



ArcelorMittal

United States Patent and Trademark Office
Before the Patent Trial and Appeal Board

POSCO Co., Ltd. v. ArcelorMittal

Patent Owner's Demonstratives

Petition for Inter Partes Review Case Nos. IPR2025-00370 and IPR2025-00371
U.S. Patent Nos. 10,961,602 and 11,326,227

Introduction to the '602 and '227 Patents

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

IPR2025-00370 and IPR2025-00371

3

The Asserted Patents



(12) **United States Patent**
Drillet et al.

(10) **Patent No.:** US 10,961,602 B2
(45) **Date of Patent:** Mar. 30, 2021

'602 Patent

(73) Assignee: **ArcelorMittal**, Luxembourg (LU)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 16/413,799

(22) Filed: **May 16, 2019**

(65) **Prior Publication Data**
US 2019/0271056 A1 Sep. 5, 2019

Related U.S. Application Data
(60) Continuation of application No. 15/606,770, filed on May 26, 2017, which is a continuation of application (Continued)

(51) **Int. CL**
C21D 9/46 (2006.01)
B32B 15/01 (2006.01)
(Continued)

(52) **U.S. CL**
CPC **C21D 9/46** (2013.01); **B32B 15/012** (2013.01); **C23C 2/12** (2013.01); **C23C 2/26** (2013.01);
(Continued)

(Continued)

FOREIGN PATENT DOCUMENTS

AU 622697 B2 4/1992

CA 2573226 A1 1/2006

(Continued)

OTHER PUBLICATIONS

Raviere et al, Hot Stamping Experiment and Numerical Simulation of Pre-coated USIBOR1500 Quenchable Steels, SAE 2003-01-2859, 2003.

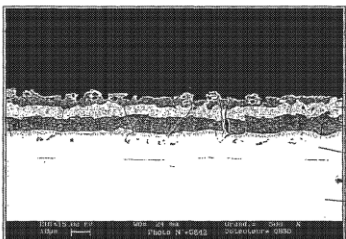
(Continued)

Primary Examiner — Daniel J. Schleis
(74) **Attorney, Agent, or Firm** — Davidson, Davidson & Kappel, LLC

ABSTRACT

(57) A pre-coated steel strip is provided. The steel strip includes a strip of base steel having a length, a width, a first side, and a second side. The length of the strip is at least 100 m and the width is at least 600 mm. An aluminum or an aluminum alloy pre-coating is on at least part of at least one of the first or second sides of the strip of base steel. A thickness t_p of the pre-coating is from 20 to 33 micrometers at every location on at least one of the first or second sides. Processes, coated stamped products and land motor vehicles are also provided.

30 Claims, 4 Drawing Sheets



10µm

(12) **United States Patent**
Drillet et al.

(10) **Patent No.:** US 10,961,602 B2
(45) **Date of Patent:** Mar. 30, 2021

(54) **COATED STEEL STRIPS, COATED STAMPED PRODUCTS AND METHODS**

(71) Applicant: **ArcelorMittal**, Luxembourg (LU)

(72) Inventors: **Pascal Drillet**, Rozerieulles (FR);
Dominique Spehner, Balan (FR);
Ronald Kefferstein, Saint Mitre les Ramparts (FR)

(73) Assignee: **ArcelorMittal**, Luxembourg (LU)

(21) Appl. No.: 16/413,799

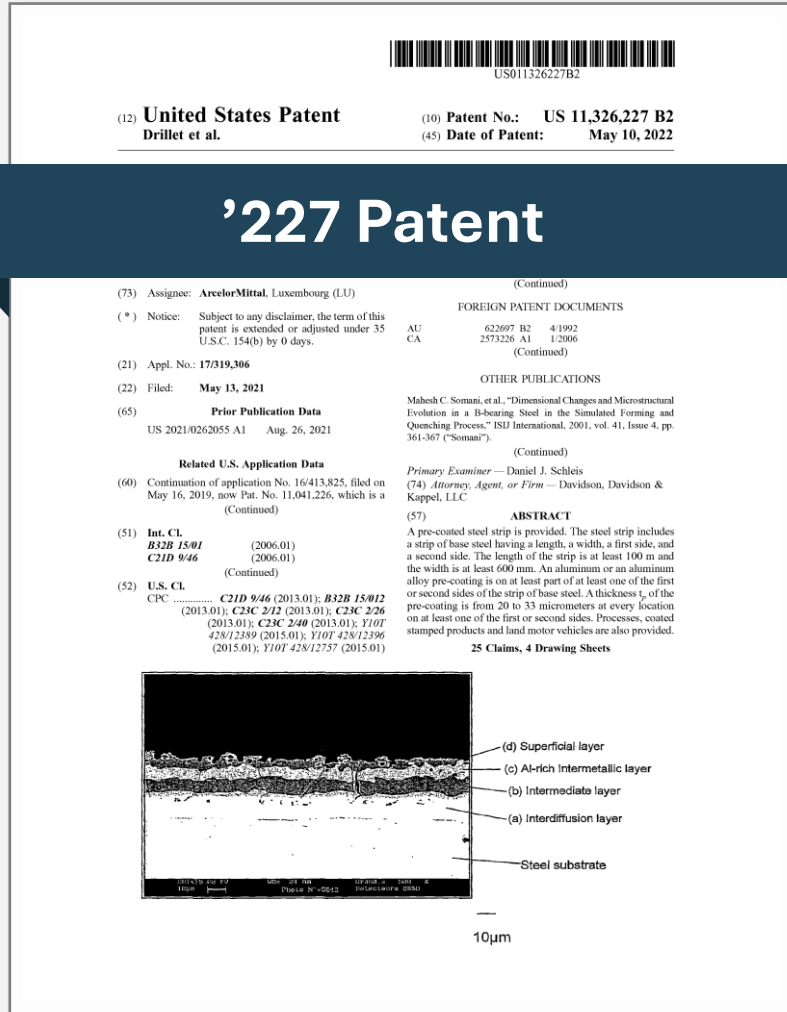
(22) Filed: **May 16, 2019**

Related U.S. Application Data

No. 13/621,015, filed on Sep. 15, 2012, now Pat. No. 9,708,683, which is a division of application No. 12/447,777, filed as application No. PCT/IB2006/004019 on **Oct. 30, 2006**, now Pat. No. 8,307,680.

EX1001 ('602 Patent)
Ex. 2043

The Asserted Patents



(12) **United States Patent**
Drillet et al.

(10) **Patent No.:** US 11,326,227 B2
(45) **Date of Patent:** May 10, 2022

(54) **COATED STEEL STRIPS, COATED STAMPED PRODUCTS AND METHODS**

(21) Appl. No.: 17/319,306

(22) Filed: **May 13, 2021**

(71) Applicant: **ArcelorMittal**, Luxembourg (LU)

(72) Inventors: **Pascal Drillet**, Rozerieulles (FR);
Dominique Spehner, Balan (FR);
Ronald Kefferstein, Saint Mitre les
Ramparts (FR)

(73) Assignee: **ArcelorMittal**, Luxembourg (LU)

Related U.S. Application Data

continuation of application No. 15/606,770, filed on May 26, 2017, now Pat. No. 10,550,447, which is a continuation of application No. 13/621,015, filed on Sep. 15, 2012, now Pat. No. 9,708,683, which is a division of application No. 12/447,777, filed as application No. PCT/IB2006/004019 on Oct. 30, 2006, now Pat. No. 8,307,680.

'602 Patent, Claim 1

1. A precoated steel product comprising:
a strip of **base steel** having a first side and a second side;
and
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:

- (a) an **interdiffusion layer** having a **first mean iron composition**,
- (b) an **intermediate layer** having a **second mean iron composition** different from the first mean iron composition,
- (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
- (d) a **superficial layer** having a **fourth mean iron composition** different from the third mean iron composition,

wherein the **coating has a thickness** greater than 30 micrometers.

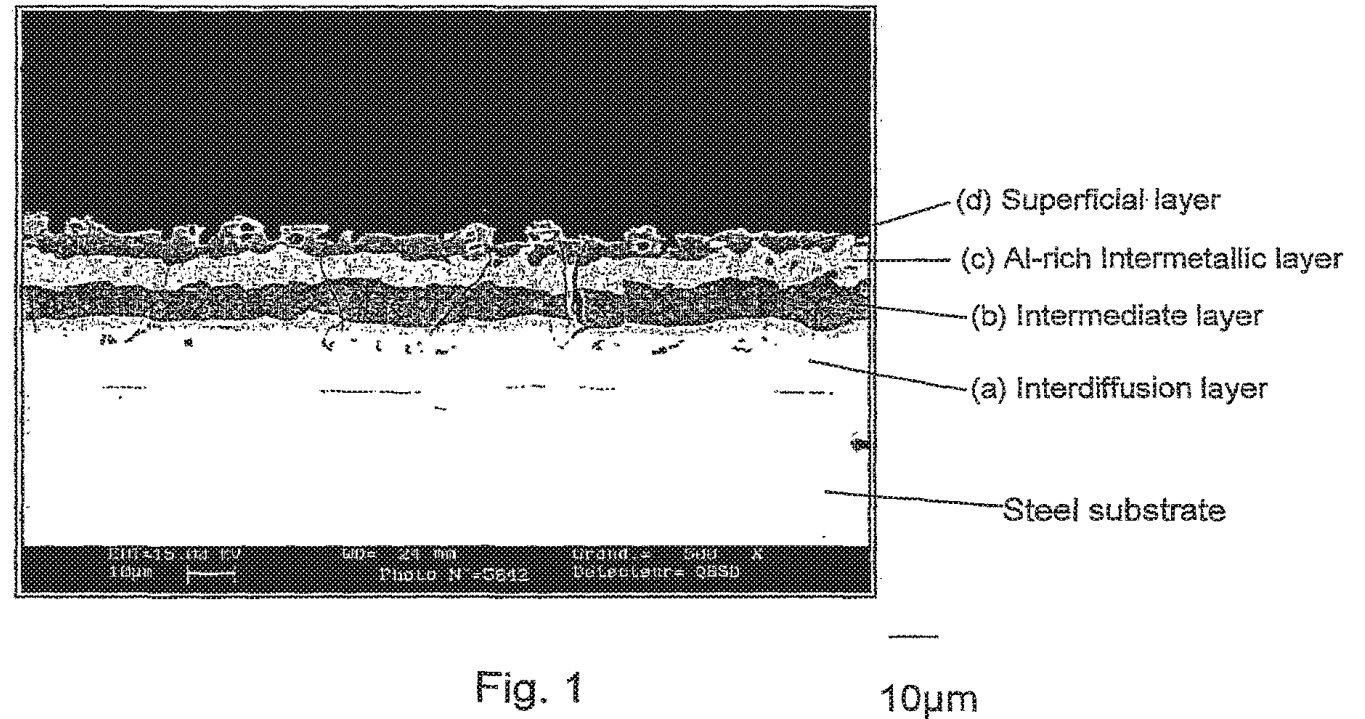
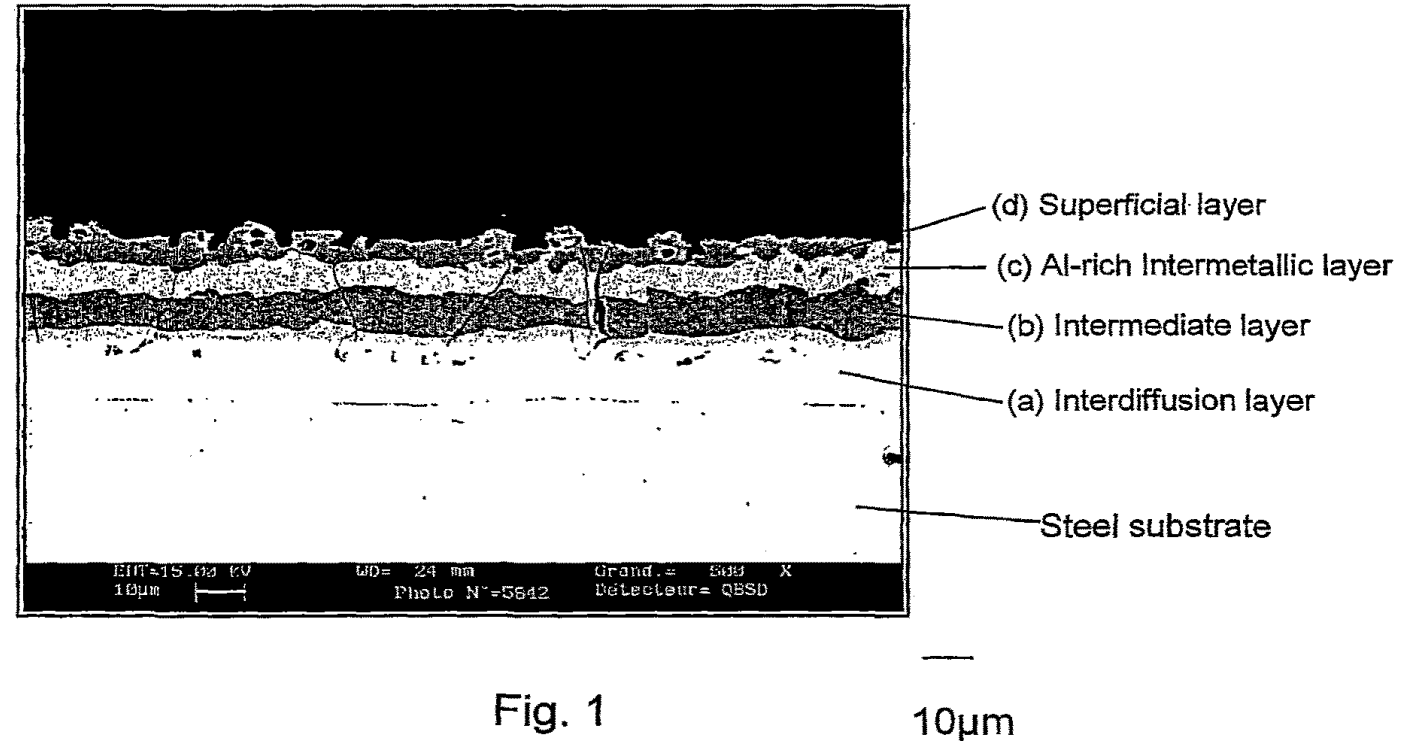


Fig. 1

10µm

'227 Patent, Claim 1

1. A hot stamped coated steel product, which comprises:
- (a) a strip of **base steel** having a first side and a second side; and
 - (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:
 - (i) said **coating results from interdiffusion between said base steel and an aluminum or aluminum alloy pre-coating**, and
 - (ii) wherein said coating comprises, proceeding from the base steel outwards:
 - (a) **an Interdiffusion layer**,
 - (b) **an Intermediate layer**,
 - (c) **an Intermetallic layer**, and
 - (d) **a Superficial layer**,wherein layers (a), (b), (c), and (d) each have a **different mean composition from one another**,wherein said coating of the hot stamped coated steel product **has a thickness greater than 30 micrometers**.



Asserted Grounds for '602 and '227 Patents

Grounds and Claims at Issue – '602 Patent

Ground	Claims	Basis	References
1A	1-2, 5-6, 9-30	35 U.S.C. §103	Takagi, Cornette
1B	3-4, 7-8	35 U.S.C. §103	Takagi, Cornette, Laurent
1C	3-6	35 U.S.C. §103	Takagi, Cornette, Nishibata
1D	1, 3-4, 11-17, 19-25, 27-30	35 U.S.C. §103	Takagi, GMW14400
1E	3-4, 7	35 U.S.C. §103	Takagi, GMW14400, Laurent
1F	3-5	35 U.S.C. §103	Takagi, GMW14400, Nishibata
2A	1-2, 5-6, 9-30	35 U.S.C. §103	Suehiro, Cornette
2B	3-4, 7-8	35 U.S.C. §103	Suehiro, Cornette, Laurent
2C	3-6	35 U.S.C. §103	Suehiro, Cornette, Nishibata
2D	1-4, 9-30	35 U.S.C. §103	Suehiro, GMW14400
2E	3-4, 7-8	35 U.S.C. §103	Suehiro, GMW14400, Laurent
2F	3-6	35 U.S.C. §103	Suehiro, GMW14400, Nishibata

Grounds and Claims at Issue – '227 Patent

Ground	Claims	Basis	References
1A	1-15, 18-25	35 U.S.C. §103	Takagi, Cornette
1B	16-17	35 U.S.C. §103	Takagi, Cornette, Laurent
1C	15	35 U.S.C. §103	Takagi, Cornette, Vaissiere
1D	1-11, 15-25	35 U.S.C. §103	Takagi, GMW14400
1E	16-17	35 U.S.C. §103	Takagi, GMW14400, Laurent
1F	15	35 U.S.C. §103	Takagi, GMW14400, Vaissiere
2A	1-2, 4-15, 18-25	35 U.S.C. §103	Suehiro, Cornette
2B	3	35 U.S.C. §103	Suehiro, Cornette, Takagi
2C	16-17	35 U.S.C. §103	Suehiro, Cornette, Laurent
2D	15	35 U.S.C. §103	Suehiro, Cornette, Vaissiere
2E	1-2, 4-25	35 U.S.C. §103	Suehiro, GMW14400
2F	3	35 U.S.C. §103	Suehiro, GMW14400, Takagi
2G	16-17	35 U.S.C. §103	Suehiro, GMW14400, Laurent
2H	15	35 U.S.C. §103	Suehiro, GMW14400, Vaissiere

Patent Owner's Arguments

Slides	Arguments	Impact
16-35	Construction of Intermetallic Layer	Claim Construction
36-39	Suehiro Does Not Include An Intermetallic Layer	'602 Patent: Grounds 2A-2F '227 Patent: Grounds 2A-2H
40-50	Takagi Does Not Disclose An Intermetallic Layer	'602 Patent: Grounds 1A-1F '227 Patent: Grounds 1A-1F
51-57	Suehiro Does Not Disclose A Superficial Layer	'602 Patent: Grounds 2A-2F '227 Patent: Grounds 2A-2H
58-85	No Motivation to Combine and No Reasonable Expectation of Success	'602 Patent: All Grounds '227 Patent: All Grounds
86-97	Takagi Is Not Enabled	'602 Patent: Grounds 1A-1F '227 Patent: Grounds 1A-1F
98-116	GMW14400 and Cornette Are Not Prior Art	'602 Patent: Grounds 1D-1F and 2D-2F (GMW14400); Grounds 1A-1C and 2A-2C (Cornette) '227 Patent: Grounds 1D-1F and 2E-2H (GMW14400); Grounds 1A-1C and 2A-2D (Cornette)
117-121	Secondary Considerations Confirm Non-Obviousness	'602 Patent: All Grounds '227 Patent: All Grounds
122-125	Dependent Claims Are Not Obvious	'602 Patent: Grounds 1A, 1D, 2A, and 2D '227 Patent: Grounds 1A, 1D, 2A, and 2E

All citations are to IPR2025-00370 ('602 Patent) unless otherwise noted

Ex. 2043

Patent Office Considered All Primary References in Counts:

NIPPON STEEL TECHNICAL REPORT No. 88-JULY 2003

UDC 609.718.5:609.14.018.201-415

Properties of Aluminum-coated Steels for Hot-forming

Suehiro

Abstract

Production of parts with high strength by means of hot-forming process has been receiving considerable attention lately. Application of aluminized steel with good hardenability for this process has been investigated*. Tensile strength over than 1,500MPa was obtained with steel containing around 0.2mass% C. Surface coated layer changed from Al-10% Si to Fe-Al(-Si) phases through the hot-forming process. The steel with Fe-Al(-Si) surface layer showed good paintability even without phosphatized treatment. After painting, they showed good corrosion resistance in JASO-CCT as galvanized steel did. The steel showed good spot weldability due to the stable surface layer at high temperature. (*license product within the frame of global strategic alliance with Arcelor (USIBOR1500))

1. Introduction

High-strength steel sheets are used more and more for automobile components in recent years to reduce the weight of an automobile to improve environmental problems and collision safety. Many car components and structural members can be made significantly lighter by using high-strength steel sheets and reducing their thicknesses. With this as a background, the strength of the steel sheets used therof has increased from 440- or 590-MPa class to 780-MPa class. Generally speaking, as the strength of a steel sheet increases, its formability deteriorates, and to overcome this problem, various types of high-strength steel sheet products with controlled microstructures have been developed¹⁾. In spite of these efforts, however, press forming complicated shapes is difficult when the strength of a steel sheet is as high as approximately 1,500 MPa.

In Europe, 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 so²⁾. By this method, the strength of a steel sheet is increased through quenching after heating it to a temperature in the austenite temperature range, say, around 900°C, while forming dies are maintained at room temperature. Techniques similar to this are being studied in Japan; similar processes have been studied or put into actual practice using steel

sheets without surface treatment³⁻⁶⁾. In Europe, Arcelor has developed and commercially launched an aluminized steel sheet product called USIBOR 1500 for that application. It has excellent hot-forming properties and corrosion resistance qualities⁵⁻⁶⁾. Based on a global strategic alliance with Arcelor, Nippon Steel Corporation has entered into a license agreement regarding USIBOR 1500 and studied the production technologies and properties of the product. This paper reports the results of the company's studies of the properties and characteristics that are required of aluminized steel sheet products for hot forming application.

