	0.20% ≤ C ≤ 0.25%	0.20% < C < 0.5%
Mn	1.1% ≤ Mn ≤ 1.35%	0.8% < Mn < 1.5%
Si	0.15% ≤ Si ≤ 0.35%	0.1% < Si < 0.35%
Cr	0.15% ≤ Cr ≤ 0.30%	0.01% < Cr < 1%
Ti	0.02% ≤ Ti ≤ 0.05%	Ti < 0.1%
Al	0.02% ≤ Al ≤ 0.06%	Al < 0.1%
P	--	P < 0.05%
S	S ≤ 0.008%	S < 0.03%
B	0.002% ≤ B ≤ 0.004%	0.0005% < B < 0.01%

RX-0019 (Cornette) at 9; RX-0109 (Laurent '805) at 1:66-2:10; CX-0084C (Brown Rpt.) ¶ 192.

2.) Claims 3 and 4

Takagi in combination with Cornette and Laurent renders obvious claims 3 and 4 of the '602 patent—base steel chemical compositions. CX-0084C (Brown Rpt.) ¶¶ 193-96. Laurent composition either exactly matches, falls fully within, or overlaps substantially with, the claimed composition of '602 patent claims 3 and 4. As shown in the below chart, Laurent's disclosure of "preferabl[e]" "steel composition by weight" teaches each of the recited compositions of claims 3 and 4.

Element	Claim [3] composition	Claim [4] composition	Laurent composition (col.2)
C	0.15% < C < 0.5%	0.2% < C < 0.5%	0.20% < C < 0.5%
Mn	0.5% < Mn < 3%	0.8% < Mn < 1.5%	0.8% < Mn < 1.5%
Si	0.1% < Si < 0.5%	0.1% < Si < 0.35%	0.1% < Si < 0.35%
Cr	0.01% < Cr < 1%	0.01% < Cr < 1%	0.01% < Cr < 1%
Ti	Ti < 0.2%	Ti < 0.1%	Ti < 0.1%
Al	Al < 0.1%	Al < 0.1%	Al < 0.1%
P	P < 0.1%	P < 0.05%	P < 0.05%
S	S < 0.05%	S < 0.03%	S < 0.03%
B	0.0005% < B < 0.08%	0.0005% < B < 0.01%	0.0005% < B < 0.01%
Remainder	"iron and impurities inherent in processing"	"iron and impurities inherent in processing"	"iron and impurities inherent in processing"

RX-0109 (Laurent '805) at 1:66-2:10; CX-0084C (Brown Rpt.) ¶ 194.

[redacted]

3.) Claims 7 and 8

Takagi in view of Cornette and Laurent renders obvious claims 7 and 8 of the '602 patent—base steel titanium to nitrogen ratio. CX-0084C (Brown Rpt.) ¶¶ 197-98. Laurent discloses "[t]itanium, the ratio of the content of which with respect to the nitrogen content should be in excess of 3.42, is introduced in order to prevent combining of the boron with the nitrogen, the nitrogen being combined with titanium." RX-0109 (Laurent '805) at 4:25-28. This is exactly the ratio recited in claims 7 and 8. It would have been obvious to use a base steel having this composition relationship in order to obtain the recited benefit of preventing combining of boron with nitrogen. CX-0084C (Brown Rpt.) ¶ 197.

iii. Cornette Grounds

a. Cornette alone

1.) Claim 1

To the extent Cornette does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 284-302.

Cornette renders obvious limitation [1pre] of the '602 patent—a precoated steel product. *See* § III.D.3.iii.a ('602 patent limitation [1pre]).

Cornette renders obvious limitation [1a] of the '602 patent—a strip of base steel. *See* § III.D.3.iii.a ('602 patent limitation [1a]).

Cornette renders obvious limitation [1b] of the '602 patent—a coating on the base steel. *See* § III.D.3.iii.a ('602 patent limitation [1b]).

Cornette renders obvious limitation [1c] of the '602 patent—an interdiffusion layer having a first mean iron composition. *See* § III.D.3.iii.a ('602 patent limitation [1c]).

Cornette renders obvious limitation [1d] of the '602 patent—an intermediate layer

[redacted]

having a second mean iron composition different from the first mean iron composition. *See* § III.D.3.iii.a ('602 patent limitation [1d]).

Cornette renders obvious limitation [1e] of the '602 patent—an intermetallic layer having 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. *See* § III.D.3.iii.a ('602 patent limitation [1e]).

Cornette renders obvious limitation [1f] of the '602 patent—a superficial layer having a fourth mean iron composition different from the third mean iron composition. *See* § III.D.3.iii.a ('602 patent limitation [1f]).

Cornette renders obvious limitation [1g] of the '602 patent—coating thickness greater than 30 µm. *See* § III.D.3.iii.a ('602 patent limitation [1g]).

2.) **Claim 2**

Cornette renders obvious claim 2 of the '602 patent—intermetallic and superficial layers are quasi continuous by occupying at least 90% of a level corresponding to each of the intermetallic and superficial layers and wherein less than 10% of intermetallic layer is present at an extreme surface of the product. *See* § III.D.3.iii.b ('602 patent claim 2). To the extent Cornette does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious. CX-0084C (Brown Rpt.) ¶¶ 303-06.

3.) **Claim 3**

Cornette renders obvious claim 3 of the '602 patent—base steel chemical compositions. *See* § III.D.3.iii.c ('602 patent claim 3). To the extent Cornette does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 307-09.

[redacted]

4.) **Claim 4**

Cornette renders obvious claim 4 of the '602 patent—base steel chemical compositions. *See* § III.D.3.iii.d ('602 patent claim 4). To the extent Cornette does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 310-11.

5.) **Claim 7**

Cornette renders obvious claim 7 of the '602 patent—base steel titanium to nitrogen ratio. *See* § III.D.3.iii.e ('602 patent claim 7). To the extent Cornette does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 315-17.

6.) **Claim 8**

Cornette renders obvious claim 8 of the '602 patent— base steel titanium to nitrogen ratio. *See* § III.D.3.iii.f ('602 patent claim 8). To the extent Cornette does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶ 318.

7.) **Claim 9**

Cornette renders obvious claim 9 of the '602 patent—interdiffusion layer thickness less than 15 micrometers. *See* § III.D.3.iii.g ('602 patent claim 9). To the extent Cornette does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶ 319.

8.) **Claim 10**

Cornette renders obvious claim 10 of the '602 patent—interdiffusion layer thickness less than 10 micrometers. *See* § III.D.3.iii.h ('602 patent claim 10). To the extent Cornette does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any

[redacted]

modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 320-23.

9.) **Claim 18**

Cornette renders obvious claim 18 of the '602 patent—interdiffusion layer thickness between 1 micron and 15 microns. *See* § III.D.3.iii.i ('602 patent claim 18). To the extent Cornette does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 324-25.