2. Hot Forming Process

The hot forming method is already a practical reality; the process is outlined in Fig. 1. In this method it is necessary to heat a steel sheet to a temperature in the austenite temperature range, equal to or higher than the A_c temperature; for example, steel containing about 0.2 mass % C must be heated to 850°C or higher. 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. At the forming work, the press machine is retained at the lower dead point until the entire steel sheet is quenched sufficiently.

¹⁾ Yawata R&D Lab.

²⁾ Yawata Works

- 16 -

1

POSCO-1053

US011326227B2

(12) United States Patent
Drillet et al.

(10) Patent No.: US 11,326,227 B2
(45) Date of Patent: May 10, 2022

'227 Patent

(73) Assignee: ArcelorMittal, Luxembourg (LU)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

FOREIGN PATENT DOCUMENTS

622697 B2 4:1992
2573226 A1 1:2006

(Continued)

May 16, 2019, now Pat. No. 11,041,225, which is a (Continued)

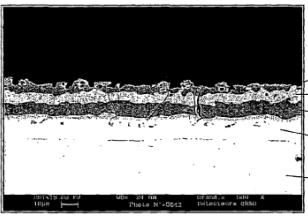
(51) Int. Cl. (2006.01)
B32B 15/01
C21D 9/46 (2006.01)

(52) U.S. Cl. (2006.01)
C21D 9/46 (2013.01); B32B 15/012 (2013.01); C23C 2/12 (2013.01); C23C 2/26 (2013.01); C23C 2/40 (2013.01); Y107 428/2359 (2015.01); Y107 428/12396 (2015.01); Y107 428/12757 (2015.01)

ABSTRACT

A pre-coated steel strip is provided. The steel strip includes a strip of base steel having a length, a width, a first side, and a second side. The length of the strip is at least 100 m and the width is at least 600 mm. An aluminum or an aluminum alloy pre-coating is on at least part of at least one of the first or second sides of the strip of base steel. A thickness t_p of the pre-coating is from 20 to 33 micrometers at every location on at least one of the first or second sides. Processes, coated stamped products and land motor vehicles are also provided.

25 Claims, 4 Drawing Sheets



(d) Superficial layer
(c) Al-
(b) In-
(a) In-
St

10µm

US10961602B2

(12) United States Patent
Drillet et al.

(10) Patent No.: US 10,961,602 B2
(45) Date of Patent: Mar. 30, 2021

'602 Patent

(73) Assignee: ArcelorMittal, Luxembourg (LU)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

FOREIGN PATENT DOCUMENTS

622697 B2 4:1992
2573226 A1 1:2006

(Continued)

(21) Appl. No.: 16/413,799

(22) Filed: May 16, 2019

(65) Prior Publication Data
US 2019/0271056 A1 Sep. 5, 2019

OTHER PUBLICATIONS

Raviere et al, Hot Stamping Experiment and Numerical Simulation of Precoated USIBOR1500 Quenchable Steels, SAE 2003-01-2859, 2003.

(Continued)

Primary Examiner—Daniel J. Schleis

(74) Attorney, Agent, or Firm—Davidson, Davidson & Kappel, LLC

(60) Continuation of application No. 15/006,770, filed on May 26, 2017, which is a continuation of application (Continued)

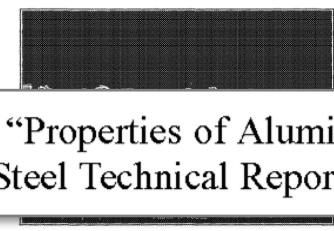
(51) Int. Cl. (2006.01)
C21D 9/46 (2013.01); B32B 15/01 (2006.01)

(52) U.S. Cl. (2006.01)
C21D 9/46 (2013.01); B32B 15/012 (2013.01); C23C 2/12 (2013.01); C23C 2/26 (2013.01); C23C 2/40 (2013.01)

ABSTRACT

A pre-coated steel strip is provided. The steel strip includes a strip of base steel having a length, a width, a first side, and a second side. The length of the strip is at least 100 m and the width is at least 600 mm. An aluminum or an aluminum alloy pre-coating is on at least part of at least one of the first or second sides of the strip of base steel. A thickness t_p of the pre-coating is from 20 to 33 micrometers at every location on at least one of the first or second sides. Processes, coated stamped products and land motor vehicles are also provided.

30 Claims, 4 Drawing Sheets



(d) Superficial layer

10µm

Suehiro, Masayoshi et al., “Properties of Aluminium-coated Steels for Hot-forming” Nippon Steel Technical Report No. 88, Jul. 2003.

EX1055 (Suehiro); EX1001 ('227 Patent) at 3; EX1001 ('602 Patent) at 2

Ex. 2043

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

IPR2025-00370 and IPR2025-00371

13

Patent Office Considered Secondary References in Counts:

**WORLDWIDE
ENGINEERING
STANDARDS**

Material Specification
Metals

GMW14400

GMW14400

This specification covers the requirements for low carbon, heat-treatable boron steel used in the manufacture of structural parts requiring heat treatments to achieve high strength. Press-hardened steel can be pre-formed and subsequently hot-stamped and die quenched, but post-forming should not be the scope for this type of steel. Typical applications include door impact beams, bumper impact beams, and reinforcements for impact structures.

1.1 Material Description. The particular application shall determine the pre- or post-forming operations to produce the finished product.

1.1.1 Resistance Welded Mechanical Tubing. Tubes supplied to this specification are roll formed from steel strip to the desired shape and dimension, electrical resistance welded into a tube, and then heat treated to achieve the final mechanical property requirements.

1.1.2 Induction Heat Treated Steel. Part sections formed with this operation and supplied under this standard shall be made by stamping a coil blank in the as-rolled condition. The raw stamping can be selectively coil induction hardened to achieve the required strength requirements. Aluminized, pre-coated products are not to be used in these applications.

1.1.3 Hot-Stamped/Die-Quenched Steel.

1.1.3.1 Uncoated Products. Part sections formed with this operation and supplied under this standard shall be made by austenitizing a pre cut blank or pre-stamped part, hot stamping the heated

remove oxide from the surface. The microstructure of the finished parts shall consist of martensite and bainite.

1.1.3.2 Pre-Coated Products. Part sections formed with this operation and supplied under this standard shall be made by austenitizing a pre cut blank, hot stamping the heated blank and rapid cooling (quenching) the stamped part in the die or via water quenching. Parts shall not be pre-stamped prior to the hot stamping operation, but slight roll-forming operations may be allowable if the coating is not damaged. Shot blasting the cooled part is not permitted for pre-coated parts due to damage to the coating. The microstructure of the finished parts shall consist of martensite and bainite.

1.2 Material Identification. The GMW base metal specification number defines the material designation, steel product type, grade, and finish type. The steel product type is "CR" for cold rolled products, or "HR" for hot rolled products. The steel grades will correspond to the chemical and mechanical requirements as shown in Tables 1 through 4. The finish type, an alpha character, will be designated with the finish U (unexposed). The above descriptive items are used together to form the coding system. Examples of the coding system for engineering part drawings, electronic math data files, and/or manufacturing engineering documents are shown in paragraph 8.

1.2.1 Material Identification.

GM WORLDWIDE	NORTH AMERICA	EUROPE	LATIN AMERICA	ASIA PACIFIC
GMW14400M-ST-T HT1475T/1170Y MS	GM4396M Type 1 (tubes)			
GMW14400M-ST-G HT1475T/1170Y MS	GMN7486			
GMW14400M-ST-S HS1300T/950Y MS	GM6429M			

© Copyright 2005 General Motors Corporation All Rights Reserved
November 2005 Originating Department: North American Engineering Standards Page 1 of 8

1 POSCO-1026


US011326227B2

(12) **United States Patent**
Drillet et al.

(10) Patent No.: **US 11,326,227 B2**

(45) Date of Patent: **May 10, 2022**

'227 Patent

(73) Assignee: **ArcelorMittal**, Luxembourg (LU)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

FOREIGN PATENT DOCUMENTS

622697 B2 4:1992
2573226 A1 1:2006

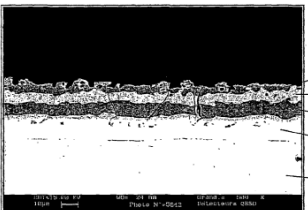
(Continued)

May 16, 2019, now Pat. No. 11,041,226, which is a (Continued)

(51) Int. Cl. **B32B 15/01** (2006.01)
C21D 9/46 (2006.01)
(Continued)

(52) U.S. Cl. **C21D 9/46** (2013.01); **B32B 15/012** (2013.01); **C23C 2/12** (2013.01); **C23C 2/26** (2013.01); **C23C 2/40** (2013.01); **Y10T 428/12396** (2015.01); **Y10T 428/12396** (2015.01); **Y10T 428/12757** (2015.01)

25 Claims, 4 Drawing Sheets



(d) Superficial layer

10µm

Low Carbon, Heat-Treatable Boron Steel—Uncoated or Aluminized PreCoated, GM Worldwide Engineering Standards, GMW14400.


US10961602B2

(12) **United States Patent**
Drillet et al.

(10) Patent No.: **US 10,961,602 B2**

(45) Date of Patent: **Mar. 30, 2021**

'602 Patent

(73) Assignee: **ArcelorMittal**, Luxembourg (LU)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

FOREIGN PATENT DOCUMENTS

622697 B2 4:1992
2573226 A1 1:2006

(Continued)

(21) Appl. No.: **16/413,799**

(22) Filed: **May 16, 2019**

(65) **Prior Publication Data**
US 2019/0271056 A1 Sep. 5, 2019

Related U.S. Application Data

(60) Continuation of application No. 15/006,770, filed on May 26, 2017, which is a continuation of application (Continued)

(51) Int. Cl. **C21D 9/46** (2006.01)
B32B 15/01 (2006.01)
(Continued)

(52) U.S. Cl. **C21D 9/46** (2013.01); **B32B 15/012** (2013.01); **C23C 2/12** (2013.01); **C23C 2/26** (2013.01); **C23C 2/40** (2013.01);

(Continued)

30 Claims, 4 Drawing Sheets



(d) Superficial layer

10µm

Low Carbon, Heat-Treatable Boron Steel—Uncoated or Aluminized PreCoated, GM Worldwide Engineering Standards, GMW14400.

EX1026 (GMW14400); EX1001 ('227 Patent) at 4; EX1001 ('602 Patent) at 4

Ex. 2043

Patent Office Considered Secondary References in Counts:

Downloaded from SAE International by Lee Neugebauer, Monday, March 25, 2019

SAE TECHNICAL
PAPER SERIES

2001-01-0078

Cornette

High Strength Steels for Automotive Safety Parts

D. Cornette, T. Hourman, O. Hudin, J. P. Laurent and A. Re
Usinor R

Reprinted From: New Sheet Steel Products and Sheet Metal Stamping
(SP-1614)

SAE The Engineering Society
For Advancing Mobility
Land Sea Air and Space
INTERNATIONAL

SAE 2001 World Congress
Detroit, Michigan
March 5-8, 2001

400 Commonwealth Drive, Warrendale, PA 15096-0001 U.S.A. Tel: (724) 776-4841 Fax: (724) 776-5760

1

POSCO-1014

US01132622B2

(12) United States Patent
Drillet et al.

(10) Patent No.: US 11,326,227 B2
(45) Date of Patent: May 10, 2022

'227 Patent

(73) Assignee: ArcelorMittal, Luxembourg (LU)
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

FOREIGN PATENT DOCUMENTS

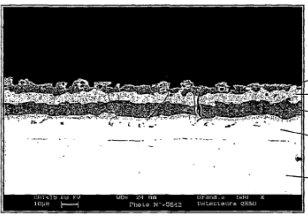
AU 622697 B2 4/1992
CA 2533226 A1 1/2006

(Continued)

(51) Int. Cl. B32B 15/01 (2006.01); C21D 9/46 (2006.01)
(52) U.S. Cl. CPC C21D 9/46 (2013.01); B32B 15/012 (2013.01); C23C 2/12 (2013.01); C23C 2/26 (2013.01); C23C 2/40 (2013.01); Y10T 428/12369 (2015.01); Y10T 428/12396 (2015.01); Y10T 428/12757 (2015.01)

A pre-coated steel strip is provided. The steel strip includes a strip of base steel having a length, a width, a first side, and a second side. The length of the strip is at least 100 m and the width is at least 600 mm. An aluminum or an aluminum alloy pre-coating is on at least part of at least one of the first or second sides of the strip of base steel. A thickness t_p of the pre-coating is from 20 to 33 micrometers at every location on at least one of the first or second sides. Processes, coated stamped products and land motor vehicles are also provided.

25 Claims, 4 Drawing Sheets



10µm

US10961602B2

(12) United States Patent
Drillet et al.

(10) Patent No.: US 10,961,602 B2
(45) Date of Patent: Mar. 30, 2021

'602 Patent

(73) Assignee: ArcelorMittal, Luxembourg (LU)
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

FOREIGN PATENT DOCUMENTS

AU 622697 B2 4/1992
CA 2533226 A1 1/2006

(Continued)

(21) Appl. No.: 16/413,799
(22) Filed: May 16, 2019
(65) Prior Publication Data US 2019/0271056 A1 Sep. 5, 2019
(60) Related U.S. Application Data Continuation of application No. 15/006,770, filed on May 26, 2017, which is a continuation of application (Continued)

OTHER PUBLICATIONS

Raviere et al, Hot Stamping Experiment and Numerical Simulation of Pre-coated US1091509 Quenchable Steels, SAE 2003-01-2859, 2003.
(Continued)
Primary Examiner—Daniel J. Schleis
(74) Attorney, Agent, or Firm—Davidson, Davidson & Kappel, LLC
(57) ABSTRACT A pre-coated steel strip is provided. The steel strip includes a strip of base steel having a length, a width, a first side, and a second side. The length of the strip is at least 100 m and the width is at least 600 mm. An aluminum or an aluminum alloy pre-coating is on at least part of at least one of the first or second sides of the strip of base steel. A thickness t_p of the pre-coating is from 20 to 33 micrometers at every location on at least one of the first or second sides. Processes, coated stamped products and land motor vehicles are also provided.

30 Claims, 4 Drawing Sheets



10µm

Cornette et al., “High Strength Steels for Automotive Safety Parts” SAE Technical Paper Series 2001-01-0078, Mar. 24 001, ISSN: 0148-7191.

Cornette et al., “High Strength Steels for Automotive Safety Parts” SAE Technical Paper Series 2001-01-0078, Mar. 24 001, ISSN: 0148-7191.

Construction of “Intermetallic Layer”

“Battle of the Experts”



Dr. Dierk Raabe
Patent Owner's Expert

Patent Owner's expert applies a scientifically accurate, supported, “textbook” construction:

“a layer containing two or more metallic (or metalloid) elements atomically joined with defined stoichiometry in an ordered crystal structure.”

E.g., POSR 2 (citing EX2040 ¶¶ 115-120)



Dr. Michael Miles
Petitioner's Expert

Petitioner's expert applies a sweepingly broad, scientifically unsupported construction:

Essentially just the presence of multiple metals/metalloids in the same material

E.g., POSR 1 (citing EX2021 at 114:10-16; EX2041 at 275:12-23, 276:7-12)
Ex. 2043

Dr. Dierk Raabe



Dr. Dierk Raabe
Patent Owner's Expert



MAX PLANCK INSTITUTE
FOR SUSTAINABLE MATERIALS

- **CEO of Max Planck Institute for Sustainable Materials** (formerly Max Planck Institute for Iron Research)
- Nearly **40 years of experience** in fields of the '602/'227 patents
- Over **700** peer reviewed articles and **seven** books
- Cited over **100,000 times** (achieving an h-index of 189)
- Neither Petitioner nor Dr. Miles Dispute Dr. Raabe's experience or expertise



POSR 1 (citing EX2040 ¶¶ 3-15, EX2041 at 250:3-252:1); POR 6-7
Ex. 2043

Dr. Michael Miles



Dr. Michael Miles

Petitioner's Expert

- Lacks expertise in the particular specialties at issue in this case
- ***Never*** worked on or researched:
 - the formation of intermetallics in aluminum alloy coatings
 - diffusion to create layered phase structures in aluminum alloy coatings
 - process parameters to obtain specific phase structures in aluminum alloy coatings

E.g., POSR 1 (citing EX2021 at 52:12-53:19, 42:11-15, 46:6-11, *see also* 32:3-33:16, 36:3-7, 39:5-40:11, 42:3-10, 45:21-46:5, 47:4-49:9, 51:8-52:11)
Ex. 2043

Petitioner Uses Sweepingly Broad, Unsupported Construction



Dr. Michael Miles
Petitioner's Expert

Mere presence of multiple metals/metalloids in same “layer” constitutes an “intermetallic layer.”

E.g., POSR 1 (citing EX2021 at 114:10-16); POR 11

- Includes solid solutions where metals/metalloids are not atomically joined

E.g., POSR 1 (citing EX 2021 at 275:12-23, 276:7-12)

- Includes material with no defined stoichiometry or ordered crystal structure

E.g., POSR 1 (citing EX2021 at 365:7-17, 283:5-284:1, 288:17-24)

Petitioner Uses Sweepingly Broad, Unsupported Construction



Dr. Michael Miles
Petitioner's Expert

No reference defines intermetallic layers as encompassing “just a solid solution” of metals or metalloids, not atomically joined, “with no defined stoichiometry at all” for which “ordered crystal structure” is lacking

POSR 5 (citing EX2041 at 275:12-23, 365:7-17; 276:7-12, 283:5-9-284:1, 288:17-24)

In fact, none of the prior art Petitioner cites defines an “intermetallic layer” at all (versus noting intermetallic compounds)

POSR 5 (citing EX2041 at 309:21-310:2)

Petitioner Uses Sweepingly Broad, Unsupported Construction



Dr. Michael Miles
Petitioner's Expert

Petitioner and Dr. Miles rely on a ***non-scientific*** source, Webster's Dictionary, for its definition of "intermetallic"

POSR 6 (citing PR 5-6; EX1075 ¶ 28)

Petitioner and Dr. Miles ignore that Webster's ***separately*** defines "intermetallic compound," which further identifies "a characteristic crystal structure" and "definite composition" "distinguished from solid solution," in accord with Dr. Raabe's construction

POR 6 (comparing EX1079 at 3, with EX2040 ¶ 120)

Dr. Miles testified that he omitted the more specific definition because he wanted to be "a little more general" (*i.e.*, broader in construction, to stretch the Challenged Claims onto the prior art)

POR 6 (citing EX2041 at 348:14-23, 349:21-350:11)
Ex. 2043

Petitioner Thus Finds “Intermetallic Layers”
Based on Only Presence of Multiple Metals

Takagi

Corresponding layers of '602 patent

TABLE 1

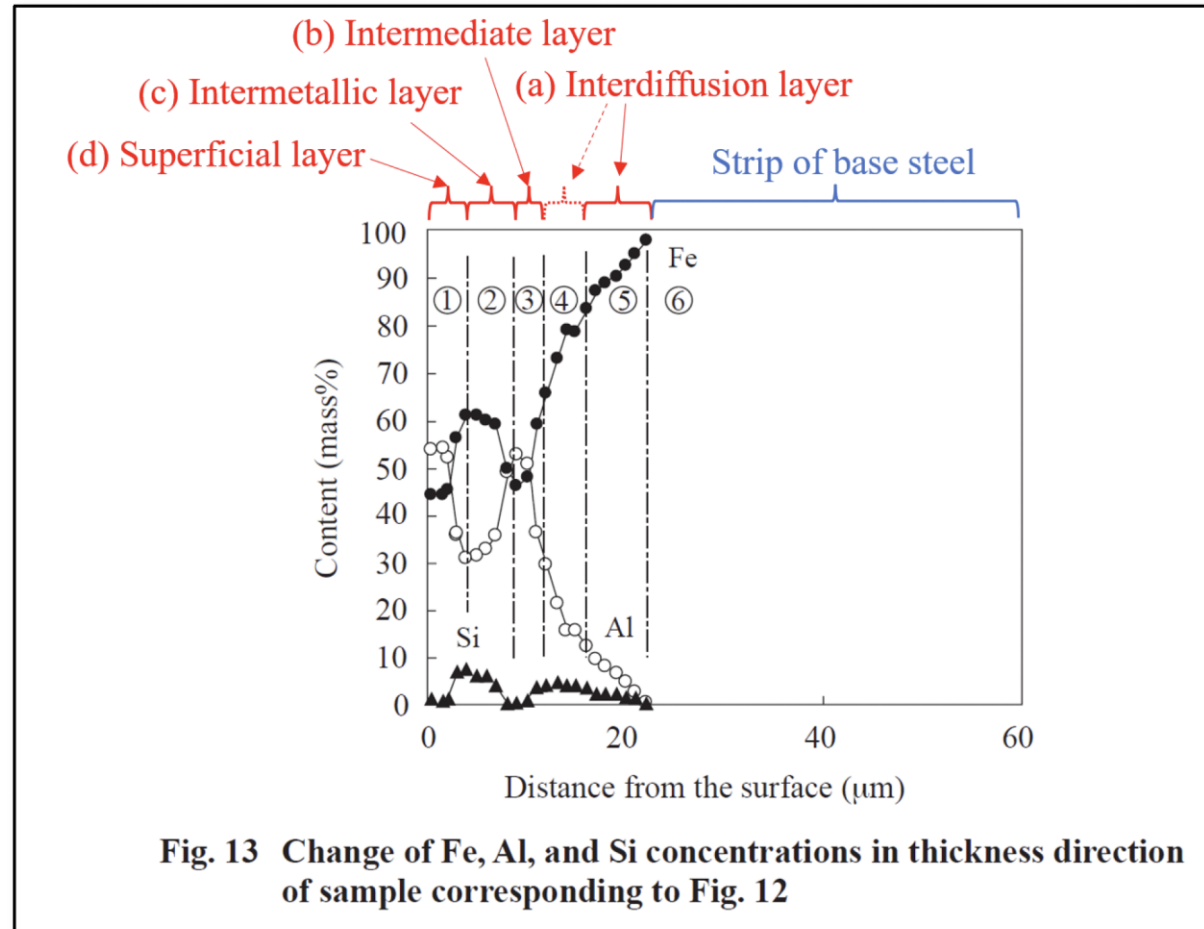
No.	PRODUCTION		COATING LAYER STRUCTURE & COMPOSITION (%)					STEEL BASE HARDNESS (Hv)	COATING LAYER HARDNESS (Hv)			OXIDE WEIGHT (mg/dm ²)	FORMABILITY	CORROSION RESISTANCE	WELDABILITY	
	RAISED TEMPERATURE (°C)	HOLD TIME (min.)	COMPONENT & HARDNESS	INNER	INTER 1	INTER 2	INTER 3		SOFTTEST	AVERAGE	SOFTER 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	89.6	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	(a)		(b)	(c)	(d)	400	305	385	78	550	○	×	×
			Si	1.5	—			0.8								
			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)