10.) **Claim 20**

Cornette renders obvious claim 20 of the '602 patent—fourth mean iron composition lower than third mean iron composition. *See* § III.D.3.iii.j ('602 patent claim 20). To the extent Cornette does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 326-28.

11.) **Claim 21**

Cornette renders obvious claim 21 of the '602 patent. *See* § III.D.3.iii.k ('602 patent claim 21). To the extent Cornette does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 329-39.

12.) **Claim 22**

Cornette renders obvious claim 22 of the '602 patent. *See* § III.D.3.iii.l ('602 patent claim 22). To the extent Cornette does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶ 340.

13.) **Claim 24**

Cornette renders obvious claim 24 of the '602 patent. *See* § III.D.3.iii.m ('602 patent claim 24). To the extent Cornette does not expressly disclose each of the limitations sufficient to

[redacted]

show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 341-56.

14.) **Claim 26**

Cornette renders obvious claim 26 of the '602 patent—interdiffusion layer has a thickness less than 15 micrometers. *See* § III.D.3.iii.n ('602 patent claim 26). To the extent Cornette does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶ 361.

iv. Suehiro II Grounds

a. Suehiro II in combination with Cornette

1.) Motivation to combine

A POSITA would have been motivated and found it obvious to adjust the coating thickness of Suehiro II to be greater than 30 µm based on Cornette. CX-0084C (Brown Rpt.) ¶¶ 372-74. A POSITA would have recognized market considerations that require the coating thickness to be greater than 30 µm, such as through GM's GMW14400 specification to learn about industrial objectives and steel processing. Commercially, a supplier would make every effort to meet a purchaser's product requirements, particularly when the purchaser is a major automotive manufacturer. GMW1400's specification requires a coating greater than 35 µm. RX-0067 (GMW14400) (VINFAST1402-00002701) at 7. Based on GMW14400's requirements, a POSITA would have sought to form a hot-stamped coating with a thickness greater than 35 µm. To do so, a POSITA would have found it obvious to implement Suehiro II's coating thickness to meet GMW1400's specification, adjusting parameters (e.g., pre-coating thickness and/or heat treatment parameters) as needed. For example, a POSITA would have found it obvious to try a pre-coating thickness range of "20 to 33" µm as described by GMW14400. RX-0067 (GMW14400) at 7. A POSITA would have also been aware of a direct correlation between pre-coating thickness and

[redacted]

coating thickness, *e.g.*, as indicated by FR Laurent's disclosure that alloying of a pre-coating "generally corresponds to a 50% increase" in thickness for the resulting coating. RX-0111 (FR2833504 – "FR Laurent") (VINFAST1402-00004549) at 5:17-20. Adjusting pre-coating and coating thickness would have been well within the skill of POSITA and would have been achievable with a reasonable expectation of success. RX-0063 (Engels) at 142; RX-0119 (JP2004244704A – "Maki") at [0013]; CX-0084C (Brown Rpt.) ¶ 372.

Motivated by GMW14400 and other market requirements, a POSITA would have identified Cornette as a reference that, when employed in hot stamping, produces a coating having a thickness of "typically about 40 µm at the steel surface," satisfying the market considerations for a coating thickness greater than 30 µm. RX-0019 (Cornette) at 9; CX-0084C (Brown Rpt.) ¶ 373. Based on Cornette's disclosure, a POSITA would have found it obvious to try modifying Suehiro II's processes based on Cornette's process parameters and conditions in order to obtain such a coating. Independent of the market considerations such as the teachings of GMW14400, a POSITA would have been motivated by Cornette's disclosure that Cornette's process using USIBOR 1500 provide benefits, such as "good formability and very high strength," "lengthening of anti-corrosion guarantees," and weldability. RX-0019 (Cornette) at 9-11; CX-0084C (Brown Rpt.) ¶ 373.

Moreover, a POSITA would have had high confidence that the modifications would be successful: the heating profiles used for Suehiro II overlap or are close to the temperature and time ranges disclosed by Cornette. Indeed, the processes disclosed in Suehiro II and Cornette are consistent with fundamental metallurgy, such as a precoated steel (e.g., USIBOR 1500), heating temperature and time (e.g., "Heating 5-10 min. 880-950 °C" in Cornette and "850 °C or higher" or 950 °C for 2.5-7 mins in Suehiro II). Given these similarities, a POSITA would have found it

[redacted]

obvious to try a pre-coating thickness of "25 µm" as described in Cornette (using the Cornette steel), resulting in the coating thickness "about 40 µm at the steel surface," as taught by Cornette. RX-0019 (Cornette) at 9. Therefore, such adjustments would have been well within the skill of POSITA and would have been achievable with a reasonable expectation of success. RX-0063 (Engels) at 142; RX-0119 (Maki) at [0013]; CX-0084C (Brown Rpt.) ¶ 374. The modifications to Suehiro II would have entailed nothing more than applying Cornette's known techniques and parameters to Suehiro II to obtain a predictable result. CX-0084C (Brown Rpt.) ¶ 374.

2.) Claim 1

Suehiro II discloses limitation [1pre] of the '602 patent—a precoated steel product. CX-0084C (Brown Rpt.) ¶ 376. Suehiro II describes "[p]roduction of parts with high strength by means of hot-forming process" and particularly discusses "an aluminized steel sheet product called USIBOR 1500" that is commercially available by Arcelor (Complainant's predecessor). RX-0022 (Suehiro II) (AM-ITC-0014691) at Abstract, 1. An aluminized steel, such as a steel precoated to form "a plating layer of aluminum containing 10% Si," undergoes "hot forming" or "hot stamping" "for fabricating automobile structural members having a strength of 1,500 MPa or so." *Id.* at 1, 2 (FIG. 1), 4.

Suehiro II discloses limitation [1a] of the '602 patent—a strip of base steel. CX-0084C (Brown Rpt.) ¶ 377. Suehiro II illustrates steel strips having first sides and second sides, as shown in annotated FIG. 1 below.

[redacted]

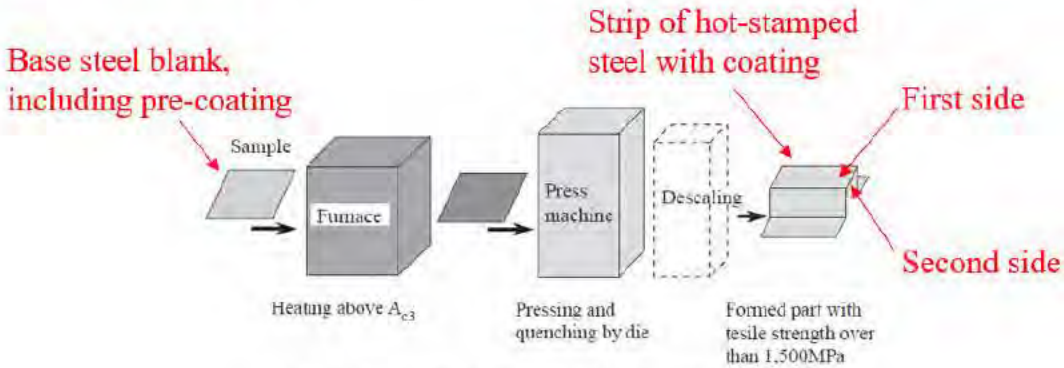


Fig. 1 Schematic illustration of hot forming process

RX-0022 (Suehiro II) at FIG. 1 (annotated); CX-0084C (Brown Rpt.) ¶ 377.