Takagi Table 1 (annotated)

Petitioner Thus Finds “Intermetallic Layers” Based on Only Presence of Multiple Metals

Suehiro



Annotated Suehiro FIG. 13

Patent Owner's Construction Is Accurate and Supported

“a layer containing two or more metallic (or metalloid) elements atomically joined with defined stoichiometry in an ordered crystal structure”

POSITA would recognize that an “intermetallic layer” in the Challenged Patents is:

- a ***phase layer*** of intermetallic ***compounds*** (not just two metals in solution)
- with organized structure and composition reflecting intermetallic compounds coalesced in a phase

Patent Owner's Construction Is Accurate and Supported

Petitioner's Expert, Dr. Miles Now Agrees With Patent Owner



Dr. Michael Miles
Petitioner's Expert

Dr. Miles *agrees* scientific literature defines intermetallics as, in substance:

- “atomically joined”
- with “defined stoichiometry”
(*i.e.*, “ordered atomic distributions”)
- in “ordered crystal structure[s]”

POSR 3 (citing EX2041 at 342:24-343:21, 344:16-346:16, *reviewing* EX2038 at 15, 18, 23 (internal 5, 7, 12))

Patent Owner's Construction Is Accurate and Supported

Petitioner's Expert, Dr. Miles Now Agrees With Patent Owner



Dr. Michael Miles
Petitioner's Expert

Dr. Miles testified that Patent Owner's construction is a "standard" "textbook definition" and not "*unreasonable*"

POSR 2 (citing EX2041 at 304:13-15, 305:11-18, 326:9-10, 327:17-25)

Dr. Miles testified Patent Owner's construction is not "wrong scientifically" or "a scientific error in describing intermetallic layers"

POSR 2 (citing EX2041 at 308:6-14)

Patent Owner's Construction Is Accurate and Supported



Dr. Michael Miles
Petitioner's Expert

Dr. Miles confirmed that Patent Owner's construction is supported by "authoritative" sources, authored by experts in the field, that are "reliable" and "accurately describe the science concerning intermetallics"

POSR 3 (citing EX2041 at 323:5-324:14; 315:8-11, 216:15-20)

Dr. Miles retracted his opinion (relied on by Petitioner) that these scientific references "contradict" Patent Owner's construction

POSR 3 (comparing EX1075 ¶ 19, with EX2041 at 329:5-7, 339:2-13, 341:3-10 and 342:2-9, 346:18-347:1; 324:18-325:4, 326:20-25, 328:6-329:12, 336:17-21)

Dr. Miles retracted his opinion (relied on by Petitioner) that "POSITA would not have looked to" these scientific references to define "intermetallic layer" in this context

POSR 3 (comparing EX1075 ¶ 19, with EX2041 at 319:2-320:5)

Ex. 2043

Intermetallic Phase Layers Comprise “Atomically Joined” Metals with “Defined Stoichiometry” and “Ordered Crystal Structure”

Gerhard Sauthoff

Intermetallics



Weinheim · New York · Basel · Cambridge · Tokyo

ArcelorMittal Ex. 2038
Page 3 of 190

Intermetallics form because the strength of bonding between the respective unlike atoms is larger than that between like atoms. Accordingly, intermetallics form particular crystal structures with ordered atom distributions where atoms are preferentially surrounded by unlike atoms. Sim-

EX2038 at 15 (internal 5); see also POSR 3 (citing EX2040 ¶ 118, [which cites EX2038 at 15 as basis for construction]; EX2041 at 342:2-6, 342:24-343:21 [testifying to EX2038 at 15 and agreeing it discloses requirements of Patent Owner's construction])

Ex. 2043

Intermetallic Phase Layers Comprise “Atomically Joined” Metals with “Defined Stoichiometry” and “Ordered Crystal Structure”

Gerhard Sauthoff

Intermetallics



Weinheim · New York · Basel · Cambridge · Tokyo

ArcelorMittal Ex. 2038
Page 3 of 190



Dr. Michael Miles
Petitioner's Expert

Dr. Miles confirmed intermetallics must have an “atomic bond”/“joining” and “crystal structure” different from their constituent metal elements

POSR 3-4 (citing EX2041 at 335:1-24, reviewing EX2038 at 11 (internal page 1))

Dr. Miles confirmed this “results in a pattern then of atomic positioning in intermetallics” and formation of “ordered crystal structures”

POSR 4 (citing EX2041 at 337:2-338:11, reviewing EX2038 at 15 (internal page 5), also cited in EX2040 ¶¶ 118-120)

Ex. 2043

Intermetallic Phase Layers Comprise “Atomically Joined” Metals with “Defined Stoichiometry” and “Ordered Crystal Structure”

Rainer Pöttgen · Dirk Johrendt

Intermetallics

—
Synthesis, Structure, Function

DE GRUYTER

ArcelorMittal Ex. 2039
Page 3 of 294

Alloys and solid solutions should clearly be distinguished from intermetallic compounds. Metals with different size and different chemical potential react to variety

* * *

In going from a disordered phase to an ordered one, one observes a negative enthalpy. The corresponding structure shows optimized space filling and mostly a defined composition (stoichiometric ratio of the elements) and we call this an intermetallic compound. The formation of such an ordered arrangement is also driven by a maximization of bonding energy and a higher contribution to the lattice energy. Similar to ionic

EX2039 at 52 (internal 42); see also POSR 3-4 (citing EX2041 at 331:21-332:3, 333:7-20, 334:7-23, testifying to EX2039 at 52)

Ex. 2043

Petitioner's Objection to Patent Owner's Construction Is a Strawman

Petitioner and Dr. Miles redraft Patent Owner's construction to require "an atomic absolute" closed set "to the atom"

- "A layer ~~containing~~ **consisting of and solely of** two or more metallic" elements

POSR 4 (citing, e.g., EX2041 at 367:4-23)

- Such that "every single atom in the layer must be atomically joined with defined stoichiometry in an ordered crystal structure"

POSR 4 (citing, e.g., EX2041 at 363:12-21, 357:9-16, 362:6-7, 369:1-14)

Petitioner's Objection to Patent Owner's Construction Is a Strawman



Dr. Michael Miles
Petitioner's Expert

Dr. Miles concedes that POSITA would have understood that an intermetallic layer allows for “some deviation” without homogeny “to the atom”

POSR 5 (citing EX2041 at 333:21-334:14)

Dr. Miles concedes POSITA would recognize the intermetallic layer recited in the Challenged Claims as a **phase layer** that is only “largely homogenous,” allowing for porosity, cracks, etcetera, and not requiring “down to the atom” homogeneity

POSR 5 (citing EX2041 at 277:13-18, 278:1-11, 280:10-281:4, 295:5-8, 296:14-18; EX1078 at 231:24-232:13)

Dr. Miles misunderstood the word “containing” in Patent Owner's construction as meaning the same as “comprising” or “consisting of”

POSR 4 (citing EX2041 at 368:7-25)

Ex. 2043

Petitioner's Construction Renders "Intermetallic" Meaningless in the Claims

- All steel and aluminum alloy coatings have more than one metal in them, even before hot stamping
- Under Petitioners' construction, every "layer" in an aluminum alloy coating would be synonymously an "intermetallic layer"
- Petitioner thus reads out the "intermetallic" narrowing requirement in the claims for the specified layer

POSR 6-7; POR 11-12 (citing EX2040 ¶¶ 118-121)



Bicon, Inc. v. Straumann Co.,

441 F.3d 945, 950-51 (Fed. Cir. 2006)

Construction should “giv[e] effect to all terms in the claim,” and “claim language should not [be] treated as meaningless.”

An “Intermetallic layer” Does Not Require Just the Presence of More Than One Metal

The metals/metalloids must be:

- 1 Atomically joined/bound into a *compound*
- 2 With defined stoichiometry
- 3 In an ordered crystal structure

POSR 2-4; EX2040 ¶¶ 115-120; EX1078 at 103:22-105:2, 126:4-23, 246:3-248:11; EX2038 at 11, 15, 18, 23; EX2039 at 52; EX2041 at 331:21-332:3, 333:7-20, 334:7-23, 342:24-343:21, 344:16-346:16, 335:1-24, 337:2-338:11

Ex. 2043

Suehiro Does Not Disclose An Intermetallic Layer

Undisputed That Suehiro Does Not Mention “Intermetallics” or an “Intermetallic Layer”

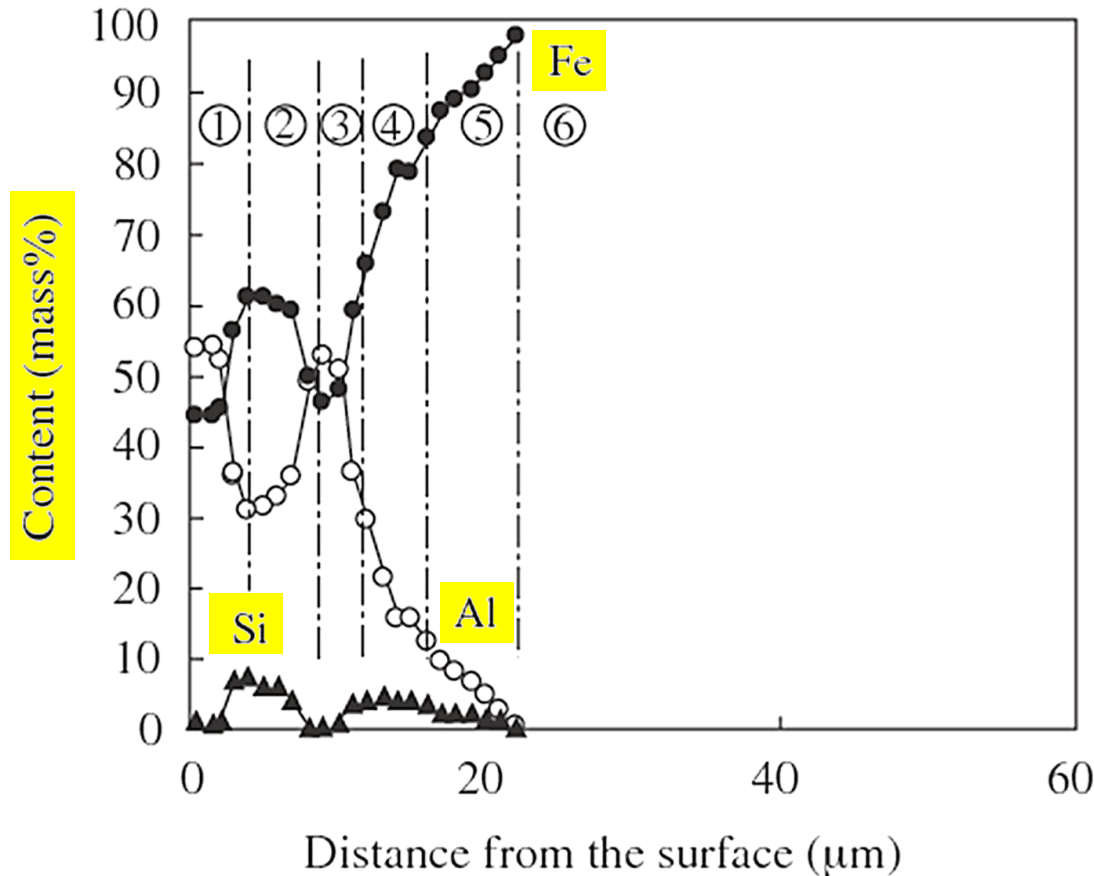


Figure 13: Change in Fe, Al and Si Element Concentration in the Thickness Direction of Sample in Figure 12

[15] Figure 12 shows the alloying state after holding at 950°C for 0.5 min, and Figure 13 shows the results of SEM-EDS measurements of Fe, Al, and Si concentrations in the surface plating layer in the direction of the plate thickness.

Suehiro only discloses the “Fe, Al, and Si concentrations” (mass%) separately for each element

Suehiro Does Not Disclose an “Intermetallic Layer”

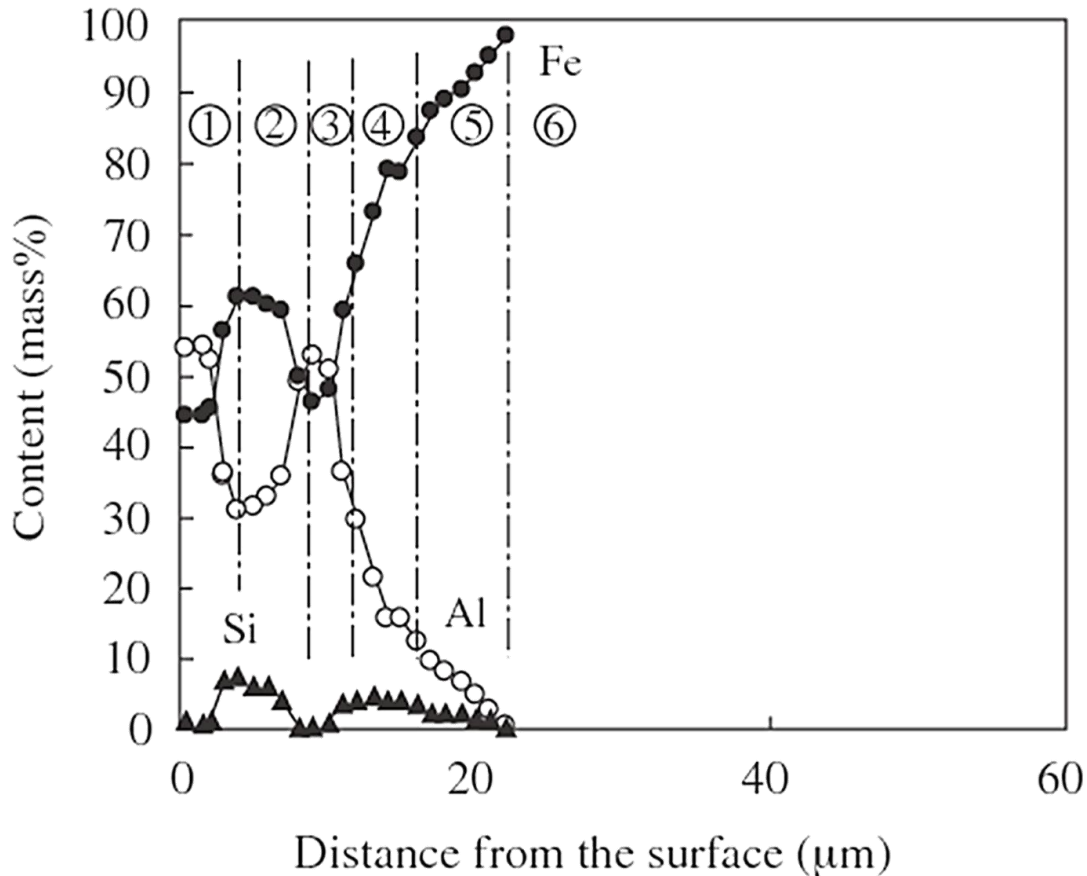


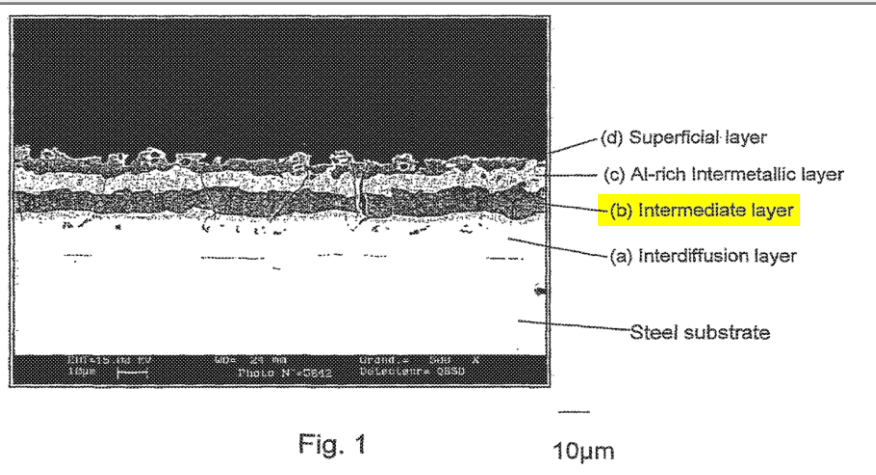
Figure 13: Change in Fe, Al and Si Element Concentration in the Thickness Direction of Sample in Figure 12

Suehiro's composition data is provided from only *a single line scan*, taken from one *undisclosed* line point in the sample

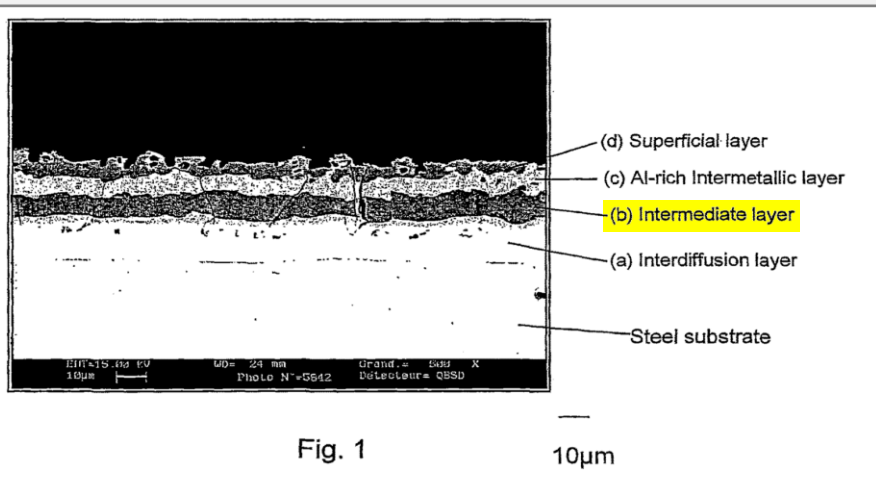
- But a single line scan (*i.e.*, one-dimensional data) does not characterize composition in two or three dimensions, as at issue here
- As Dr. Miles testified, to confirm composition (or consistency) in two dimensions across a layer, one would “do more than one line scan”

Suehiro Does Not Disclose an “Intermetallic Layer”

The Challenged Claims Require an Intermetallic “Layer” Not a “Line”



EX1001 ('602 Patent) Claim 1, Fig. 1



EX1001 ('227 Patent) Claim 1, Fig. 1

- Suehiro does ***not*** disclose, even along a line, to what degree Fe, Al, or Si form intermetallic *compounds*, nor disclose whether an internal intermetallic phase layer has formed as needed to satisfy the claims

POSR 10 (citing EX2040 ¶ 160); POR 22-23 (citing EX2040 ¶¶ 160-161)



Dr. Michael Miles
Petitioner's Expert

Petitioner's Expert:

“[W]e really don't know from what's in the patent or the prior art what the actual microstructures are in the layers” and have to “make assumptions of what's actually in those layers.”