Suehiro II discloses limitation [1b] of the '602 patent—a coating on the base steel. CX-0084C (Brown Rpt.) ¶¶ 378-81. Suehiro II at Fig. 12 illustrates "an alloy layer structure after retaining an aluminized steel sheet at 950°C for 0.5 min." RX-0022 (Suehiro II) at 4.

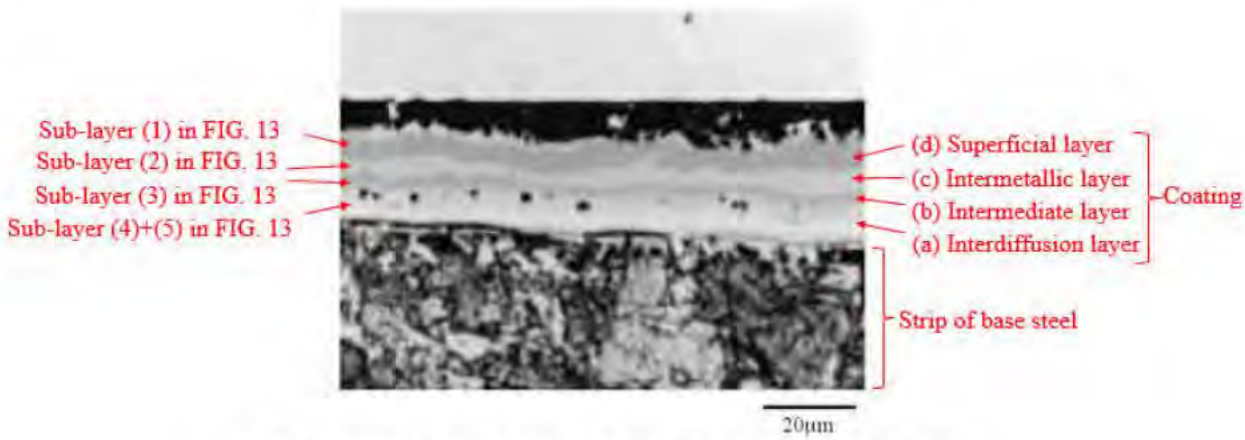


Fig. 12 Sectional optical micrograph showing plating layer structure after heated at 950°C for 30 s

[redacted]

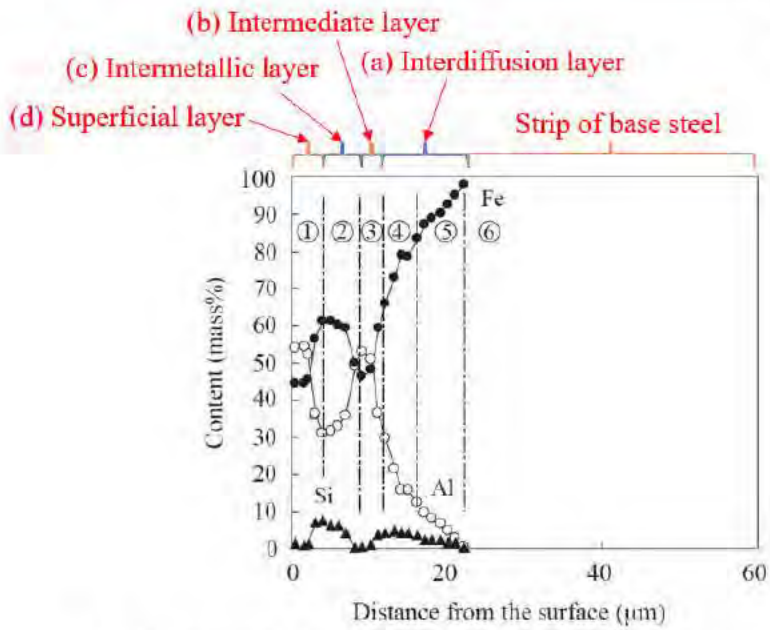


Fig. 13 Change of Fe, Al, and Si concentrations in thickness direction of sample corresponding to Fig. 12

RX-0022 (Suehiro II) at Figs. 12 and 13 (annotated); CX-0084C (Brown Rpt.) ¶ 379.

Suehiro II describes that "during heating at a heating rate attainable with an electric furnace, an Fe-Al alloy having a high melting point forms from the interface with the base metal, and the alloying quickly reaches the surface and for this reason, no molten alloy sticks to furnace structures." RX-0022 (Suehiro II) at 4. "As the alloying proceeds, the coating layer develops a sub-layer structure as shown in [Figs. 12-13]. *Id.*; *see also id.* at Abstract ("Surface coated layer changed from Al-10% Si to Fe-Al(-Si) phases through the hot-forming process."). A POSITA would have understood that Suehiro II's sub-layer structure (coating) was formed by interdiffusion between the iron of the base steel and the aluminum and silicon of pre-coating. CX-0084C (Brown Rpt.) ¶ 381. Suehiro II touts many benefits of the resulting alloyed coating layer, that the "steel with Fe-Al(-Si) surface layer showed good paintability even without phosphatized treatment," "good corrosion resistance," and "good spot weldability." RX-0022 (Suehiro II) at -691 (abstract); *see also id.* at 695 ("paintability is good without the chemical treatment."), 696 ("no corrosion is

[redacted]

observed"; "the consecutive spot weldability of the aluminized steel sheet product is excellent"; "Fe-Al alloy phase displays a better corrosion resistance than a steel sheet without surface treatment and almost equivalent corrosion resistance to a galvannealed steel sheet.").

Suehiro II discloses or renders obvious limitations [1c]-[1f] of the '602 patent. CX-0084C (Brown Rpt.) ¶¶ 382-87. Under ArcelorMittal's infringement theory, Suehiro II discloses (a) an interdiffusion layer, (b) an intermediate layer, (c) an intermetallic layer, and (d) a superficial layer, with the recited mean iron compositions. As illustrated in Suehiro II's FIG. 12, each of sub-layers (5)+(4) (alternatively sub-layer (5)), (3), (2), and (1) constitutes a layer and satisfies the foregoing limitation of claim 1 according to the following mappings:

- Sub-layers (5)+(4) (alternatively, sub-layer (5)) teaches layer (a) (the "interdiffusion layer"). As shown in FIG. 12, sub-layers (5)+(4) (alternatively, sub-layer (5)) are arranged directly on the underlying steel.
- Sub-layer (3) teaches layer (b) (the "intermediate layer").
- Sub-layer (2) teaches layer (c) (the "intermetallic layer").
- Sub-layer (1) teaches layer (d) (the "superficial layer").