POSR 10-11 (citing EX2041 at 306:5-10)

Ex. 2043

Takagi Does Not Disclose An Intermetallic Layer

Takagi Does Not Disclose an “Intermetallic Layer”

Corresponding layers of '227 patent

TABLE 1

No.	PRODUCTION		COATING LAYER STRUCTURE & COMPOSITION (%)					STEEL BASE HARDNESS (Hv)	COATING LAYER HARDNESS (Hv)			OXIDE WEIGHT (mg/dm ²)	FORMABILITY	CORROSION RESISTANCE	WELDABILITY	
	RAISED TEMPERATURE (°C)	HOLD TIME (min.)	COMPONENT & HARDNESS	INNER	INTER 1	INTER 2	INTER 3		OUTER	SOFTTEST	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	89.6	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	280	760	720	—	810								
3	930	10	Al	(a)		(b)	(c)	(d)	400	305	385	78	550	○	×	×
			Si	1.5	—			1.0								
			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)

Petitioner relied solely on Takagi’s line scan elemental concentration data (EX1016 Table 1) to argue an “intermetallic layer” is disclosed

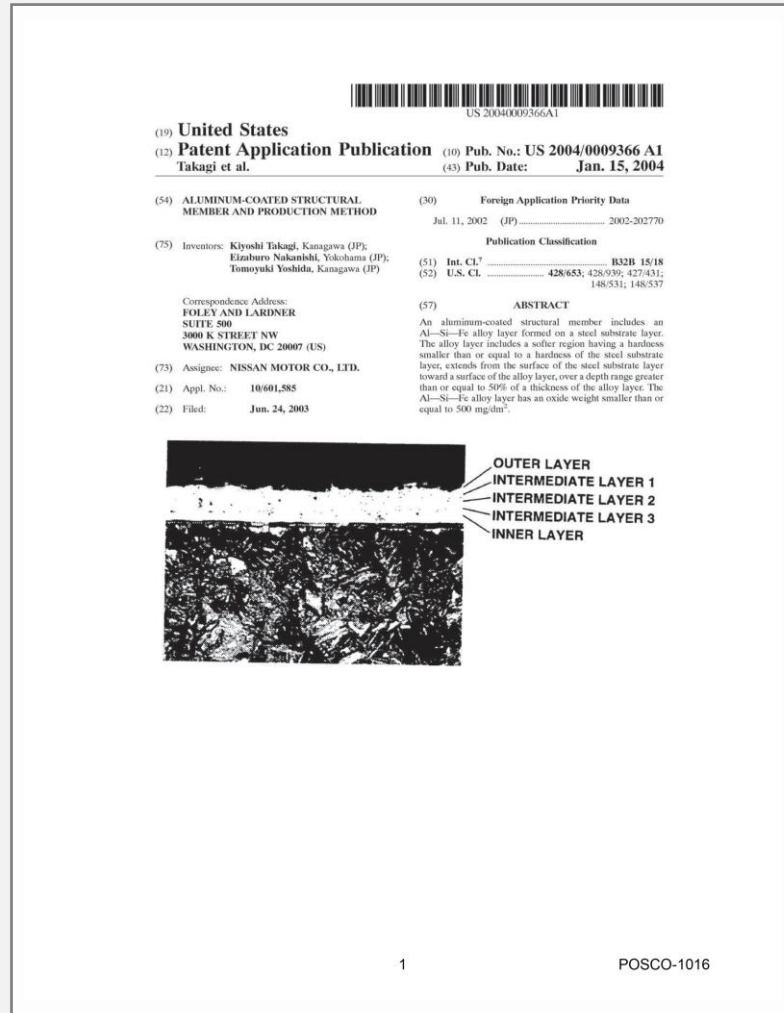
Takagi Does Not Disclose an “Intermetallic Layer”

Petitioner and Dr. Miles Rely Solely on *Elemental* Line Scan Data

[1f]: (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

58. Takagi alone and/or as modified by Cornette discloses the intermetallic layer. According to Takagi’s Table 1, 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.

Takagi Does Not Disclose an “Intermetallic Layer”



- Takagi’s line scan data (*i.e.*, one-dimensional data) does not characterize composition in two or three dimensions as the Challenged Claims require (requiring intermetallic “layers” not “lines”)

POR 13 (citing EX2040 ¶¶ 131-132); POSR 13 (citing EX1078 at 263:1-8; EX2021 at 158:20-159:17; EX2040 ¶ 131)

- **Both side’s experts agree:** Characterizing composition (or consistency) in two dimensions across a layer requires “more than one line scan”

POSR 11 (citing EX2041 at 257:16-25, 258:10-15), POSR 13 (citing EX1078 at 263:1-8; EX2040 ¶ 131)

- Nor, even along that line does a line scan disclose to what degree intermetallic compounds are formed

POR 13 (citing EX2040 ¶ 133)

EX1016 (Takagi)

Ex. 2043

Takagi's Composition Data Does Not Confirm Phase Layering

FIG.4

TABLE 1

No.	PRODUCTION		COATING LAYER STRUCTURE & COMPOSITION (%)						STEEL BASE HARDNESS (Hv)	COATING LAYER HARDNESS (Hv)			OXIDE WEIGHT (mg/dm ²)	FORMABILITY	CORROSION RESISTANCE	WELDABILITY
	RAISED TEMPERATURE (°C)	HOLD TIME (min.)	COMPONENT & HARDNESS	INNER	INTER 1	INTER 2	INTER 3	OUTER		SOFTTEST	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	89.6	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								

- Takagi does not disclose any elemental line scan results directly
- Takagi only discloses a single, summarized value for each element at unspecified depths in the overall alloy coating

Takagi's Composition Data Does Not Confirm Phase Layering

FIG.4

TABLE 1

No.	PRODUCTION		COATING LAYER STRUCTURE & COMPOSITION (%)						STEEL BASE HARDNESS (Hv)	COATING LAYER HARDNESS (Hv)			OXIDE WEIGHT (mg/dm ²)	FORMABILITY	CORROSION RESISTANCE	WELDABILITY
	RAISED TEMPERATURE (°C)	HOLD TIME (min.)	COMPONENT & HARDNESS	INNER	INTER 1	INTER 2	INTER 3	OUTER		SOFTTEST	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	89.6	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								



Dr. Dierk Raabe
Patent Owner's Expert

Patent Owner's Expert:

“You cannot infer that from these few data points that it is automatically in a layer topology. That’s pure speculation.”

“There’s no indication that this would automatically qualify as a two-dimensional layer.”

Takagi's Composition Data Does Not Confirm Phase Layering

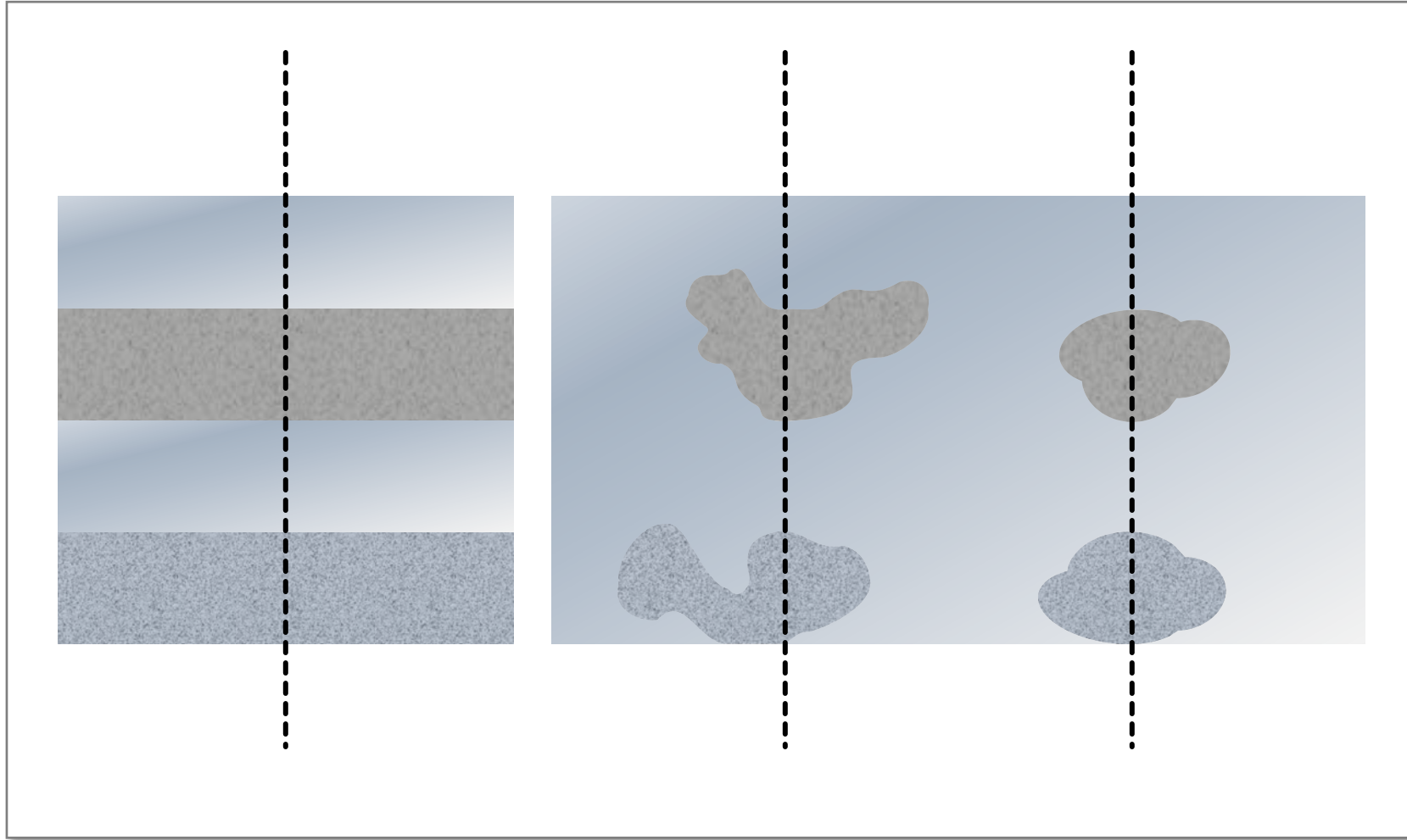
FIG.4

TABLE 1

No.	PRODUCTION		COATING LAYER STRUCTURE & COMPOSITION (%)						STEEL BASE HARDNESS (Hv)	COATING LAYER HARDNESS (Hv)			OXIDE WEIGHT (mg/dm ²)	FORMABILITY	CORROSION RESISTANCE	WELDABILITY
	RAISED TEMPERATURE (°C)	HOLD TIME (min.)	COMPONENT & HARDNESS	INNER	INTER 1	INTER 2	INTER 3	OUTER		SOFTTEST	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	89.6	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								

- Takagi's composition data (EX1016 Fig. 4) could equally map to cloud-like formations or disorganized “lava lamp” arrangements as much as it could to structured layering

Takagi's Composition Data Does Not Confirm Phase Layering

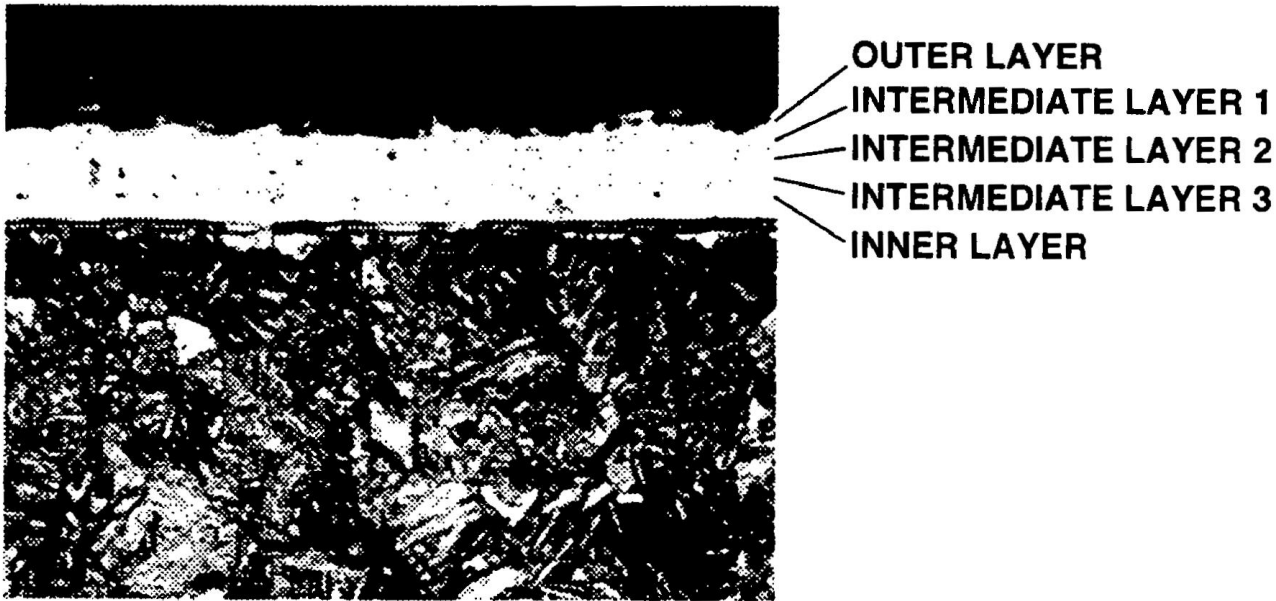


- Takagi's composition data (EX1016 Fig. 4) could equally map to cloud-like formations or disorganized “lava lamp” arrangements as much as it could to structured layering

POSR 14 (citing EX1016 Fig. 4/Table 1; EX1078 at 260:7-22, 261:13-16; 283:20-284:13); POR 13 (citing EX2040 ¶¶ 131-133) Ex. 2043

Takagi's SEM Data Does Not Show Any Intermetallic Layer

FIG.2A

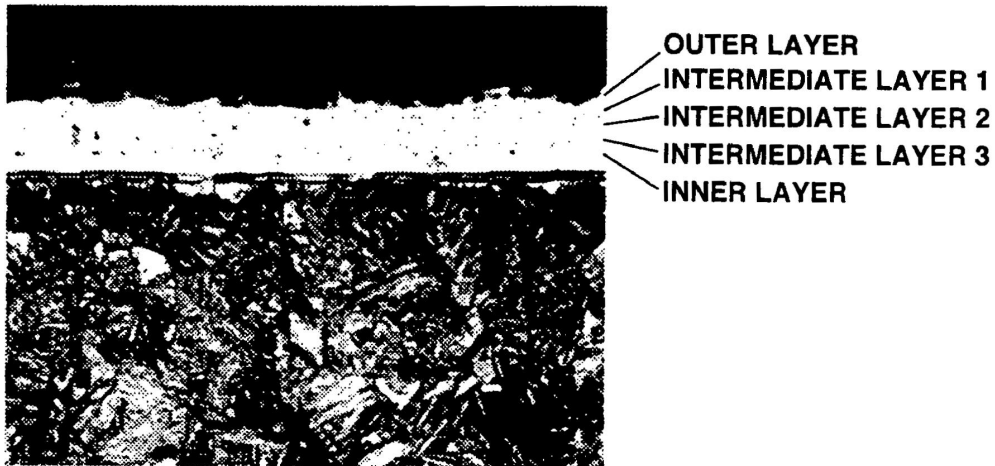


- On its face, Takagi Fig. 2A does not show any subordinate coating layers, much less an intermetallic layer

EX1016 Fig. 2A

Takagi's SEM Data Does Not Show Any Intermetallic Layer

FIG.2A



- Petitioner's expert and Patent Owner's expert **both** confirmed that **no** subordinate layers are discernable in Takagi Fig. 2A



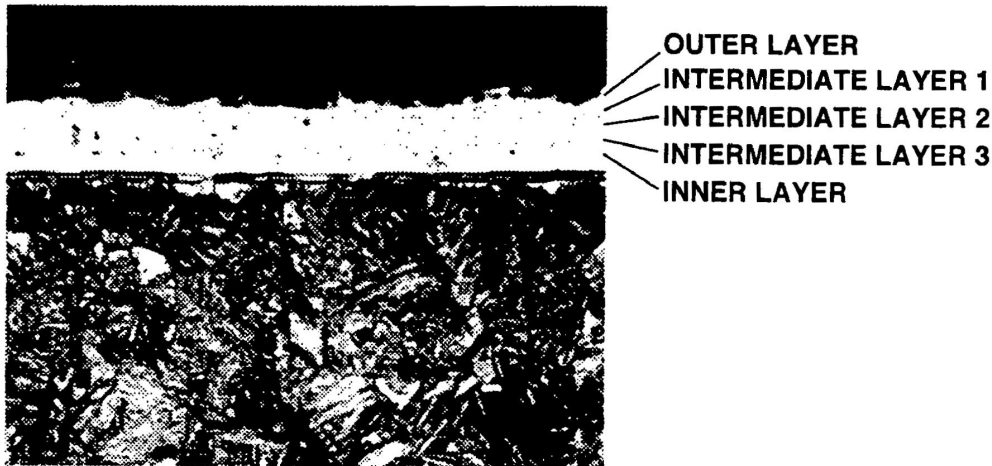
Dr. Dierk Raabe
Patent Owner's Expert

Patent Owner's Expert:

Takagi “has given us a picture which shows nothing like a layer”

Takagi's SEM Data Indicates That NO Intermetallic Layer Formed

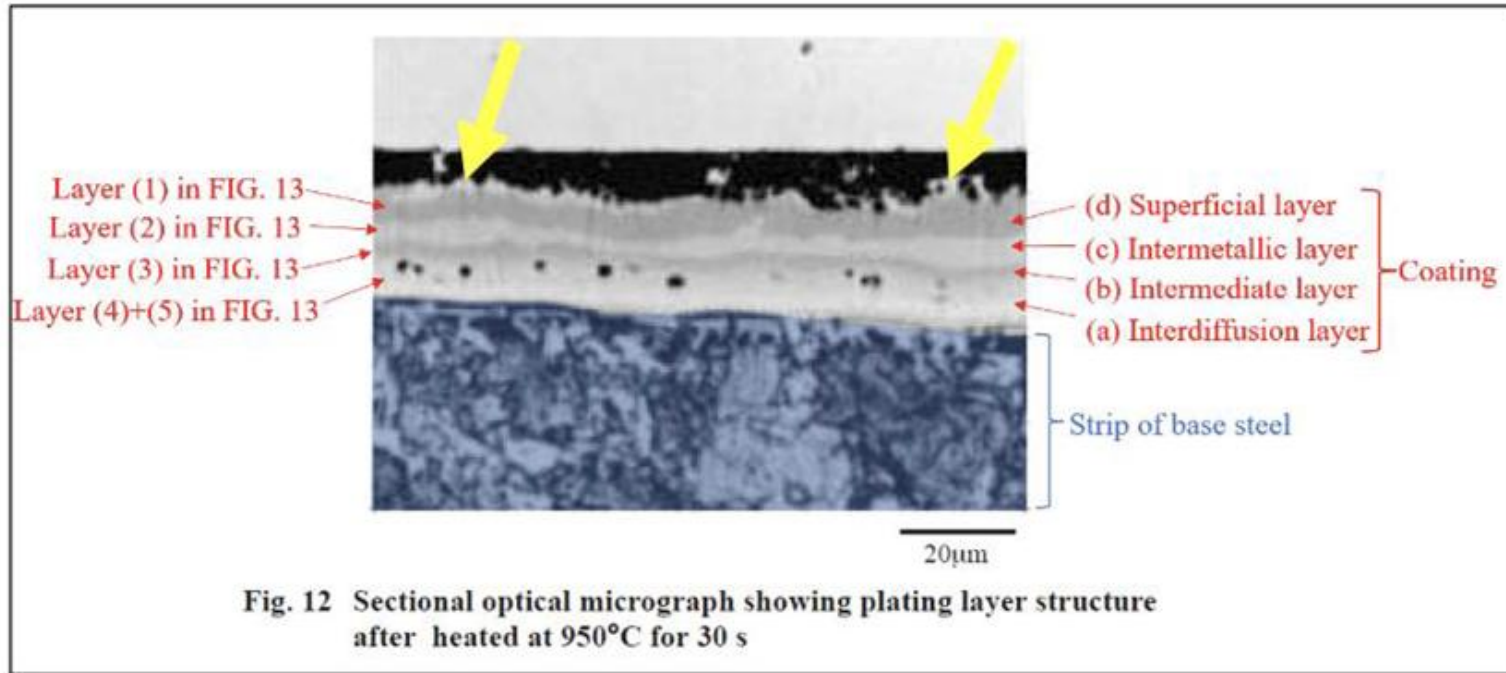
FIG.2A



- Critically, the scattered distribution of porosity (voids presenting as black dots in Fig. 2A) **does not show** banding as would occur if multiple phase layers existed as the Challenged Claims require
- This shows that the required intermetallic layer **is not present**
- **Petitioner and Dr. Miles never address this key fact**