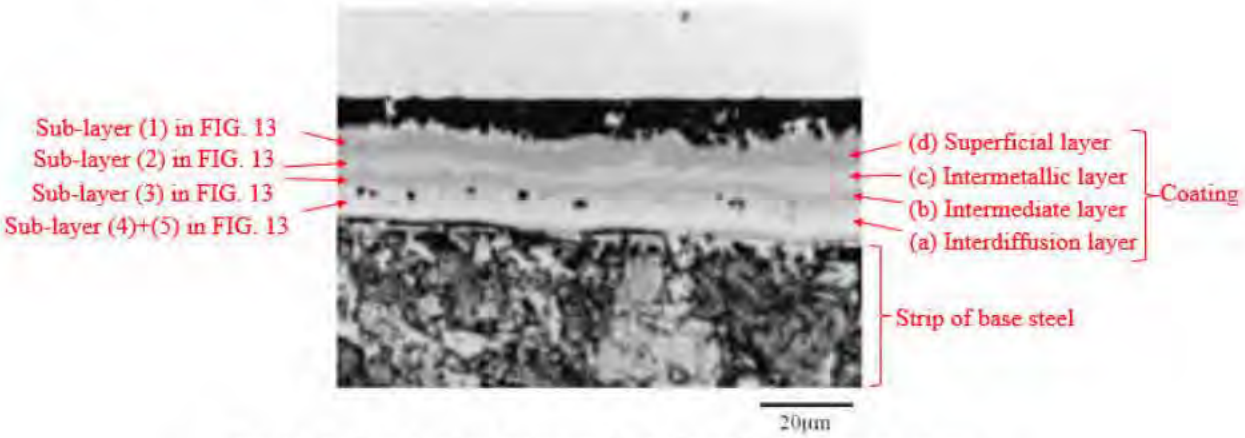


Fig. 12 Sectional optical micrograph showing plating layer structure after heated at 950°C for 30 s

RX-0022 (Suehiro II) at Fig. 12 (annotated); CX-0084C (Brown Rpt.) ¶ 382.

Suehiro II discloses or render obvious that layers (a), (b), (c), and (d) have the recited mean iron compositions. CX-0084C (Brown Rpt.) ¶¶ 383-87. Suehiro II's FIG. 13 provides elemental

[redacted]

compositions for each of sub-layers (5)+(4), (3), (2), and (1), which correspond to claimed layers (a)-(d), respectively. Each of these sub-layers has a different mean iron composition.

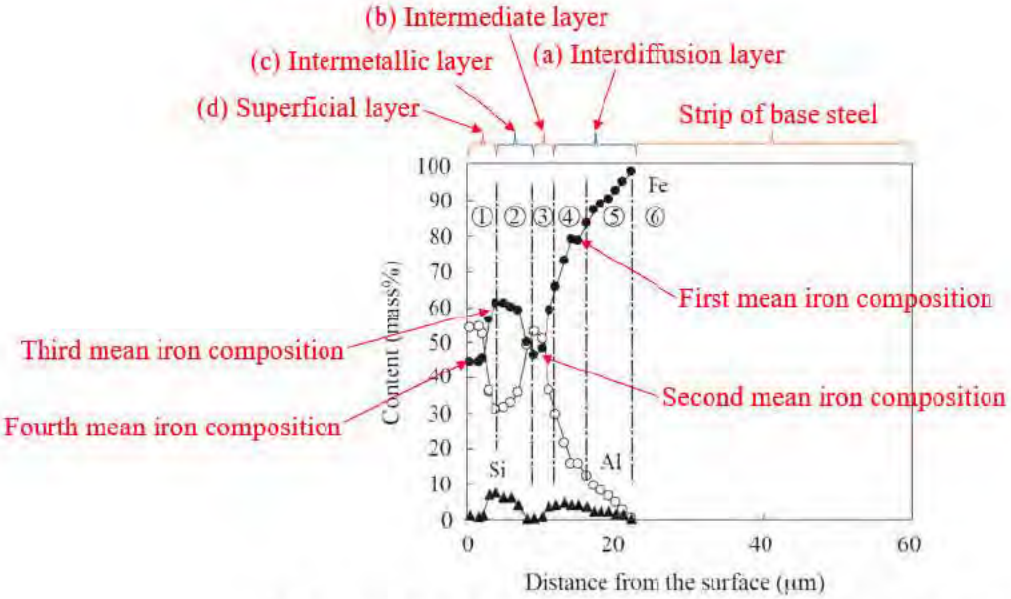
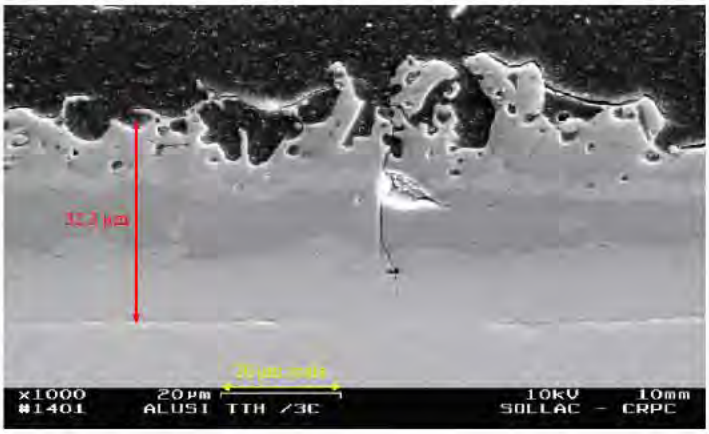


Fig. 13 Change of Fe, Al, and Si concentrations in thickness direction of sample corresponding to Fig. 12

RX-0022 (Suehiro II) at Fig. 13 (annotated); CX-0084C (Brown Rpt.) ¶ 383. Furthermore, sub-layer (2) (corresponding to layer (c)) has a mean iron composition greater than the mean iron composition of sub-layer (3) (corresponding to layer (b)). *Id.* ¶ 386.

Suehiro II in combination with Cornette renders obvious limitation [1g] of the '602 patent—coating thickness greater than 30 μm. CX-0084C (Brown Rpt.) ¶¶ 388-89. Under ArcelorMittal's infringement theory for thickness, a POSITA would have been motivated to modify the Suehiro II coating to have a thickness greater than 30 μm as taught by Cornette, based on market requirements as discussed above in the motivation to combine. *Id.* ¶¶ 372-74. The modified Suehiro II coating has a thickness "typically about 40 μm" as taught by Cornette. Furthermore, Cornette's FIG. 22 discloses a coating thickness greater than 30 μm, such as 32.3 μm:

[redacted]



RX-0019 (Cornette) at FIG. 22 (annotated); CX-0084C (Brown Rpt.) ¶ 389.