Suehiro Does Not Disclose A Superficial Layer

Petitioners Do Not Identify a Superficial Layer in Suehiro

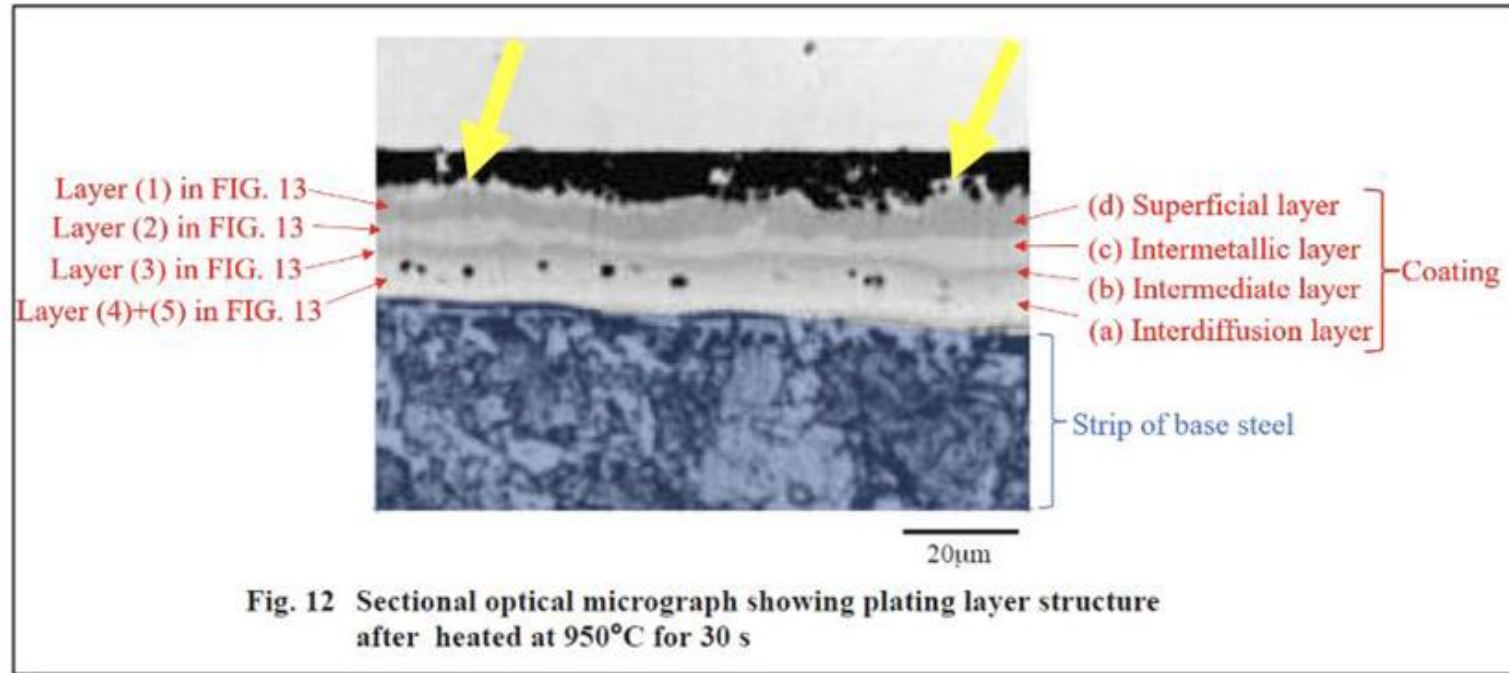


Annotated Suehiro FIG. 12

EX1055 Fig. 12 as annotated in **red by Petitioner** (EX1003 ¶ 148) and **yellow by Patent Owner**

- Suehiro undisputably shows an extra layer interposed between what Petitioner identifies as the purported “superficial layer” and the coating’s surface

Petitioners Do Not Identify a Superficial Layer in Suehiro



Annotated Suehiro FIG. 12

EX1055 Fig. 12 as annotated in **red by Petitioner** (EX1003 ¶ 148) and **yellow by Patent Owner**

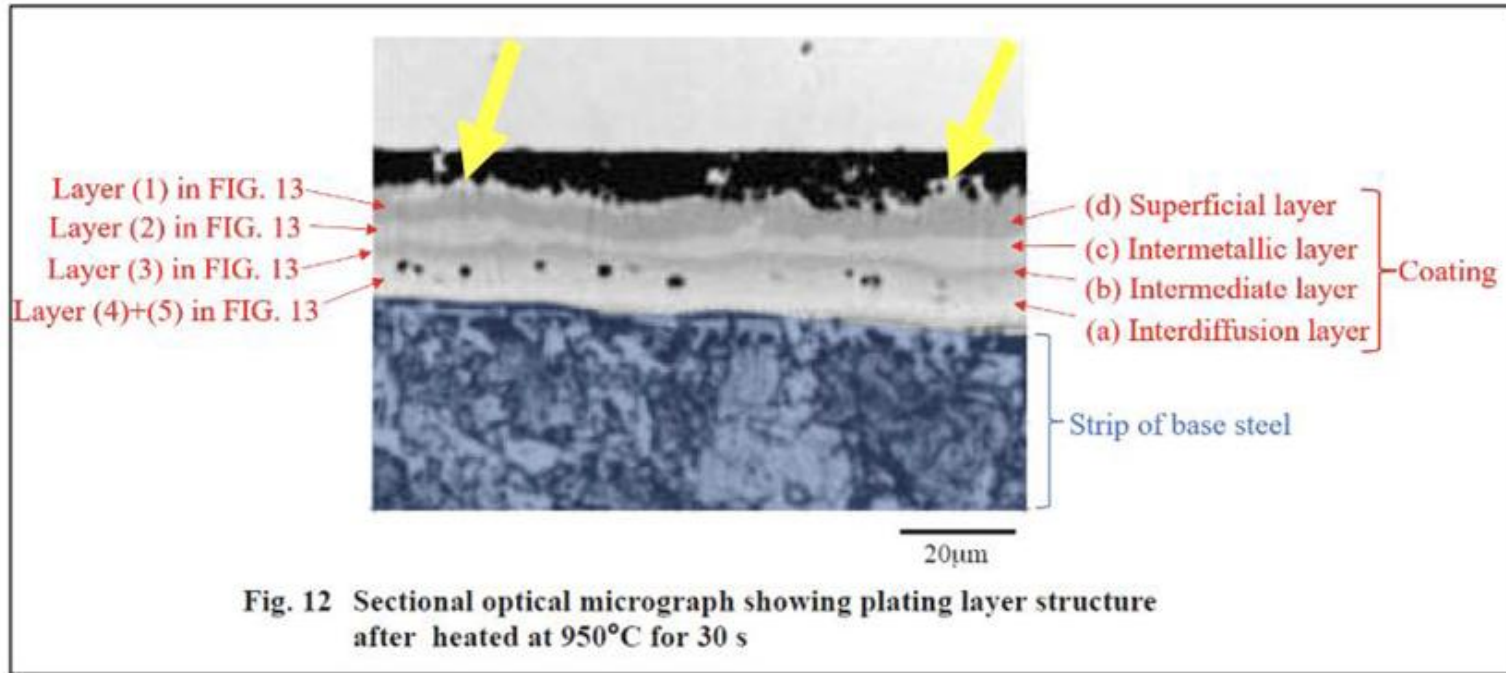
- The parties do not dispute that the required “superficial layer” must be the “surface layer,” *i.e.*, the “top-most layer”

POR 8-9 (citing EX1031 at 32; EX2040 ¶¶ 114, 168-71 (further citing EX2021 at 120:6-8; EX2028 ¶ 46; EX2029 ¶ 63; EX1031 at 24))

- But Petitioner undisputably identifies material in Suehiro Fig. 12 that is ***not*** the “top-most” or “surface layer” as the superficial layer

POSR 15-16 (citing EX1055 Fig. 12; EX1078 at 228:14-230:10; EX2021 at 206:12-25); POR 24-26 (citing EX2040 ¶¶ 174-179)

Petitioners Do Not Identify a Superficial Layer in Suehiro



Annotated Suehiro FIG. 12

EX1055 Fig. 12 as annotated in **red by Petitioner**
(EX1003 ¶ 148) and **yellow by Patent Owner**

- Thus, the material Petitioner identifies in Suehiro does not meet the “superficial layer” requirement in the Challenged Claims
- And Petitioner has not shown and cannot show that the extra layer (see yellow arrows) meets the requirements of the Challenged Claims

Suehiro's Line Scan Data Does Not Fix Petitioner's Problem



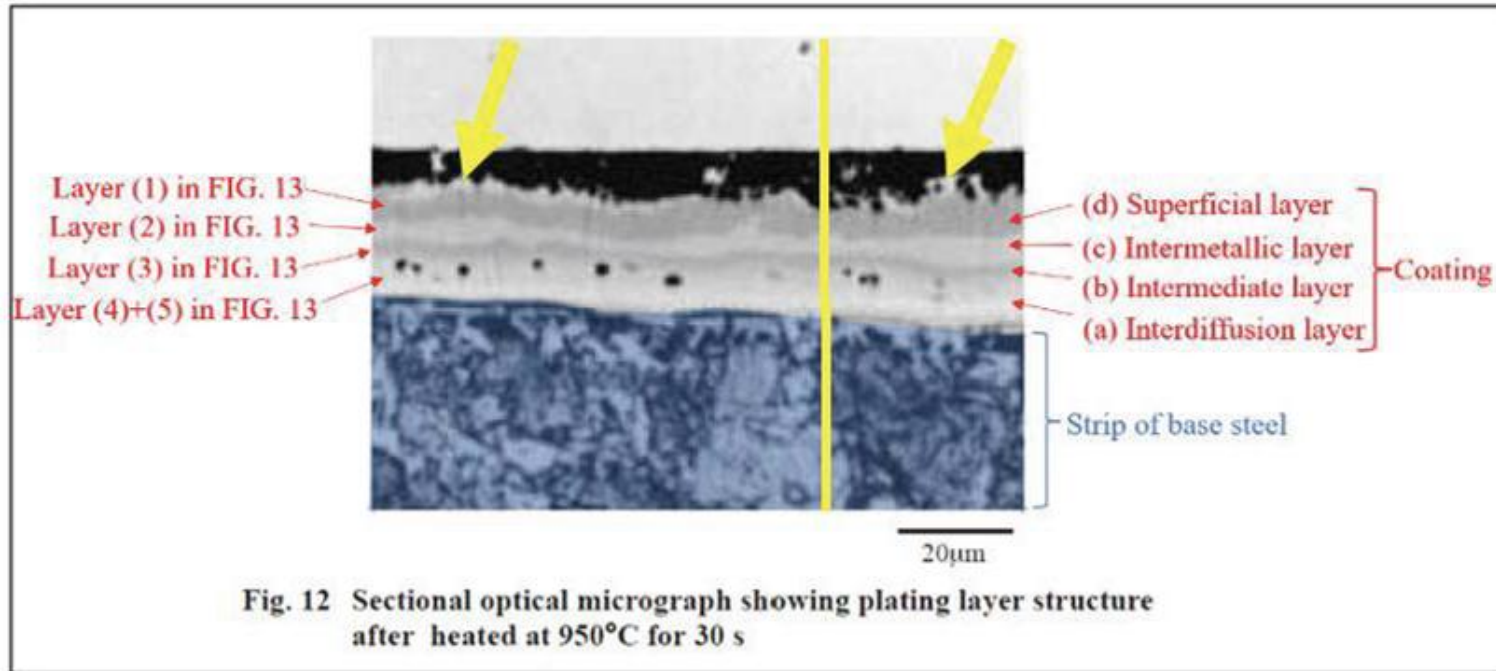
Dr. Michael Miles
Petitioner's Expert

Petitioner and Dr. Miles Do Not and Cannot Explain the Extra Layer in Suehiro Fig. 12

Instead, Petitioner and Dr. Miles argue that Suehiro's line-scan (Fig. 13) does not report values for an extra layer—***which does not erase the existence of what is unquestionable shown in Fig. 12***

POSR 15-16 (citing EX1055 Figs. 12, 13; EX1078 at 228:14-230:10, 280:2-16; EX2021 at 206:12-25; PR 21-22; EX1075 ¶¶ 59-60)

Suehiro's Line Scan Data Does Not Fix Petitioner's Problem

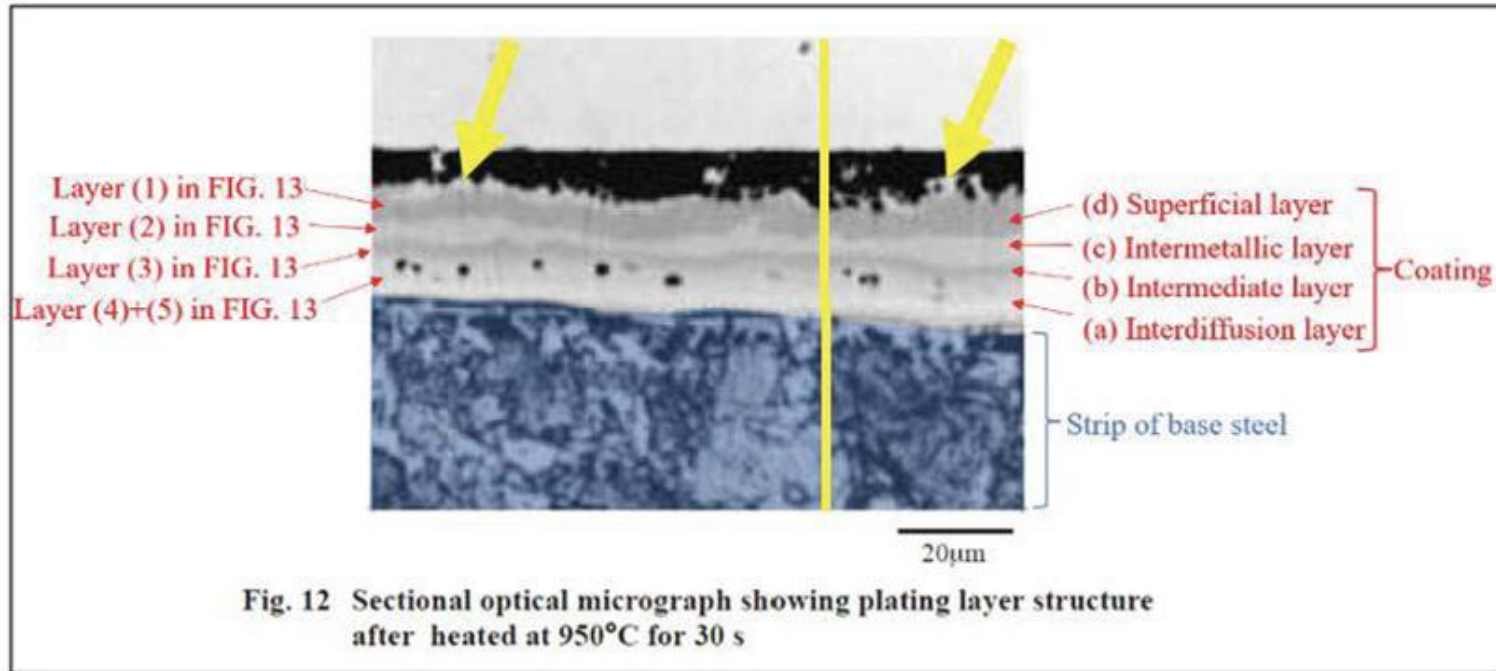


Annotated Suehiro FIG. 12

EX1055 Fig. 12 as annotated in **red by Petitioner** (EX1003 ¶ 148) and **yellow by Patent Owner**

- If Suehiro's line scan data was taken from where the extra layer in Suehiro Fig. 12 was interrupted or thin (for example, at the yellow line below), the extra layer would not register on the line scan

Suehiro's Line Scan Data Does Not Fix Petitioner's Problem



Annotated Suehiro FIG. 12

EX1055 Fig. 12 as annotated in **red by Petitioner** (EX1003 ¶ 148) and **yellow by Patent Owner**

- Dr. Miles concedes that Suehiro does not disclose where on the sample the line scan was taken

POSR 10, 15-16 (citing EX2021 at 199:23-200:21)

- Suehiro's line scan (Fig. 13) thus cannot be shown to conflict with evidence of an extra layer in Suehiro's SEM (Fig. 12)

POSR 15-16 (citing EX1055 Figs. 12, 13, EX1078 at 230:9-231:7); POR 24-26 (citing, *inter alia*, EX2040 ¶¶ 172-179); cf. EX1001 ('602 Patent) Claim 1; EX1001 ('227 Patent) Claim 1

**No Motivation to Combine
and No Reasonable
Expectation of Success**

Two Critical Failures: Motivation and Expectation of Success

1

Lack of Motivation

- Art taught AWAY from thicker coatings
- GMW14400 doesn't provide motivation
- Cornette doesn't provide motivation
- Takagi doesn't disclose claimed thickness
- No motivation to go thicker and keep claimed microstructure

2

No Reasonable Expectation of Success

- Technology highly complex and unpredictable
- Require more than routine experimentation
- POSITA would lack the expertise
- Can't mix and match—not "obvious to try"
- Science is unpredictable

Petitioner Fails on BOTH

The Law Requires More Than Hindsight



ATD Corp. v. Lydall, Inc.,
159 F.3d 534, 546 (Fed. Cir. 1998)

“[A d]etermination of obviousness can[]not be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.”

This Is Hindsight Reconstruction

PROPER ANALYSIS

- Look at prior art as it existed in 2006
- Ask: What would a POSITA have done in 2006?
- Where does that lead?

PETITIONER'S APPROACH (Backward-Looking)

- Look at the patent claims
- Ask: Where can I find each element?
- Grab pieces from different references to match

What Would a POSITA Have Done in 2006?

Properties of Aluminum-coated Steels for Hot-forming

Suehiro

Abstract

Production of parts with high strength by means of hot-forming process has been receiving considerable attention lately. Application of aluminized steel with good

hardenable for this process, 1,500 MPa was obtained with a surface layer changed from Al-10% Fe to Fe-Al alloy. The steel with Fe-Al alloy phosphatized treatment, JASO-CCT as galvanized stable surface layer at high strength, and al strategic alliance

1. Introduction

High-strength steel sheets are used as main components in recent years to reduce weight and improve environmental problems of car components and structural members. Lighter by using high-strength steel sheets and saving resources. With this as a background, the strength of steel used theretofore has increased from 440- or 590-MPa class. Generally speaking, as the strength of a steel increases, its formability deteriorates, and to overcome this, types of high-strength steel sheet products with structures have been developed. In spite of these, press forming complicated shapes is difficult when steel sheet is as high as approximately 1,500 MPa. In Europe, a forming method called die quench hot stamping or hot pressing is employed for fabricating structural members having a strength of 1,500 MPa. In this method, the strength of a steel sheet is increased after heating it to a temperature in the austenite region, say, around 900°C, while forming dies are maintained at a low temperature. Techniques similar to this are being studied. Processes have been studied or put into actual practice.

¹⁾ Yawata R&D Lab.

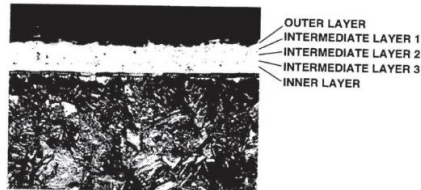
Takagi



(19) United States
(12) Patent Application Publication (10) Pub. No.: US 2004/009366 A1
Filed: Jun. 24, 2003

Correspondence Address:
FOLEY AND LARDNER
SUITE 500
3000 K STREET NW
WASHINGTON, DC 20007 (US)
(79) Assignee: NISSAN MOTOR CO., LTD.
(21) Appl. No.: 10/601,585
(22) Filed: Jun. 24, 2003

(57) ABSTRACT
An aluminum-coated structural member includes an Al-Si-Fe alloy layer formed on a steel substrate layer. The alloy layer includes a welder region having a hardness smaller than or equal to a hardness of the steel substrate layer, extends from the surface of the steel substrate layer toward a surface of the alloy layer, over a depth range greater than or equal to 50% of a thickness of the alloy layer. The Al-Si-Fe alloy layer has an oxide weight smaller than or equal to 500 mg/dm².



Would that POSITA have been motivated to increase thickness while maintaining the claimed four-layer microstructure?

NO

No Basis for Petitioner's Motivation to Combine



Dr. Michael Miles
Petitioner's Expert

- Dr. Miles lacks experience and expertise to opine on motivation to combine
- Never studied hot stamping parameters in combinations
- Not published any works on setting or experimenting with hot-stamping parameters
- Never researched working with or hot stamping aluminum alloy-coated steel
- Not published any work or research related to fully martensitic press-hardened steel

No Basis for Petitioner's Motivation to Combine



Dr. Michael Miles
Petitioner's Expert

- Q.** And it is accurate to say that you have not published any research or work authoring setting or experimenting with hot stamping parameters or requirements for aluminum alloy-coated steel; correct?
- A.** Correct.

No Basis for Petitioner's Motivation to Combine



Dr. Michael Miles

Petitioner's Expert

- Q.** And during your career in education, you have not worked on a research the formation of intermetallics in aluminum alloy coating on steel during the hot stamping process correct?
- A.** Correct.
- Q.** And during your career and education, you have not worked on or researched designing or determining the heating, holding or cooling parameters to determine specific phase structures in aluminum alloy coatings to steel; correct?
- A.** Correct.
- Q.** And during your career and education, you have not researched or worked on controlling the diffusion of layered phase structures in aluminum alloy coatings on steel; correct?
- A.** Correct. The only thing that I have done that maybe has some relationship with what you just mentioned is – and you can decide if this is relevant – in the friction bit joining aluminum to steel, as the bit is rotating rapidly, plunging through the aluminum and bonding with the steel on the backside, the side of the bit does react with the aluminum and form an intermetallic of aluminum and iron which constitutes, maybe, a secondary bonding mechanism in the process. The primary one being the steel-to-steel bond on the backside.
- Q.** But you have – it is fair to say that during your career in education, you have not researched or been involved in studying the diffusion from the base steel in – to create layer phase structures in the aluminum alloy coating on the steel, the diffusion between the base steel and the coating –
- A.** Correct.