3.) Claim 2

Suehiro II in combination with Cornette renders obvious claim 2 of the '602 patent—intermetallic and superficial layers are quasi continuous by occupying at least 90% of a level corresponding to each of the intermetallic and superficial layers and wherein less than 10% of intermetallic layer is present at an extreme surface of the product. CX-0084C (Brown Rpt.) ¶¶ 390-93. As explained above in Section § III.B.2, ArcelorMittal's expert Dr. Fekete does not offer any analysis as to what the claimed "level" is, and how layers (c) and (d) occupies at least 90% of this undefined level. To the extent ALJ finds infringement of claim 2 based on insufficient information presented by ArcelorMittal, Suehiro II discloses claim 2. Suehiro II's FIG. 12 illustrates that each of sub-layer (2) and (1) (corresponding to layers (c) and (d)) extends continuously without discontinuity (e.g. pore, slit, etc.) across the entire SEM image in FIG. 12. Suehiro II's FIG. 12 also shows that essentially none of sub-layer (2) (corresponding to layer (c)) is present at the extreme surface of Suehiro II's coating. This is evident by an examination of Suehiro II's FIG. 12, in which the lighter shaded sub-layer (2) is entirely covered by the darker sub-layer (1):

[redacted]

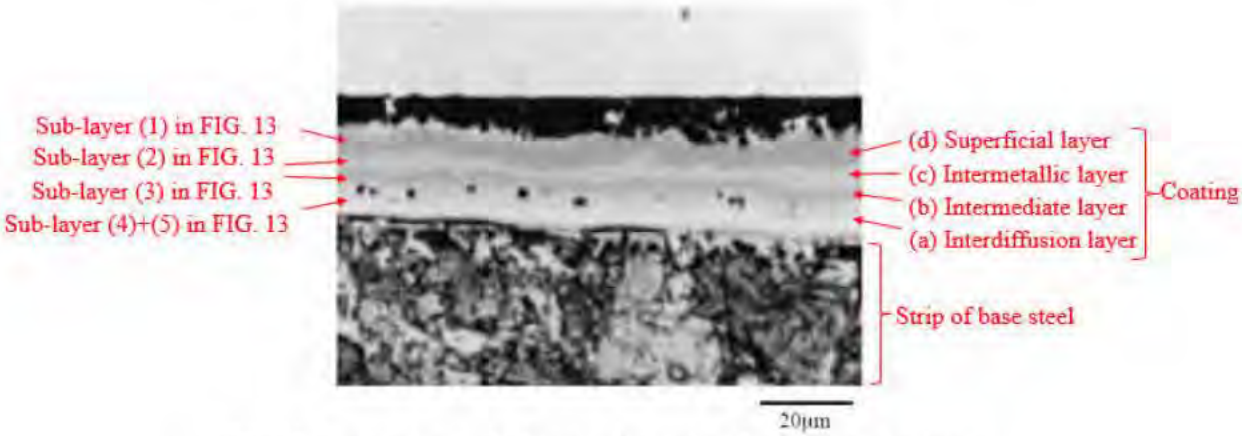
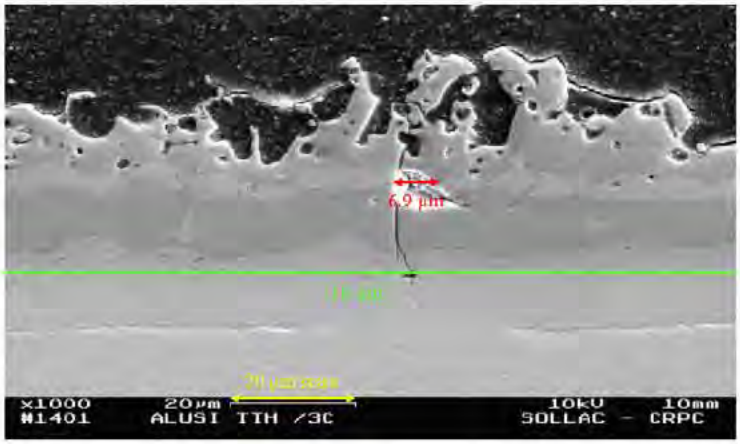


Fig. 12 Sectional optical micrograph showing plating layer structure after heated at 950°C for 30 s

RX-0022 (Suehiro II) at Fig 12 (annotated); CX-0084C (Brown Rpt.) ¶¶ 391-92.

In addition, Suehiro II as modified by Cornette renders obvious claim 2. CX-0084C (Brown Rpt.) ¶¶ 148-49, 393. In Cornett Fig. 22, layers (c) and (d) extend continuously or essentially continuously across the entire image as shown below. A POSITA would have considered the layers to be continuous or essentially continuous (or quasi continuous) despite this segment. To the extent that this segment is considered to make the layer discontinuous, the segment occupies only about 6% (6.9 μm/116 μm) of the total width of FIG. 22. Therefore, layer (c) in Cornette FIG. 22 is "quasi-continuous" even if the indicated red section is interpreted as a discontinuity. CX-0084C (Brown Rpt.) ¶¶ 148-49, 393.



RX-0019 (Cornette) at FIG. 22 (annotated); CX-0084C (Brown Rpt.) ¶¶ 148-49, 393.

[redacted]

Further, Cornette FIG. 22 illustrates, based on visual inspection and the relative shadings of different layers, that essentially none of the second-highest layer (corresponding to layer (c) of the Takagi-Cornette No. 5 coating) is present at the extreme surface of the coating. CX-0084C (Brown Rpt.) ¶¶ 150, 393.

4.) Claim 3

Suehiro II discloses or renders obvious claim 3 of the '602 patent—base steel chemical compositions. CX-0084C (Brown Rpt.) ¶¶ 394-96. Suehiro II uses USIBOR 1500 as a base material and discusses the major composition of C, Mn, Cr, and B that fall within the claimed ranges. RX-0022 (Suehiro II) at 2 ("Table 1"). The chemical composition of USIBOR 1500 falls within the claimed ranges and has remained in the claimed ranges over time. Various references readily available to a POSITA discuss a detailed composition of the USIBOR 1500 used for hot stamping in Suehiro II, which show that the carbon, manganese, silicon, chromium, titanium, aluminum, phosphorous, sulfur, and boron content of Usibor 1500 are within the claimed ranges. RX-0081 (Vaissiere) (VINFAST1402-00003251) at 3254.

2-1 Chemical analysis and coating.

USIBOR 1500 is a carbon/manganese steel micro-alloyed with boron.

	C	Mn	Si	S	Cr	Al	B	Ti
Mini	200	1100	150		150	20	2	20
Maxi	250	1350	350	8	300	60	4	50

Chemical analysis in thousandths of a %.

[redacted]

USIBOR 1500P is a 22MnB5 manganese-boron precoated steel for hot stamping. It contains added carbon, manganese, chromium and boron for good hardenability between hot stamping tools after austenitizing in furnaces. At the same time, it contains silicon (solid solution hardening) and titanium (to trap N, thus avoiding the formation of B nitrides). The chemical composition is shown in Table 1:

Table 1: Chemical composition of USIBOR 1500P

	mini	max	
C	2000	2500	ppm
Mn	11000	13500	ppm
P		250	ppm
S		80	ppm
If	1500	3500	ppm
Al	200	600	ppm
Ti	200	500	ppm
N		90	ppm
Cr	1500	3000	ppm
B	20	40	ppm

CX-0890C (AM-ITC-0102285) (Grigorieva 2006 report re alleged reduction to practice) at 309; *see also* CX-0669C (AM-ITC-0101925) at 926 ("Usibor® 1500 AluSi Global product file"); RX-0031 (AM-ITC-0015137); RX-0044 (AM-ITC-0023464) at 483 ("Thesis: Thermo-mechanical study and numerical modeling of the hot stamping of the Usibor 1500"); RX-0048 (AM-ITC-0053159).

5.) Claim 4

Suehiro II discloses claim 4 of the '602 patent—base steel chemical compositions. CX-0084C (Brown Rpt.) ¶ 397. As discussed in relation to claim 3 above, Suehiro II discloses the use of Usibor 1500P which is the base steel comprising the chemical composition of claim 4.

6.) Claim 9

Suehiro II in view of Cornette renders obvious claim 9 of the '602 patent—interdiffusion layer thickness less than 15 micrometers. CX-0084C (Brown Rpt.) ¶¶ 401-02. Based on ArcelorMittal's analysis for thickness, the layer of Cornette's coating that is adjacent the base steel (which corresponds to layer (a) of the '602 Patent) has a measured thickness of 10.7 μm. CX-0084C (Brown Rpt.) ¶ 402. RX-0019 (Cornette) at Fig. 22 (annotated).

[redacted]

7.) Claim 10

Suehiro II in view of Cornette renders obvious claim 10 of the '602 patent—interdiffusion layer thickness less than 10 micrometers. CX-0084C (Brown Rpt.) ¶¶ 403-08. As discussed above in relation to claim 9, Cornette's coating that is adjacent the base steel (which corresponds to layer (a) of the '602 Patent) has a thickness of 10.7 µm. The thickness of layer (a) is "directly" related to the temperature of the furnace and dwell time in the furnace, and the thickness of the interdiffusion layer (a) is nothing more than a design choice that would be well within the capabilities of a POSITA. *See* CX-0617C (AM-ITC-0094851) at 874; RX-1282C (Drillet Tr.) at 115:18-22; CX-0084C (Brown Rpt.) ¶ 404. A POSITA would have found it obvious to experiment with the coating thickness to arrive at the claimed less than 10 µm. CX-0084C (Brown Rpt.) ¶ 405. Also, the 0.7 µm difference between 10.7 µm and 10 µm would have been less than manufacturing tolerances for layer thicknesses of coatings on hot-stamped steel parts. RX-0067 (GMW14400) at 3; CX-0084C (Brown Rpt.) ¶ 406. This is corroborated by Passat where the cross-sectional SEM micrograph of the Passat 1049 B-pillar shows a coating with interdiffusion layer average thickness of 9.4 µm based on two measurements slightly greater than 10 µm (*i.e.*, 10.2 µm and 10.5 µm) and five measurement less than 10 µm. RX-0086 (VINFAST1402-00003562) (annotated); CX-0083C (Bradley Passat Rpt.) ¶¶ 33-34. And a POSITA would not have recognized the "10 micrometers thick" characteristic as providing any notable benefit. *Id.* ¶ 407. A POSITA would have been motivated to try adjusting its thickness as a matter of routine optimization. *Id.* ¶ 408; RX-0104 (Takagi) at [0017].

8.) Claim 18

Suehiro II in combination with Cornette renders obvious claim 18 of the '602 patent—interdiffusion layer thickness between 1 micron and 15 microns. CX-0084C (Brown Rpt.) ¶

[redacted]

414. *See* discussion above at '602 patent claim 9 of Cornette disclosing interdiffusion layer thickness of 10.7 μm.

9.) Claim 20

Suehiro II discloses claim 20 of the '602 patent—fourth mean iron composition lower than third mean iron composition. CX-0084C (Brown Rpt.) ¶ 415. Suehiro II Fig. 13 discloses that mean iron composition of sub-layer (1), which corresponds to the "fourth mean iron composition" of layer (d) (superficial layer), is lower than the mean iron composition of sub-layer (2), which corresponds to the "third mean iron composition" of layer (c) (intermetallic layer).

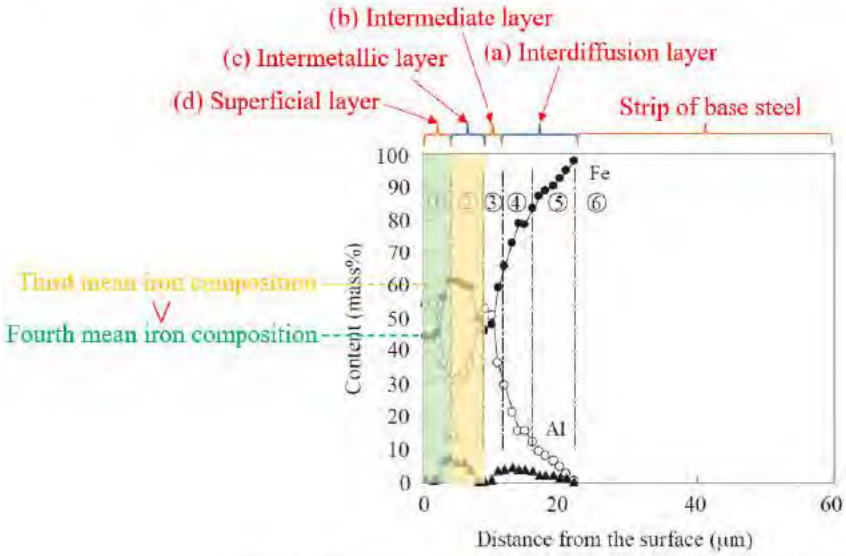


Fig. 13 Change of Fe, Al, and Si concentrations in thickness direction of sample corresponding to Fig. 12

RX-0022 (Suehiro II) at Fig. 13 (annotated); CX-0084C (Brown Rpt.) ¶ 415.

10.) Claim 21

Suehiro II in combination with Cornette renders obvious claim 21 of the '602 patent. CX-0084C (Brown Rpt.) ¶¶ 416-25. *See* § III.D.4.iv.a.2 analyzing claim 1 limitations [1pre]-[1g]. With respect to limitation [21f], referring to Cornette's FIG. 13 below, the mean iron composition of sub-layer (1), which corresponds to the "fourth mean iron composition" of layer (d) (superficial

[redacted]

layer), is different from each of the mean iron compositions of sub-layer (4)+(5), (3), and (2), which correspond to the first, second, and third mean iron compositions, respectively.