The Art Taught Away From Thicker Coatings

- **Cost:** More pre-coating = higher material cost
- **Equipment Fouling:** Liquid aluminum transfers to rollers
➡ production shutdowns
- **Uneven Application:** Thicker coatings harder to apply uniformly
- **Thermal Insulation:** Thicker coating acts as insulator ➡ longer heating times
- **Formability:** Thicker interdiffusion layer increases cracking risk



EX2040 ¶ 193



“Simply put, more is not always better.”

EX2040 ¶ 198

Dr. Dierk Raabe
Patent Owner's Expert

PR 29-35 (citing EX2040 ¶¶ 155, 190-198, 258-263); POSR 17-18
Ex. 2043

No Motivation to Go Thicker

Dr. Miles Said Go Thinner—Now He Says Go Thicker

Previous Declaration

discussed in EP Laurent (10-25 μm). Further, I also believe that reducing a thickness of the coating by 5 μm (or even 3 μm) would result in a substantial cost saving as less material is used on each part (*e.g.*, especially when thousands of coated parts are manufactured). Because of this, a PHOSITA would have been motivated to reduce the pre-coating thickness in order to save costs. In addition, because an automobile's overall weight impacts fuel economy, a PHOSITA would have been motivated to perform routine experimentation using reduced coating thicknesses in order to reduce weight and cost, in my opinion.

PR at 28-29; EX2029 ¶ 164; POSR 17-18

Current Declaration

Dr. Miles now opines POSITA motivated to **INCREASE** thickness

EX1003 ¶¶ 28-32

Ex. 2043

No Motivation to Go Thicker



Johns Hopkins Univ. v. Datascope Corp.,
543 F.3d 1342, 1349 (Fed. Cir. 2008)

“No reasonable jury could have found that the [accused] device literally met this limitation based on [expert’s] opinion, given his contradictory testimony.”

GMW14400 Does Not Provide Motivation



In re Clay,

966 F.2d 656, 659 (Fed. Cir. 1992)

Reference relevant if it “logically would have commended itself to an inventor’s attention in considering his problem . . . If [reference] is directed to a different purpose, the inventor would accordingly have had less motivation or occasion to consider it.”



Dr. Dierk Raabe

Patent Owner's Expert

- GMW14400 was directed to and intended for a very different and very specific audience
- POSITA in this proceeding would have been an experienced technician working in some aspect of metallurgy
- POSITA would not have been someone who has risen to the highly specialized role of designing hot-stamping processing procedures for aluminum-alloy coated steel (much less specifically for GM)

GMW14400 Does Not Provide Motivation

No Motivation to Maintain Claimed Four-layer Microstructure



Dr. Dierk Raabe
Patent Owner's Expert

Patent Owner's Expert:

- Q.** Speaking of the recipes of the patent, now the patent you said requires an intermetallic layer, correct?
- A.** Correct.
- Q.** What are the GMW requirements for the intermetallic layer?
- A.** There's no mentioning at all of any intermetallic layer or any microstructure at all. There's nothing in that GM document.
- Q.** Well, so let me clarify that. What internal microstructural topological requirements does the GM document set?
- A.** The GM document does not make any statement about any microstructural guidance or microstructural requirement. So the – related to the patent and to the coating. So there's no information.

EX1078 at 238:5-20

PR 32-35 (citing EX2040 ¶¶ 258-263); POSR 17-20
Ex. 2043

GMW14400 Does Not Provide Motivation

No Motivation to Maintain Claimed Four-layer Microstructure



Dr. Dierk Raabe
Patent Owner's Expert

Patent Owner's Expert:

- Q.** So there is some discussion of microstructures in GMW's specification, correct?
- A.** There's a description of microstructure features of the basic base hot stamping steel. That has nothing to do with the '602 patent which is about coatings. Bainite and martensite are exclusive features of a transformed hot stamping steel. It has absolutely nothing to do with any coating.

EX1078 at 269:6-13

PR 32-35 (citing EX2040 ¶¶ 258-263); POSR 17-20
Ex. 2043

IPR2025-00370 and IPR2025-00371

GMW14400 Does Not Provide Motivation

No Motivation to Maintain Claimed Four-layer Microstructure



Dr. Dierk Raabe
Patent Owner's Expert

Patent Owner's Expert:

Q. But it is a precoated product, correct?

A. No. So it's – the heading says it's a precoated product. That's what the heading says. You are totally correct. On the last sentence, the sentence is by physics very well defined. Bainite and martensite you only form in this base steel. You cannot form martensite in aluminum. It's impossible. So it's very clear that this statement can never refer to any aluminum or aluminum silicon or aluminum silicon iron product. Impossible.

Q. But the '602 patent also refers to martensite, correct?

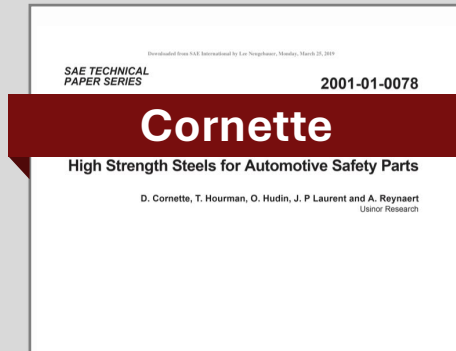
A. It refers to the formation of martensite related to the base steel material, but the reason why the GM is discussed at all as a reference referred to the coating and this microstructure sentence is exclusively and only about the base steel. Again, it has nothing to do with the coating.

EX1078 at 269:14-270:6

PR 32-35 (citing EX2040 ¶¶ 258-263); POSR 17-20
Ex. 2043

Cornette Does Not Provide Motivation

Cornette does not ascribe a benefit to a post hot-stamp coating thickness of greater than 30 μm



DESCRIPTION OF THE COATING

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

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

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

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

EX1014 at 9



Dr. Michael Miles
Petitioner's Expert

“Cornette itself notes that ‘[t]he average [pre-coating] layer thickness showing the best compromise between corrosion protection and weldability is 25 μm ’ and links this ‘best’ pre-coating thickness to a ‘typical’ thickness of the alloyed ‘Fe-Al-Si’ layer of ‘about 40 μm at the steel surface.’”

EX1003 ¶ 29



Dr. Dierk Raabe
Patent Owner's Expert

“[I]t defies logic that there is a specific pre-coating thickness that achieves the best corrosion protection and weldability, which are attributes that are formed by the hot stamping process. In other words, corrosion protection and weldability are impacted by many things beyond just pre-coating thickness. For example, heating time, heating rate, thickness of the blank, oven type, atmospheric conditions, Kirkendall effect, porosity etc.”

EX2040 ¶ 250

PR 32-35 (citing EX2040 ¶¶ 247-263); POSR 19-20
Ex. 2043

Takagi Does Not Disclose Claimed Thickness

- No defined link between pre-coating thickness and post hot-stamping thickness
- Cornette, FR Laurent and GMW14400 do not purport establish any universally specific relationship



Petitioner's Expert, Dr. Michael Miles

expected coating thickness would be 32 μm . 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. EX-1025, 5:17-20. This relationship is further evidenced by

FR Laurent

The coating of the aluminum-based, coated, hot-rolled sheet comprises in its basic composition by weight 9% to 10% silicon, 2% to 3.5% iron.

The coating on the coated, hot-rolled sheet may also comprise 2% to 4% iron in its basic composition by weight. The basic composition by weight of the metal bath may contain 0 to 50% zinc.

In one example, steel according to the invention containing 0.231% carbon; 1.145% manganese; 0.020% phosphorus; 0.0038% sulfur; 0.239% silicon; 0.043% aluminum; 0.009% copper; 0.020% nickel; 0.179% chromium; 0.0042% nitrogen; 0.032% titanium; 0.0028% boron; 0.0051% calcium in the form of a sheet is coated with an aluminum-based layer approximately 25 μm thick prior to heat treatment.

The sheet metal blank is heated in a furnace to a temperature of between 750°C and 1000°C, and more generally to a temperature of between 850°C and 950°C, for a time varying according to thickness. For a thickness of 2 mm, the sheet metal blank remains in the furnace for 6 minutes. The temperature rise rate is in excess of 3°C/s. Because of the coating, it is not necessary to use an inert atmosphere furnace.

When the sheet metal blank is reheated, the coating combines with the substrate to form an intermetallic alloy. The alloying, through interdiffusion, leads to an increased thickness of the layer which, for the treatment specified above, generally corresponds to a 50% increase.

Takagi Does Not Disclose Claimed Thickness



Dr. Michael Miles
Petitioner's Expert

Petitioner's Expert:

Q. Do you see that the statement that the increase between the precoating and the post hot stamping thickness is 50 percent is caveated in Laurent as limited to the treatment specified above; correct?

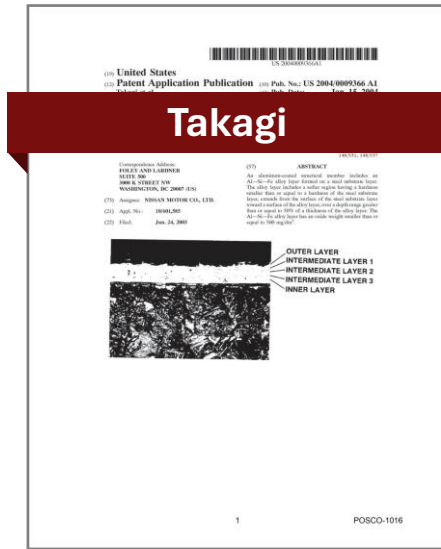
A. Yes.

Q. Laurent does not purport to make a universal statement that there is a 50 percent increase that occurs in hot stamping between the precoating thickness of aluminum alloy and the post hot stamping thickness; correct?

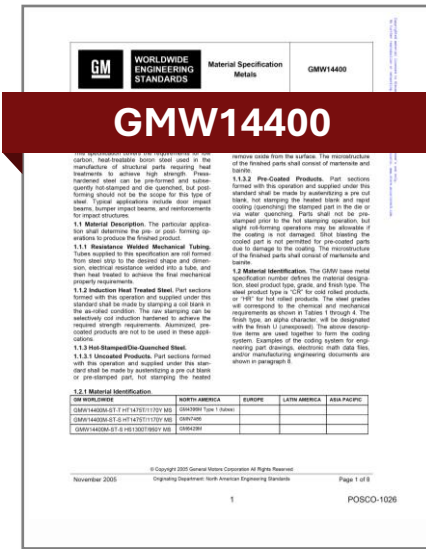
A. Correct.

EX2021 at 240:4-14

No Motivation to Go Thicker and Keep Claimed Microstructure



Takagi **does not teach** the claimed four-layer microstructure



GMW14400 **does not require** the claimed four-layer microstructure

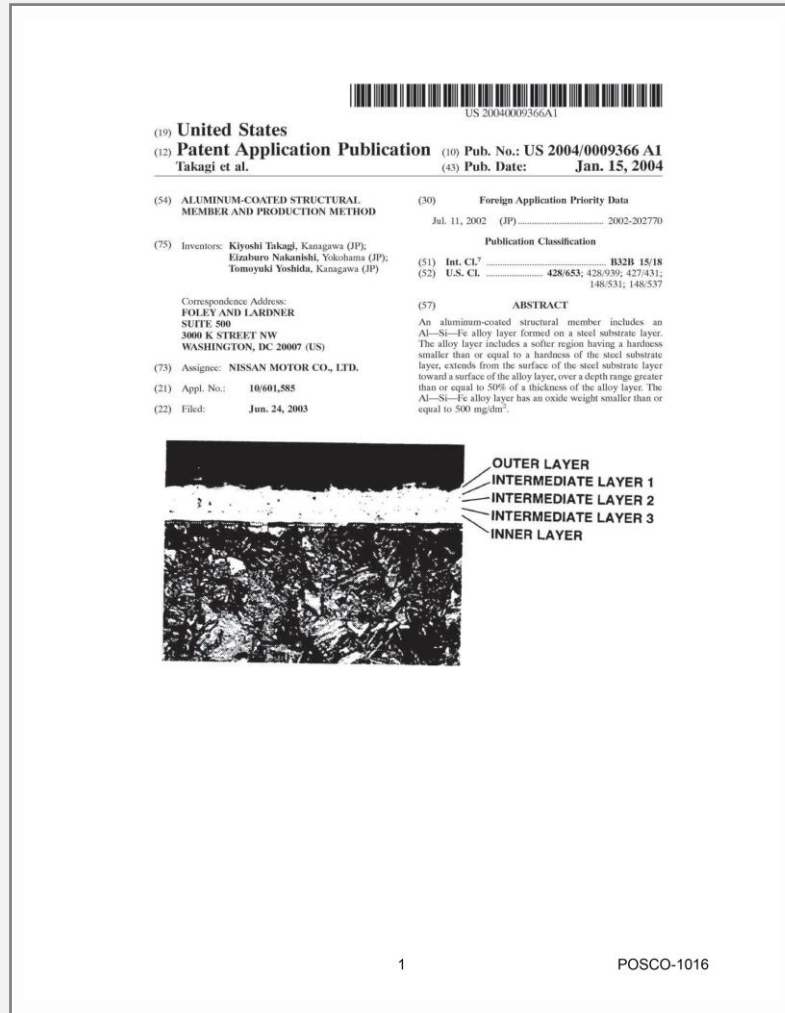


Dr. Michael Miles
Petitioner's Expert

Offers no evidence that those results would remain when those features changed to obtain increased thickness

No Reasonable Expectation of Success

The Science Is Complex and Unpredictable



Takagi

[0019] The mechanism of formation of the layered structure is not fully evident. Currently, the presumption by the inventors of the present invention is as follows: (1) The retention of a specimen at an elevated temperature causes the diffusion of Fe, and produce a concentration gradient in Fe and Si in the coating layer. (2) In this case, the coating alloy phase is urged to transform into a stable compound phase determined by the composition at each depth, so that there are formed different compound layers in different regions of depth. (3) Therefore, by controlling the raised temperature of the heating and the holding time at the raised temperature, the diffusion quantity of Fe is varied and the degree of transformation into a stable compound is varied.

Investigation of 22MnB5 formability in hot stamping operations

EX2025 at Abstract

EX2026 at 265

Ex. 2043

80

The Science Is Complex and Unpredictable

UNITED STATES INTERNATIONAL TRADE COMMISSION

In the Matter of:) Investigation No.
CERTAIN HIGH-STRENGTH ALUMINUM OR) 337-TA-1402
ALUMINUM-ALLOY COATED STEEL, AND)
AUTOMOTIVE PRODUCTS AND)
AUTOMOBILES CONTAINING SAME)

OPEN SESSIONS

Pages: 871 through 1124 (with excerpts)
Place: Washington, D.C.
Date: March 6, 2025

HERITAGE REPORTING CORPORATION
Official Reporters
1150 Connecticut Avenue, N.W., Suite 305
Washington, D.C. 20036
(202) 628-4888
contracts@hrcourtreporters.com

ArcelorMittal Ex. 201:
Posco Co. LTD. v. ArcelorMitt
IPR2025-00371
Page 1 of 22

Testimony of Dr. Stuart Brown

- Q.** In your view, the heating rate, the heating time, holding time, and quenching rate during hot-stamping are all process conditions that affect the result of the hot-stamped, aluminum alloy-coated steel; correct?
- A.** Well, the difficulty I have with the question is that we know that Dr. Drillet has said that those parameters are important. I think in my deposition, I stated that I think it's not clear that how each one of those parameters affect the formation of the coating, because there hasn't been a good description in any document I've seen, other than to say that it has an influence, how that influence imposes itself, how those process conditions impose themselves in terms of forming a microstructure in the coating. Because we've seen that it's possible to form coatings which don't have that microstructure. And I think that there is according to the literature that I've seen, not a clear consensus in terms of precisely what set of conditions are required to produce that specific microstructure because we see that sometimes it occurs and sometimes it doesn't.

EX2013 at 961:4-24 (see also EX2040 ¶ 71); PO 36-41 (EX2040 ¶¶ 208-246) Ex. 2043

POSITA Would Lack the Required Expertise

Generalist POSITA

A generalist POSITA **would not be expected to have experience** designing hot stamping parameters to obtain particular multi-layered phases or intermetallic phase layers via diffusion kinetics

EX2040 ¶¶ 228-229



Dr. Michael Miles
Petitioner's Expert

Dr. Miles himself has never published work on:

- Martensitic press-hardened steels,
- Hot-stamping parameters, or
- Obtaining phase layered microstructures in aluminum alloy-coated steel

RPI's Expert (Dr. Stuart Brown)

RPI's own expert testified that **“it's not clear [] how each one of those parameters affect the formation of the coating”** and **“there hasn't been a good description in any document I've seen”** about how process conditions form a specific microstructure

EX2040 ¶ 71

POSITA Would Lack the Required Expertise



Bayer Schering Pharma AG v. Barr Lab'ys, Inc.,

575 F.3d 1341, 1347 (Fed. Cir. 2009)

“First, an invention would not have been obvious to try when the inventor would have had to try all possibilities in a field unreduced by direction of the prior art. When ‘what would have been “obvious to try” would have been to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful’ an invention would not have been obvious.”

Cannot Mix and Match

Cannot “Supersize” a Microstructure

“PETITIONER’S THEORY”

Add More



Same Result, Bigger

VS

“REALITY”

Complex
Interdependent
System

Cannot Mix and Match



Dr. Dierk Raabe
Patent Owner's Expert

“[D]esigning and controlling microstructure via diffusion kinetics to form intermetallic phase layers is not like baking a layer cake—you don’t just add more batter to the pans and get the same cake, just taller subject to maybe a little extra oven time .”

EX2040 ¶ 211

PO 35-36 (EX2040 ¶¶ 208-246)
Ex. 2043

Takagi Is Not Enabled

Prior Art Must Be Enabling



Elan Pharms., Inc. v. Mayo Found.,
346 F.3d 1051, 1055 (Fed. Cir. 2003)

“It is well settled that prior art under 35 U.S.C. § 102(b) must sufficiently describe the claimed invention to have placed the public in possession of it.”



In re Antor Media Corp.,
689 F.3d 1282, 1290 (Fed. Cir. 2012)

“Enablement of prior art requires that the reference teach a skilled artisan to make or carry out what it discloses in relation to the claimed invention.”



Raytheon Techs. Corp. v. Gen. Elec. Co.,
993 F.3d 1374, 1380 (Fed. Cir. 2021)

“To render a claim obvious, the prior art, taken as a whole, must enable a skilled artisan to make and use the claimed invention.”

Assessing Enablement: *Wands* Factors

In re Wands, 858 F.2d 731, 737 (Fed. Cir. 1988)



Relative skill of those in the art



Amount of direction or guidance presented



Predictability or unpredictability of the art



Quantity of experimentation necessary

Every factor weighs against enablement

Wands Factor 1: Relative Skill of Those in the Art



POSITA Lacks Sufficient Expertise

Petitioner's POSITA

Undergraduate degree in materials science, manufacturing engineering, mechanical engineering, or equivalent knowledge, training, or experience, with two years of experience working in metallurgy

Petition at 6

VS

Dr. Raabe



A POSITA would not have been a specialist in, or even experienced with, the microstructural science of aluminum-alloy coated hot-stamped steel, or of obtaining multi-phase layered microstructural variants therein

EX2040 ¶ 149

PO 18-19; POSR 21-24
Ex. 2043

Wands Factor 1: Relative Skill of Those in the Art



POSITA Lacks Sufficient Expertise

Petitioner's POSITA

Undergraduate degree in materials science, manufacturing engineering, mechanical engineering, or equivalent knowledge, training, or experience, with two years of experience working in metallurgy

Petition at 6

VS

RPI's Expert (Dr. Stuart Brown)

Q. For example, if a steel worker at a plant had an undergraduate degree in mechanical engineering and two years of experience working the line where they're melting and forming steel slabs, they would qualify as a person of skill in the art, in your view, with respect to the asserted patents; correct?