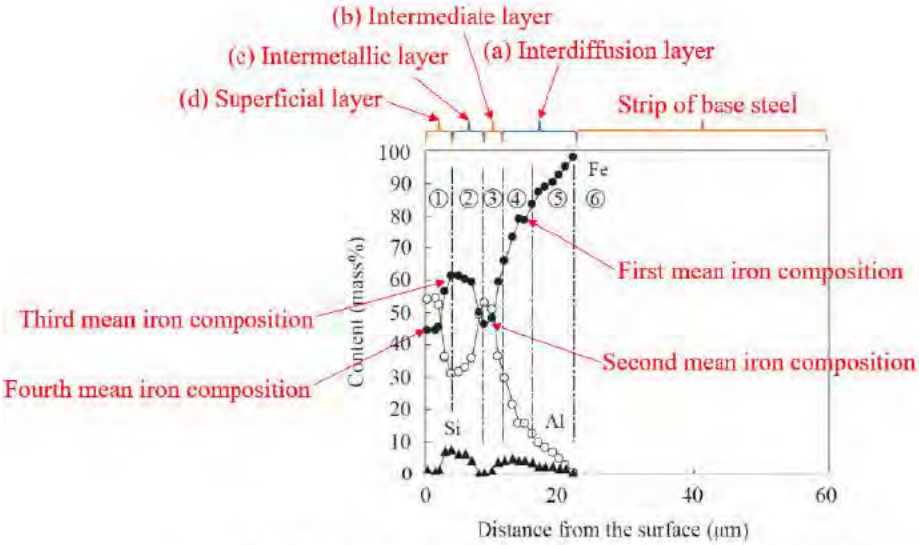


Fig. 13 Change of Fe, Al, and Si concentrations in thickness direction of sample corresponding to Fig. 12

RX-0022 (Suehiro II) at Fig. 13 (annotated); CX-0084C (Brown Rpt.) ¶ 424.

11.) Claim 22

Suehiro II discloses claim 22 of the '602 patent— fourth mean iron composition lower than third mean iron composition. CX-0084C (Brown Rpt.) ¶ 426. *See* discussion above at § III.D.4.iv.a.9 ('602 patent claim 20) of Suehiro II disclosing fourth mean iron composition lower than third mean iron composition.

12.) Claim 24

Suehiro II in combination with Cornette renders obvious limitations [24pre]-[24g] of the '602 patent. CX-0084C (Brown Rpt.) ¶¶ 427-37. *See* § III.D.4.iv.a.2 analyzing claim 1 limitations [1pre]-[1g]. With respect to the aluminum composition limitations of [24c]-[24f], Suehiro II discloses that layers (a), (b), (c), and (d) have the recited mean aluminum compositions. CX-0084C (Brown Rpt.) ¶ 432. Suehiro II's FIG. 13 provides elemental compositions for each of

[redacted]

sub-layers (5)+(4), (3), (2), and (1), which correspond to layers (a)-(d), respectively. Each of these sub-layers has a different mean aluminum composition from one another:

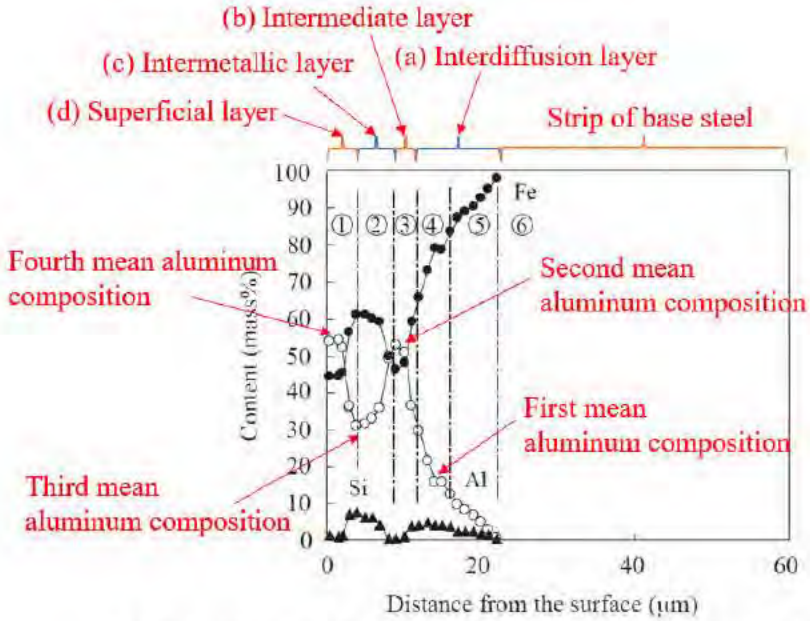


Fig. 13 Change of Fe, Al, and Si concentrations in thickness direction of sample corresponding to Fig. 12

RX-0022 (Suehiro II) at Fig. 13 (annotated); CX-0084C (Brown Rpt.) ¶ 432. Further, as shown in FIG. 13 above, Suehiro II's sub-layer (3) (corresponding to layer (b)) has a mean aluminum composition greater than the mean aluminum composition of sub-layer (2) (corresponding to layer (c)). CX-0084C (Brown Rpt.) ¶ 436.

13.) Claim 26

Suehiro II in combination with Cornette renders obvious claim 26 of the '602 patent—interdiffusion layer has a thickness less than 15 micrometers. CX-0084C (Brown Rpt.) ¶ 441. *See* discussion above at § III.D.4.iv.a.6 ('602 patent claim 9) of Cornette disclosing interdiffusion layer thickness of 10.7 μm, which is less than 15 micrometers.

[redacted]

b. Suehiro II in combination with Cornette and Laurent

1.) Motivation to combine

A POSITA would have been motivated to combine Laurent with Suehiro II and Cornette. CX-0084C (Brown Rpt.) ¶¶ 449-50. Laurent describes "steel sheet[s]" having compositions that "ensur[e] a very high mechanical resistance after thermal treatment." RX-0109 (Laurent '805) at 1:47-62. A POSITA would have found it obvious to try using these steel compositions in the hot stamping processes described by Suehiro II and Cornette. This would have constituted no more than substitution of one element (the Laurent steel) for another (the USIBOR 1500 steel of Suehiro II or Cornette) known in the field. RX-0022 (Suehiro II) at 1; RX-0019 (Cornette) at 9. A POSITA would have been motivated at least by Laurent's discussion of the advantages of such a steel and, more particularly, the specified advantages associated with the particular elements and concentrations of the elements of the steel. CX-0084C (Brown Rpt.) ¶ 449.

Further, as shown in the table below, Laurent's steel and the USIBOR 1500 steel disclosed by Suehiro II and Cornette have generally similar compositions, such that the substitution of one for the other would have constituted a minor modification within the general conditions of what was already in use.

[redacted]

Element	USIBOR 1500 composition (%) in Suehiro II	USIBOR 1500 composition (%) in Cornette	Laurent Composition (%)
C	0.22	0.20% ≤ C ≤ 0.25%	0.20% < C < 0.5%
Mn	1.2	1.1% ≤ Mn ≤ 1.35%	0.8% < Mn < 1.5%
Si		0.15% ≤ Si ≤ 0.35%	0.1% < Si < 0.35%
Cr	0.15	0.15% ≤ Cr ≤ 0.30%	0.01% < Cr < 1%
Ti		0.02% ≤ Ti ≤ 0.05%	Ti < 0.1%
Al		0.02% ≤ Al ≤ 0.06%	Al < 0.1%
P		--	P < 0.05%
S		S≤ 0.008%	S < 0.03%
B	0.002	0.002% ≤ B ≤ 0.004%	0.0005% < B < 0.01%

RX-0022 (Suehiro II) at 2; RX-0019 (Cornette) at 9; RX-0109 (Laurent '805) at 1:66-2:10; CX-0084C (Brown Rpt.) ¶ 450.

2.) Claims 3 and 4

Suehiro II in combination with Cornette and Laurent renders obvious claims 3 and 4 of the '602 patent—base steel chemical compositions. CX-0084C (Brown Rpt.) ¶¶ 451-56. Laurent composition either exactly matches, falls fully within, or overlaps substantially with, the claimed composition of '602 patent claims 3 and 4. As shown in the below chart, Laurent's disclosure of "preferabl[e]" "steel composition by weight" teaches each of the recited compositions of claims 3 and 4.

Element	Claim [3] composition	Claim [4] composition	Laurent composition (col.2)
C	0.15% < C < 0.5%	0.2% < C < 0.5%	0.20% < C < 0.5%
Mn	0.5% < Mn < 3%	0.8% < Mn < 1.5%	0.8% < Mn < 1.5%
Si	0.1% < Si < 0.5%	0.1% < Si < 0.35%	0.1% < Si < 0.35%
Cr	0.01% < Cr < 1%	0.01% < Cr < 1%	0.01% < Cr < 1%
Ti	Ti < 0.2%	Ti < 0.1%	Ti < 0.1%
Al	Al < 0.1%	Al < 0.1%	Al < 0.1%
P	P < 0.1%	P < 0.05%	P < 0.05%
S	S < 0.05%	S < 0.03%	S < 0.03%
B	0.0005% < B < 0.08%	0.0005% < B < 0.01%	0.0005% < B < 0.01%
Remainder	"iron and impurities inherent in processing"	"iron and impurities inherent in processing"	"iron and impurities inherent in processing"

RX-0109 (Laurent '805) at 1:66-2:10; CX-0084C (Brown Rpt.) ¶ 455.

[redacted]

3.) Claims 7 and 8

Suehiro II in combination with Cornette and Laurent renders obvious claims 7 and 8 of the '602 patent—base steel titanium to nitrogen ratio. CX-0084C (Brown Rpt.) ¶¶ 457-59. Laurent discloses "[t]itanium, the ratio of the content of which with respect to the nitrogen content should be in excess of 3.42, is introduced in order to prevent combining of the boron with the nitrogen, the nitrogen being combined with titanium." RX-0109 (Laurent '805) at 4:25-28. This is exactly the ratio recited in claims 7 and 8. As discussed above with respect to claims 3 and 4, a POSITA would have been motivated to reference the chemical compositions of Laurent's steel in the hot-stamping process described by Suehiro II, to obtain the recited benefits of preventing combining of boron with nitrogen. CX-0084C (Brown Rpt.) ¶ 458.

v. Lachman Grounds

a. Lachmann alone

1.) Claim 1

To the extent Lachmann does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 627-39.

Lachmann renders obvious limitation [1pre]-[1g] of the '602 patent. *See* § III.D.3.iv.a ('602 patent limitation [1pre]-[1g]).

2.) Claim 2

Lachmann renders obvious claim 2 of the '602 patent. *See* § III.D.3.iv.b ('602 patent claim 2). To the extent Lachmann does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 640-43.

[redacted]

3.) **Claim 3**

Lachmann renders obvious claim 3 of the '602 patent. *See* § III.D.3.iv.c ('602 patent claim 3). To the extent Lachmann does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 644-46.

4.) **Claim 4**

Lachmann renders obvious claim 4 of the '602 patent. *See* § III.D.3.iv.d ('602 patent claim 4). To the extent Lachmann does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 647-48.

5.) Claim 20

Lachmann renders obvious claim 20 of the '602 patent. *See* § III.D.3.iv.e ('602 patent claim 20). To the extent Lachmann does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶ 654.

6.) **Claim 21**

Lachmann renders obvious claim 21 of the '602 patent. *See* § III.D.3.iii.f ('602 patent claim 21). To the extent Lachmann does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 655-664.

7.) **Claim 22**

Lachmann renders obvious claim 22 of the '602 patent. *See* § III.D.3.iv.g ('602 patent claim 22). To the extent Lachmann does not expressly disclose each of the limitations sufficient

[redacted]

to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶ 665.

8.) **Claim 24**

Lachmann renders obvious claim 24 of the '602 patent. *See* § III.D.3.iv.h ('602 patent claim 24). To the extent Lachmann does not expressly disclose each of the limitations sufficient to show anticipation under § 102, any modifications would be obvious to a POSITA. CX-0084C (Brown Rpt.) ¶¶ 666-76.

b. Lachmann in combination with Cornette

1.) Motivation to combine

It would have been obvious to apply Cornette's disclosure of various process parameters, such as pre-coating thickness, base steel, alloying temperatures, and heating times, to Lachmann. CX-0084C (Brown Rpt.) ¶¶ 679-82; RX-0019 (Cornette) at 9. A POSITA would have recognized that these specific numerical values would be useful for experimenting based on Lachmann's disclosure, which discloses heat treatment at "temperatures between 900 ˚C and 950 ˚C" but does not disclose specific values for some other parameters. RX-0062 (AM-ITC-0019466) at 19469. A POSITA would already have been aware of reasonable values for these parameters based on general knowledge in the art, but the POSITA would also have recognized the usefulness of Cornette's specific disclosure and sought to apply it when performing hot-stamping as taught by Lachmann. A POSITA would also have been motivated by Cornette's disclosure that these process specifics provide the "best compromise between corrosion protection and weldability" and "excellent mechanical properties of the material after the press hardening process with good corrosion protection." RX-0019 (Cornette) at 9-10.

For example, to achieve these results, it would have been obvious for the POSITA to use the USIBOR 1500 steel disclosed by Cornette and/or to perform a 900˚C austenitization for five