A. Yes

EX2040 ¶ 150

PO 18-19; POSR 21-24
Ex. 2043

Wands Factor 2: Amount of Direction or Guidance Presented



Takagi Lacks Sufficient Guidance

- Does not disclose how to characterize relative coating layers or phases
- Does not provide guidance on what the microstructure looked like
- Does not explain relative sizing or features
- Does not teach how to achieve the four-layer structure of the Challenged Claims

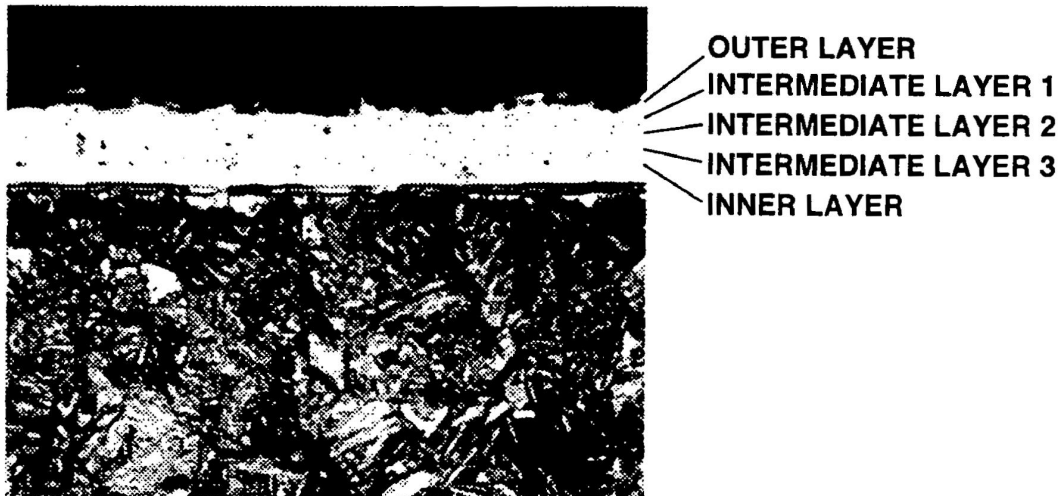
Wands Factor 2: Amount of Direction or Guidance Presented



Takagi Lacks Sufficient Guidance

Takagi

FIG.2A



EX1016, Fig. 2A



Dr. Michael Miles
Petitioner's Expert

Petitioner's Expert:

Q. Okay. And as you point out, the – the Figure 2A, you cannot identify discernable layers in Figure 2A; correct?

A. Correct.

Q. You can't identify whether there is four layers or five layers or three layers. It is just not shown visually in Figure 2A, correct?

A. Correct.

EX2040 ¶ 143 (citing EX2021 at 151:13-20)

PO 18; POSR 21-24
Ex. 2043

Wands Factor 3: Predictability or Unpredictability of the Art



The State of the Art Was Unpredictable

Testimony of Dr. Stuart Brown

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

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

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

**UNITED STATES
INTERNATIONAL TRADE COMMISSION**

In the Matter of:	)	Investigation No.
CERTAIN HIGH-STRENGTH ALUMINUM OR	)	337-TA-1402
ALUMINUM-ALLOY COATED STEEL, AND	)	
AUTOMOTIVE PRODUCTS AND	)	
AUTOMOBILES CONTAINING SAME	)	

OPEN SESSIONS

Pages: 871 through 1124 (with excerpts)
Place: Washington, D.C.
Date: March 6, 2025

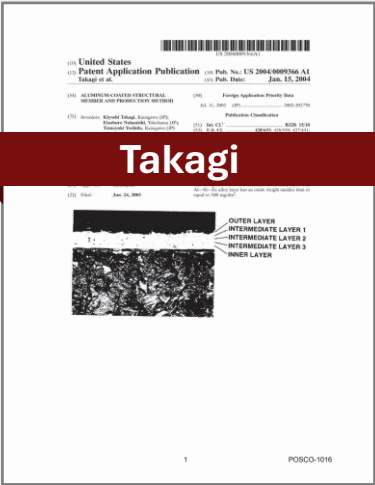
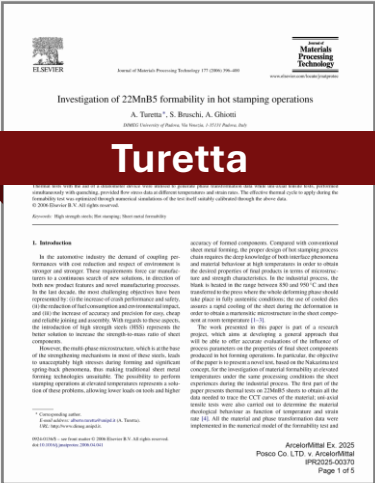
HERITAGE REPORTING CORPORATION
Official Reporters
1150 Connecticut Avenue, N.W., Suite 305
Washington, D.C. 20036
(202) 628-4888
contracts@hrcreporters.com

ArcelorMittal Ex. 201:
Posco Co. LTD. v. ArcelorMitt
IPR2025-00371
Page 1 of 22

Wands Factor 3: Predictability or Unpredictability of the Art



The State of the Art Was Unpredictable



Investigation of 22MnB5 formability in hot stamping operations

In the automotive industry, the hot forming of high strength steels offers the possibility to obtain significant reduction of weight without affecting the structural performances of final products. The main reason of its restricted application in the industry lies however in the lack of basic knowledge about mechanical and microstructural characteristics of sheets at elevated temperature, boundary conditions (i.e. friction and heat transfer), sensitivity of the formed component geometrical and mechanical characteristics to all the process parameters.

EX2025 at Abstract; see also EX2040 ¶ 69

[0019] The mechanism of formation of the layered structure is not fully evident. Currently, the presumption by the

EX1016 ¶ [0019]

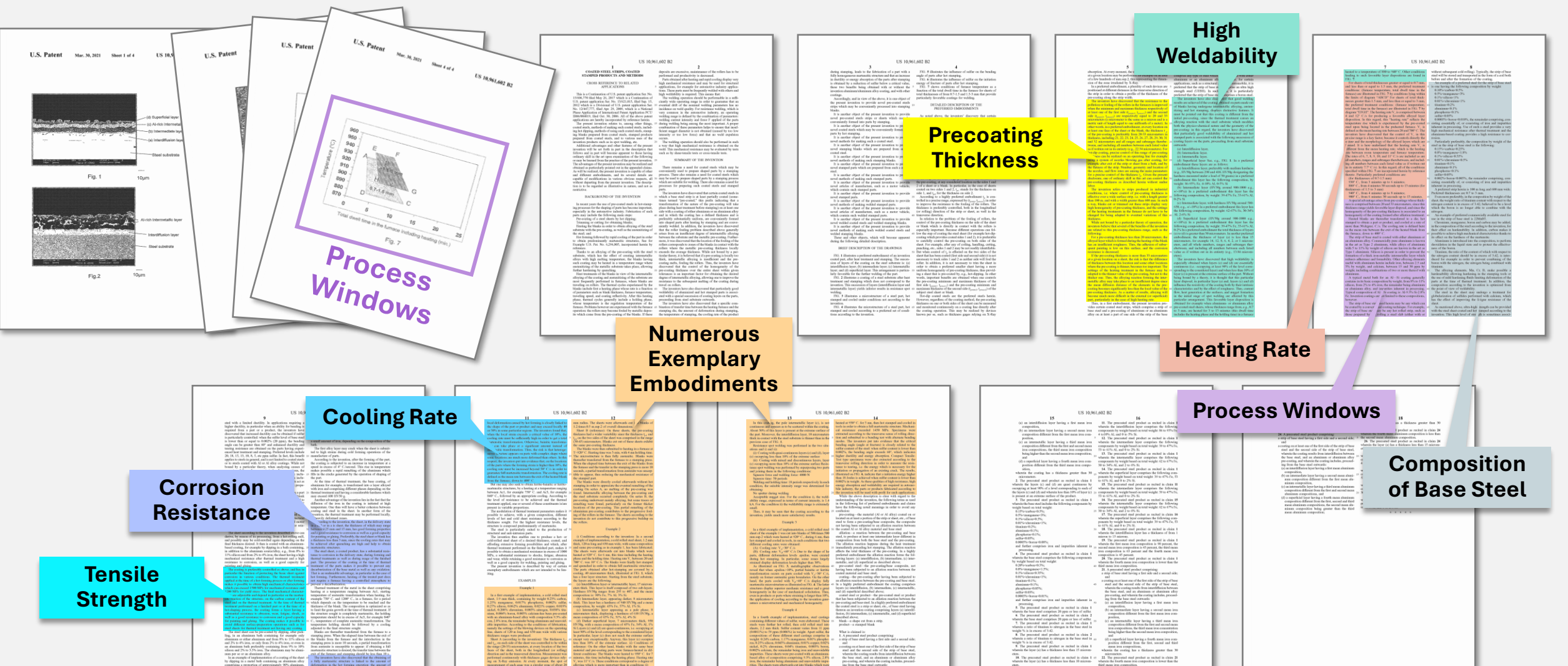
Wands Factor 4: Quantity of Experimentation Necessary



Undue Experimentation Would Be Required

- Extensive and undue amount of experimentation required to create a part with the interdiffusion phase layers reflected in Takagi
- Beyond the education, knowledge, and work experience of a POSITA
- Beyond the knowledge of the state of the art

The Asserted Patents



Wands Factors: Takagi Is Not Enabled



Adang v. Fischhoff,

286 F.3d 1346, 1358 (Fed. Cir. 2002)

“[T]he gaps in the disclosure of [prior art reference] amount to far more than minor details . . . Accordingly, we affirm the Board’s conclusion that [prior art reference] did not enable the invention.”

GMW14400 and Corvette Are Not Prior Art

Petitioner Failed to Prove Public Accessibility



Acceleration Bay, LLC v. Activision Blizzard Inc.,

908 F.3d 765, 772 (Fed. Cir. 2018)

“A reference is considered publicly accessible if it was ‘disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it.’”

Petitioner Failed to Prove Public Accessibility



In re Cronyn,

890 F.2d 1158, 1161 (Fed. Cir. 1989)

“[References] were not accessible to the public because they had not been either cataloged or indexed in a meaningful way.”

GMW14400: No Evidence POSITA Would Have Known About IHS

DECLARATION OF JUNE ANN MUNFORD

DECLARATION OF JUNE ANN MUNFORD

1

POSCO-1027

5. Based on my review, I can confirm that the “GMW14400” document has been listed in our database and available to the public for purchase online since December 1, 2005. The “GMW14400” document is a true, complete, and accurate copy of the document that would have been available for purchase as of December 1, 2005.

EX1027



Microsoft Corp. v. Throughputer, Inc.,
IPR2022-01566, Paper 13 at 11-12 (PTAB May 31, 2023)
(internal citation omitted)

“Ms. Munford’s conclusory assertion that Tuan ‘was made available to the public’ is insufficient. As our reviewing court has explained, it is ‘critical’ that there be ‘some evidence that a person of ordinary skill could have reasonably found’ the reference.”

PG 52-55; POSR 24-25
Ex. 2043

GMW14400: No Evidence POSITA Would Have Known About IHS

DECLARATION OF JUNE ANN MUNFORD

DECLARATION OF JUNE ANN MUNFORD

1

POSCO-1027

Relies on three hyperlinks for GMW14400

No evidence POSITA would have known about these URLs

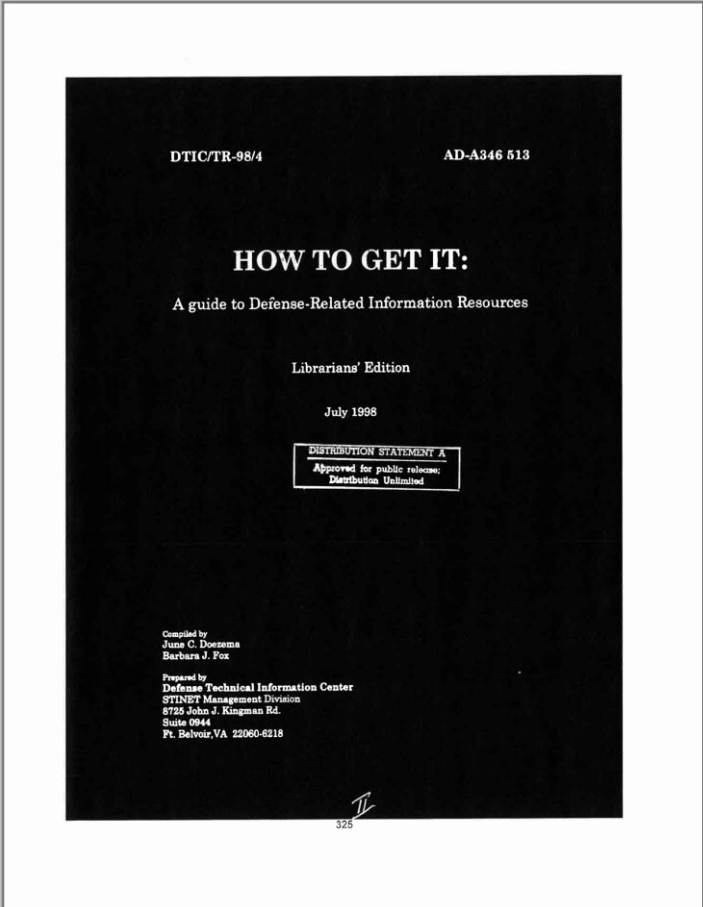


Ens Labs Ltd. v. Unstoppable Domains Inc.,

IPR2024-00872, Paper 8 at 19-20 (PTAB Nov. 22, 2024)
(internal citation omitted)

“That a person might have been able to download Johnson through public means is not evidence that Johnson was ‘made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can locate it.’ *Bruckelmyer*, 445 F.3d at 1378. The Frank-White Affidavit’s evidence of public accessibility amounts to little more than Johnson was available on the Internet by December 13, 2019. However, because the Wayback Machine is only searchable by URL, as attested to in the Frank-White Affidavit, this does not suffice to support that one of ordinary skill in the art would have sought out the Read the Docs website and, once there, located Johnson without prior knowledge of Johnson and the URL at which Johnson was available.”

GMW14400: No Evidence POSITA Would Have Known About IHS



HOW TO GET IT:

A guide to Defense-Related Information Resources

Purpose

The guide is intended to assist librarians and information specialists as well as other individuals who need to identify or acquire Government-published, Government-sponsored, or Defense-related information resources.

Scope

The contents are limited to technical documents and information resources prepared for or of particular interest to the Department of Defense and its contractors (or potential contractors).

GMW14400: No Evidence POSITA Would Have Known About IHS

DECLARATION OF JUNE ANN MUNFORD

DECLARATION OF JUNE ANN MUNFORD

1

POSCO-1027

DECLARATION OF JUNE ANN MUNFORD

DECLARATION OF JUNE ANN MUNFORD

POSCO-1082
POSCO v. Arechoy-Mittal
IPR2025-00370

INTERNET ARCHIVE

Wagback Machine

https://db.lib.washington.edu/standards/

Go

JUL

AUG

DEC

28

2004

2005

2006

ABOUT THIS MACHINE

65 captures

< Jul 2002 - 30 Mar 2025

Engineering Standards Database Search

The standards held in the [Engineering Library](#) collection are primarily engineering related. For standards related to other subjects, check with other libraries. For example, the Health Sciences, Forest Resources, and Architecture Libraries all have standards in their collections.

The edition held by the Engineering Library, may *not* be the most current edition. To check for other editions of a standard, search [I.I. Standards Infobase \(UW Restricted\)](#) or [Global Engineering Documents](#).

Several series of standards that are held at the Engineering Library are *not* entered into this database. These series include: AASHTO, ASTM, Mil-Specs, Mil-Stds, NAS, SAE J-series, and UBC standards. Check in the [UW Libraries Catalog](#) or ask at the [Reference Desk](#) for help finding these standards.

IEEE standards are *only available* via [IEEE Xplore](#) from 1988 to the present, in full-text. We no longer have any print IEEE standards.[UW restricted]

Questions about the content of this database or our collection can be directed to englib@u.washington.edu.

[Standard database search tips](#)
[More information about standards](#)

If you experience problems, please call the Engineering Library Reference Desk at (206)543-0741.

	Acronym (Choose an acronym from the list or leave blank)
Additional Acronym	
Letter	
Number	
Keyword	

Submit Query

Reset

Retrieval software: DB/Text WebPublisher, provided by [IMAGIC](#)

EX1027; EX1082 at 342; PO 52-55; POSR 24-25

Ex. 2043

IPR2025-00370 and IPR2025-00371

GMW14400: No Evidence POSITA Would Have Known About IHS

DECLARATION OF JUNE ANN MUNFORD

DECLARATION OF JUNE ANN MUNFORD

1

POSCO-1027

DECLARATION OF JUNE ANN MUNFORD

DECLARATION OF JUNE ANN MUNFORD

POSCO-1082
POSCO v. ArechoyMittal
IPR2025-00370

June A. Munford Curriculum Vitae

June A. Munford
Curriculum Vitae

Education

University of Wisconsin-Milwaukee - MS, Library & Information Science, 2008
Milwaukee, WI

- Coursework included cataloging, metadata, data analysis, library systems, management strategies and collection development.
- Specialized in library advocacy, cataloging and public administration.

Grand Valley State University - BA, English Language & Literature, 2008
Allendale, MI

- Coursework included linguistics, documentation and literary analysis.
- Minor in political science with a focus in local-level economics and government.

Professional Experience

Researcher / Expert Witness, October 2017 – present
Freelance • Pittsburgh, Pennsylvania & Grand Rapids, Michigan

- Material authentication and public accessibility determination. Declarations of authenticity and/or public accessibility provided upon research completion. Experience with appeals and deposition process.
- Research provided on topics of public library operations, material publication history, digital database services and legacy web resources.
- Past clients include Alston & Bird, Arnold & Porter, Baker Botts, Fish & Richardson, Erise IP, Irell & Manella, O'Melveny & Myers, Perkins-Coie, Pillsbury Winthrop Shaw Pittman and Slayden Grubert Beard.

Library Director, February 2013 - March 2015
Dowagiac District Library • Dowagiac, Michigan

- Executive administrator of the Dowagiac District Library. Located in Southwest Michigan, this library has a service area of 13,000, an annual operating budget of over \$400,000 and total assets of approximately \$1,300,000.

44

- Developed careful budgeting guidelines to produce a 15% surplus during the 2013-2014 & 2014-2015 fiscal years while being audited.

- Using this budget surplus, oversaw significant library investments including the purchase of property for a future building site, demolition of existing buildings and building renovation projects on the current facility.

- Led the organization and digitization of the library's archival records.

- Served as the public representative for the library, developing business relationships with local school, museum and tribal government entities.

- Developed an objective-based analysis system for measuring library services - including a full collection analysis of the library's 50,000+ circulating items and their records.

November 2010 - January 2013
Librarian & Branch Manager, Anchorage Public Library • Anchorage, Alaska

- Headed the 2013 Anchorage Reads community reading campaign including event planning, staging public performances and creating marketing materials for mass distribution.

- Co-led the social media department of the library's marketing team, drafting social media guidelines, creating original content and instituting long-term planning via content calendars.

- Developed business relationships with The Boys & Girls Club, Anchorage School District and the US Army to establish summer reading programs for children.

June 2004 - September 2005, September 2006 - October 2013
Library Assistant, Hart Area Public Library
Hart, MI

- Responsible for verifying imported MARC records and original MARC cataloging for the local-level collection as well as the Michigan Electronic Library.

- Handled OCLC Worldwide interlibrary loan requests & fulfillment via ongoing communication with lending libraries.

Professional Involvement

Alaska Library Association - Anchorage Chapter

45

- Treasurer, 2012

Library Of Michigan
• Level VII Certification, 2008
• Level II Certification, 2013

Michigan Library Association Annual Conference 2014
• New Directors Conference Panel Member

Southwest Michigan Library Cooperative
• Represented the Dowagiac District Library, 2013-2015

Professional Development

Library Of Michigan Beginning Workshop, May 2008
Petokey, MI

- Received training in cataloging, local history, collection management, children's literacy and reference service.

Public Library Association Intensive Library Management Training, October 2011
Nashville, TN

- Attended a five-day workshop focused on strategic planning, staff management, statistical analysis, collections and cataloging theory.

Alaska Library Association Annual Conference 2012 - Fairbanks, February 2012
Fairbanks, AK

- Attended seminars on EBSCO advanced search methods, budgeting, cataloging, database usage and marketing.

Depositions

2019 • Fish & Richardson
Apple v. Qualcomm (Case No. IPR2018-001281, 39521-00421IP, IPR2018-01282 and 39521-00421IP2)

2019 • Erise IP
Implicit, LLC v. Netscout Systems, Inc (Case No. 2:18-cv-53-JRG)

2019 • Perkins-Coie
Adobe Inc. v. RAH Color Technologies LLC (Case No. IPR2019-00627, IPR2019-00628, IPR2019-00629 and IPR2019-00646)

46

EX1082 at 44-46

EX1027; EX1082 at 342; PO 5255; POSR 24-25; *DISH Network LLC v. Entropic Communications, LLC*, IPR2024-00373, EX2020-12:3-16 (Feb. 20, 2025) (experience working at town public libraries, but not college or research libraries)

Ex. 2043

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

IPR2025-00370 and IPR2025-00371

105

GMW14400: No Evidence POSITA Would Have Found It



Samsung Elecs. Co. v. Infobridge Pte. Ltd.,

929 F.3d 1363, 1372 (Fed. Cir. 2019)

“A work is not publicly accessible if the only people who know how to find it are the ones who created it.”

“Samsung did not offer evidence, apart from the speculation of Mr. Bross, that a person of ordinary skill, exercising reasonable diligence, would have located the [website] or even known to look for it.”

GMW14400: No Evidence POSITA Would Have Found It

DECLARATION OF JUNE ANN MUNFORD

DECLARATION OF JUNE ANN MUNFORD

1

POSCO-1027

Relies on three hyperlinks
for GMW14400

No evidence POSITA would have
known about these URLs

URLs are from the
wrong time frame

EX1027 at 23; PO 52-55; POSR 24-25
Ex. 2043

GMW14400: No Evidence POSITA Would Have Known About IHS

DECLARATION OF JUNE ANN MUNFORD

DECLARATION OF JUNE ANN MUNFORD

1

POSCO-1027

9. Attached hereto as Appendix IHS01 is a screen capture of the Internet Archive Wayback Machine entry for <http://www.global.ihs.com/>. I secured these screen captures myself from <https://web.archive.org/web/20030719192402/http://www.global.ihs.com/>. This record was captured as of July 19, 2003.

11. Attached hereto as Appendix IHS02 is a screen capture of the Internet Archive Wayback Machine entry for [http://global.ihs.com/contact_us.cfm?currency_code=USD&customer_id=!%BU%5c%0a&shopping_cart_id=%27%8+\(K@HAZ@+&%0a&rid=NS&input_doc_number=ASME+Y14.24&lang_code=ENGL](http://global.ihs.com/contact_us.cfm?currency_code=USD&customer_id=!%BU%5c%0a&shopping_cart_id=%27%8+(K@HAZ@+&%0a&rid=NS&input_doc_number=ASME+Y14.24&lang_code=ENGL). I secured these screen captures myself from [https://web.archive.org/web/20030217093206/http://global.ihs.com:80/contact_us.cfm?currency_code=USD&customer_id=!%BU%5c%0a&shopping_cart_id=%27%8+\(K@HAZ@+&%0a&rid=NS&input_doc_number=ASME+Y14.24&lang_code=ENGL](https://web.archive.org/web/20030217093206/http://global.ihs.com:80/contact_us.cfm?currency_code=USD&customer_id=!%BU%5c%0a&shopping_cart_id=%27%8+(K@HAZ@+&%0a&rid=NS&input_doc_number=ASME+Y14.24&lang_code=ENGL). This record was captured as of February 17, 2003.

13. Attached hereto as Appendix IHS03 is a screen capture of the Internet Archive Wayback Machine entry for http://global.ihs.com/images/ENGL/ps_catalog.pdf. I secured these screen captures myself from https://web.archive.org/web/20030611014420/http://global.ihs.com/images/ENGL/ps_catalog.pdf. This record was captured as of June 11, 2003.

GMW14400: No Evidence POSITA Would Have Known About IHS

DECLARATION OF JUNE ANN MUNFORD

DECLARATION OF JUNE ANN MUNFORD

1

POSCO-1027

DECLARATION OF JUNE ANN MUNFORD

DECLARATION OF JUNE ANN MUNFORD

POSCO-1082
POSCO v. ArcelorMittal
IPR2025-00370



EX1027 at 29

Cornette: No Evidence POSITA Would Have Found It



Medtronic, Inc. v. Barry,
891 F.3d 1368, 1380 (Fed. Cir. 2018)

“[I]n the context of references stored in libraries . . . we generally inquire whether the reference was sufficiently indexed or cataloged.”

Cornette: No Evidence POSITA Would Have Found It

DECLARATION OF MEL DESART

DECLARATION OF MEL DESART

I, Mel DeSart, declare as follows:

1. I am Head of the Engineering Library at the University of Washington (the "Library") located in Seattle, Washington. I have worked at the Library since March, 2000 and I am familiar with the policies and procedures of the Library as they relate to the receipt, cataloging, and tracking of books and publications and I have personal knowledge of the facts set forth below.
2. The Library acquires publications from various sources. One set of publications received by the Library is the SAE Technical Paper Series. Upon receiving papers in that series, staff in the Acquisitions Department in the main library ("Suzzallo") stamps each of those reports with the words "Engineering" and "University of Washington," and the date the Acquisitions Department received each paper in the series. Once a paper is stamped, it is routed to the Library for shelving and is normally placed in the Library's stacks within a few weeks of its receipt.
3. The Library's historical collection includes various publications. As part of that collection, the Library maintains custody of an original copy of "High Strength Steels for Automotive Safety Parts," SAE Technical Paper 2001-01-0078, 2001, by Cornette, D., Hourman, T., Hudin, O., Laurent, J., and Reynaert, A. (attached as Exhibit A) (the "Paper"). Based upon my review of the Library's records, my knowledge of the Library's standard procedures, and the date stamp on the Cover Sheet of Exhibit A, the Paper was publicly available at the Library within a few weeks of March 13, 2001.

No information about
indexing or cataloging

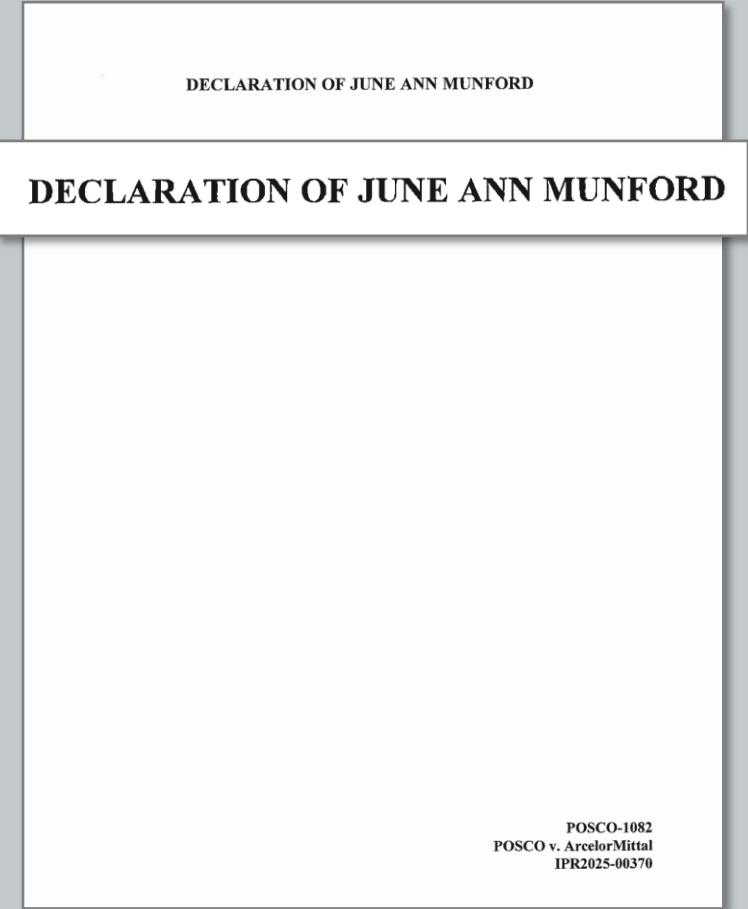
Cornette: No Evidence POSITA Would Have Found It



Robroy Indus.-Texas, LLC v. Thomas & Betts Corp.,
2017 WL 1319553, at *9 (E.D. Tex. Apr. 10, 2017)

“[D]enominating a witness as an expert does not give that witness leave to simply read materials such as exhibits and depositions in the case and then testify as to their contents.”

Cornette: No Evidence POSITA Would Have Found It



Improperly opines on
Desart's declaration

Cornette: No Evidence POSITA Would Have Found It

MARC Record From Present

DECLARATION OF JUNE ANN MUNFORD

DECLARATION OF JUNE ANN MUNFORD

[illegible]

87

POSCO-1082
POSCO v. ArcelorMittal
IPR2025-00370

[illegible]

Engineers of Japan, 1903-5.

Some papers for <2003> also bear numbering used by Society of Automotive Engineers of Japan, i.e. 2003-52-0001 also cited JSAE 2003-02-01.

1917-1977, New York, NY.: Society of Automotive Engineers

Publisher
Publication Date 1917
Date of Publication 1977
Origin 1917

Frequency
Issue of Publication Regular
ISSN 0148-7391
Publication Identifier ISSN: 0148-7391 (Additional Format)
ISSN: 1035-4955 (Additional Format)
0950-0021

OCLC Number 014832000001452
Number of Record 1
Alpha NCI Record Number 0144333800001461

Links

Virtual Browse

◀ ▶

Microfilm
1975-1987

Report
1977

Annual
publication
of SAE
technical
papers
G1845

SAE
technical
paper series
1917

89

EX1082 at 87-89; PO 56-57; POSR 25-26
Ex. 2043

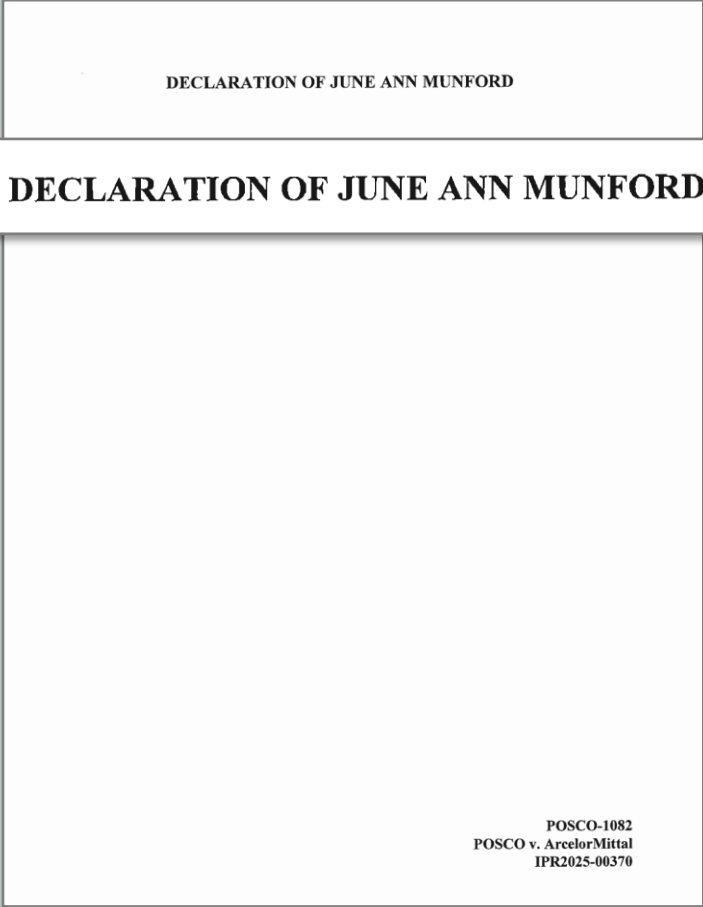
IPR2025-00370 and IPR2025-00371

114

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Cornette: No Evidence POSITA Would Have Found It

No Evidence POSITA Would Have Found This



No evidence that POSITA would have looked at University of Washington’s Engineering Standards Database Search webpage

Cornette: No Evidence POSITA Would Have Found It

DECLARATION OF JUNE ANN MUNFORD

DECLARATION OF JUNE ANN MUNFORD

POSCO-1082
POSCO v. ArcelorMittal
IPR2025-00370

June A. Munford Curriculum Vitae

June A. Munford
Curriculum Vitae

Education

University of Wisconsin-Milwaukee - MS, Library & Information Science, 2009
Milwaukee, WI

- Coursework included cataloging, metadata, data analysis, library systems, management strategies and collection development.
- Specialized in library advocacy, cataloging and public administration.

Grand Valley State University - BA, English Language & Literature, 2008
Allendale, MI

- Coursework included linguistics, documentation and literary analysis.
- Minor in political science with a focus in local-level economics and government.

Professional Experience

Researcher / Expert Witness, October 2017 – present
Freelance • Pittsburgh, Pennsylvania & Grand Rapids, Michigan

- Material authentication and public accessibility determination. Declarations of authenticity and/or public accessibility provided upon research completion. Experience with appeals and deposition process.
- Research provided on topics of public library operations, material publication history, digital database services and legacy web resources.
- Past clients include Alston & Bird, Arnold & Porter, Baker Botts, Fish & Richards, Erise IP, Irell & Manella, O'Melveny & Myers, Perkins-Coie, Pillsbury Winthrop Sh Pittman and Slayden Grubert Beard.

Library Director, February 2013 - March 2015
Dowagiac District Library • Dowagiac, Michigan

- Executive administrator of the Dowagiac District Library. Located in Southwest Michigan, this library has a service area of 13,000, an annual operating budget of over \$400,000 and total assets of approximately \$1,300,000.

44

• Developed careful budgeting guidelines to produce a 15% surplus during the 2013-2014 & 2014-2015 fiscal years while being audited.

• Using this budget surplus, oversaw significant library investments including the purchase of property for a future building site, demolition of existing buildings and building renovation projects on the current facility.

• Led the organization and digitization of the library's archival records.

• Served as the public representative for the library, developing business relationships with local school, museum and tribal government entities.

• Developed an objective-based analysis system for measuring library services - including a full collection analysis of the library's 50,000+ circulating items and their records.

November 2010 - January 2013
Librarian & Branch Manager, Anchorage Public Library • Anchorage, Alaska

- Headed the 2013 Anchorage Reads community reading campaign including event planning, staging public performances and creating marketing materials for mass distribution.
- Co-led the social media department of the library's marketing team, drafting social media guidelines, creating original content and instituting long-term planning via content calendars.
- Developed business relationships with The Boys & Girls Club, Anchorage School District and the US Army to establish summer reading programs for children.

June 2004 - September 2005, September 2006 - October 2013
Library Assistant, Hart Area Public Library
Hart, MI

- Responsible for verifying imported MARC records and original MARC cataloging for the local-level collection as well as the Michigan Electronic Library.
- Handled OCLC Worldcat interlibrary loan requests & fulfillment via ongoing communication with lending libraries.

Professional Involvement

Alaska Library Association - Anchorage Chapter

45

- Treasurer, 2012

Library Of Michigan

- Level VII Certification, 2008
- Level II Certification, 2013

Michigan Library Association Annual Conference 2014

- New Directors Conference Panel Member

Southwest Michigan Library Cooperative

- Represented the Dowagiac District Library, 2013-2015

Professional Development

Library Of Michigan Beginning Workshop, May 2008
Petoskey, MI

- Received training in cataloging, local history, collection management, children's literacy and reference service.

Public Library Association Intensive Library Management Training, October 2011
Nashville, TN

- Attended a five-day workshop focused on strategic planning, staff management, statistical analysis, collections and cataloging theory.

Alaska Library Association Annual Conference 2012 - Fairbanks, February 2012
Fairbanks, AK

- Attended seminars on EBSCO advanced search methods, budgeting, cataloging, database usage and marketing.

Depositions

2019 • Fish & Richardson

Apple v. Qualcomm (Case No. IPR2018-001281, 39521-00421IP, IPR2018-01282 and 39521-00421IP2)

2019 • Erise IP

Implicit, LLC v. Netscout Systems, Inc (Case No. 2:18-cv-53-JRG)

2019 • Perkins-Coie

Adobe Inc. v. RAIH Color Technologies LLC (Case No. IPR2019-00627, IPR2019-00628, IPR2019-00629 and IPR2019-00646)

46

Secondary Considerations Confirm Non-Obviousness

Commercial Success



Merck & Co., Inc. v. Teva Pharms. USA, Inc.,
395 F.3d 1364, 1376 (Fed. Cir. 2005)

“Commercial success is relevant because the law presumes an idea would successfully have been brought to market sooner, in response to market forces, had the idea been obvious to persons skilled in the art.”

Secondary Considerations Confirm Non-Obviousness

Commercial Success

USIBOR sales dramatically increased after the invention

Long-Felt Need

Industry needed high-strength steel with better weldability, paintability, and corrosion resistance

Unexpected Results

Prior art had not achieved these properties in hot-stamped products

Commercial Success

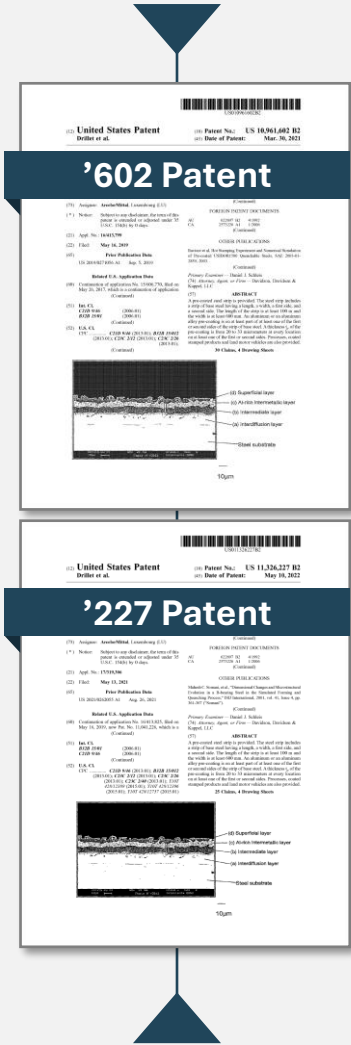
USIBOR had “very small volumes” of sales



Dr. Pascal Drillet
ArcelorMittal
Fact Witness

Dr. Drillet was specifically tasked with developing innovations to increase USIBOR's commercial viability

EX2011 at 172:7-10



USIBOR sales increased significantly

EX2011 at 147:22-148:6, EX2013 at 1066:22-1067:20, 716:1-14



Long Felt Need and Unexpected Results



WBIP, LLC v. Kohler Co.,

829 F.3d 1317, 1332 (Fed. Cir. 2016)

“Evidence of a long felt but unresolved need tends to show non-obviousness because it is reasonable to infer that the need would have not persisted had the solution been obvious.”

In re Soni,

54 F.3d 746, 750 (Fed. Cir. 1995)

“[T]hat which would have been surprising to a person of ordinary skill in a particular art would not have been obvious. The principle applies most often to the less predictable fields, such as chemistry, where minor changes in a product or process may yield substantially different results.”



Dr. Pascal Drillet



Dr. Dierk Raabe

**Automotive manufacturers
needed high-strength steel**

EX2009 at 1067:21-1068:8, 108:3-109:3, 461:21-463:3

PO 57-59; POSR 26
Ex. 2043

Dependent Claims Are Not Obvious

(Claims 10, 12, and 19 of the '602 Patent
and Claims 19 and 21 of the '227 Patent)



ATD Corp. v. Lydall, Inc.,
159 F.3d 534, 546 (Fed. Cir. 1998)

“Determination of obviousness can[]not be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.”

Claim 10 of the '602 Patent Is Not Obvious

'602 Patent, Claim 10

10. The precoated steel product as recited in claim 1 wherein the layer (a) has a thickness less than 10 micrometers.

EX1001 ('602 Patent) Claim 10



Dr. Michael Miles
Petitioner's Expert

Petitioner's Expert:

Decrease thickness



Increase thickness



Decrease thickness

Takagi Teaches Away

[0017] When the hardness of Al—Si—Fe alloy layer exceeds the hardness of steel substrate, the Al—Si—Fe alloy layer exerts adverse influence on the formability in the forming process of the steel sheet, and on the corrosion resistance by deteriorating the compliance of the coating and increasing the possibility of cracks in the coating. Therefore, in this embodiment, there is formed a less hard or soft layer having a hardness smaller than the hardness of the steel substrate at or near the boundary between the steel and coating. This soft layer prevents crack, even if produced by any chance, from extending deeper from the surface toward the steel substrate. In this embodiment, the thickness of this soft layer is made equal to or greater than 50% of the total thickness of the alloy coating layer. The thick soft layer extending from a level at or near the boundary with the steel substrate, to or beyond the middle in the depth of the coating layer is effective for preventing progress of crack and securing sufficient corrosion resistance.

EX1016 at [0017]

PO 50-51; POSR 26
Ex. 2043

Claims 12 and 19 of the '602 Patent and Claims 19 and 21 of the '227 Patent Are Not Obvious

'602 Patent, Claims 12, 19

12. The precoated steel product as recited in claim 1 wherein the intermediate layer comprises the following components by weight based on total weight: 39 to 47% Fe, 53 to 61% Al, and 0 to 2% Si.

* * *

19. The precoated steel product as recited in claim 1 wherein the first mean iron composition is 90 percent, the second mean iron composition is 43 percent, the third mean iron composition is 63 percent and the fourth mean iron composition is 45 percent.

EX1001 ('602 Patent) Claims 12, 19

'227 Patent, Claims 19, 21

19. The hot stamped coated steel product according to claim 18, wherein the Intermediate layer comprises the following components by weight based on total weight: 39 to 47% Fe, 53 to 61% Al, and 0 to 2% Si.

* * *

21. The hot stamped coated steel product according to claim 20, wherein the Superficial layer comprises the following components by weight based on total weight: 39 to 47% Fe, 53 to 61% Al, and 0 to 2% Si, and wherein said layer (a) has a thickness that is less than half of said thickness of the coating.

EX1001 ('227 Patent) Claims 19, 21

No motivation

No reasonable expectation of success



Patent Owner's Expert Dr. Dierk Raabe:

“[S]mall differences in composition can dramatically impact properties. And more importantly, in order for the composition to change, that means another layer’s composition will have changed. Dr. Miles does not explain what impact this would have on the overall steel part. Indeed, Dr. Miles’s analysis ignores the related nature of all of these parameters, which as I have explained, creates a complex relationship. Trying to achieve a specific compositional percentage in one area of a part is going to impact all other attributes of the part. Dr. Miles does not even explain how trying to achieve these percentages would impact the other limitations of the independent claims; he appears to assume they would remain static, but that is not the case. Thus, I disagree with Dr. Miles. This is not a distinction without a difference.”

EX2040 ¶ 270

PO 52 (IPR2025-00370); PO 50-51 (IPR2025-00371); POSR 26

Ex. 2043

IPR2025-00370 and IPR2025-00371