

Inv. No. 337-TA-1402

March 3, 2025

**Before the Honorable Monica Bhattacharyya,
Administrative Law Judge**

In The Matter Of
**Certain High-strength
Aluminum Or Aluminum-alloy
Coated Steel, And Automotive
Products And Automobiles
Containing Same**

Complainant's Opening Statement



CDX-0001C.1

Roadmap

- 1) Technology at issue and ArcelorMittal's Patents
- 2) Economic and Technical Domestic Industry exists
- 3) VinFast infringes the Asserted Patents
- 4) The Asserted Patents are valid
- 5) ArcelorMittal is entitled to an exclusion order

The Asserted Patents Are Valid

1. The asserted references were already considered and overcome.
2. VinFast fails to prove that most references are actually *prior art*.
 - a. No proof of public availability
 - b. Post-dates invention
3. The alleged references fail to invalidate (alone or in combination).
4. VinFast ignores the secondary considerations.



Dr. Dierk Raabe
Technical Expert

2006 VW Passat Is Not Prior Art

2006 VW Passat 1049



CARFAX Report

Vehicle History Report™

**2006 VOLKSWAGEN
PASSAT 2.0T**
VIN: WVWAK73C66P041049
SEDAN 4 DR
2.0L I4 F
GASOLINE
FRONT WHEEL DRIVE

No accidents or damage reported to CARFAX

29 Service history records

At least 1 open recall

2 Previous owners

Types of owners: Personal lease, Personal

167,795 Last reported odometer reading

This CARFAX Vehicle History Report is based only on information supplied to CARFAX and available as of 8/20/24 at 5:37:14 PM (CDT). Other information about this vehicle, including problems, may not have been reported to CARFAX. Use this report as one important tool, along with a vehicle inspection and test drive, to make a better decision about your next used car.

Additional History
Not all accidents / issues are reported to CARFAX

Owner 1

Owner 2

CARFAX DEPENDS ON ITS SOURCES FOR THE ACCURACY AND RELIABILITY OF ITS INFORMATION. THEREFORE, NO RESPONSIBILITY IS ASSUMED BY CARFAX OR ITS AGENTS FOR ERRORS OR OMISSIONS IN THIS REPORT. CARFAX FURTHER EXPRESSLY DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

© 2024 CARFAX, Inc., part of S&P Global. All rights reserved.
8/20/24 5:37:14 PM (CDT)

CX-0082C (Raabe Rpt.) at ¶¶ 121–187, 448–484, 643–662; RX-0715.0001, .0009 (Carfax Rpt.); CX-0084C (Brown Rpt.) ¶¶ 76–78

CDX–0001C.58

ArcelorMittal Ex. 2007
Posco Co. LTD. v. ArcelorMittal
IPR2024-01376
Page 4 of 17

Patent Office Already Considered the 2006 VW Passat

2006 VW Passat 1049



'227 Patent

Self-study programme 339—Volkswagen Passat, Mar. 2005.

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

(55) Date of Patent: May 10, 2022

(58) Field of Classification Search: None

Self-study programme 339, The Passat 2006.

(*) 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 623807 B2 4/1992

CA 2573226 A1 1/2006

(Continued)

Wikipedia Article on VW Passat, downloaded at https://fr.wikipedia.org/wiki/Volkswagen_Passat, last accessed on Aug. 11, 2016 see machine translation.

(51) Int. Cl.

B21D 15/01 (2006.01)

C21D 9/46 (2006.01)

(52) U.S. Cl.

(Continued)

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 non-coating is on at least part of at least one of the first

Boezewinkel et al.: Tata Steel analysis of Volkswagen Passat. Project 11450, Oct. 7, 2017.

(61) Superficial layer

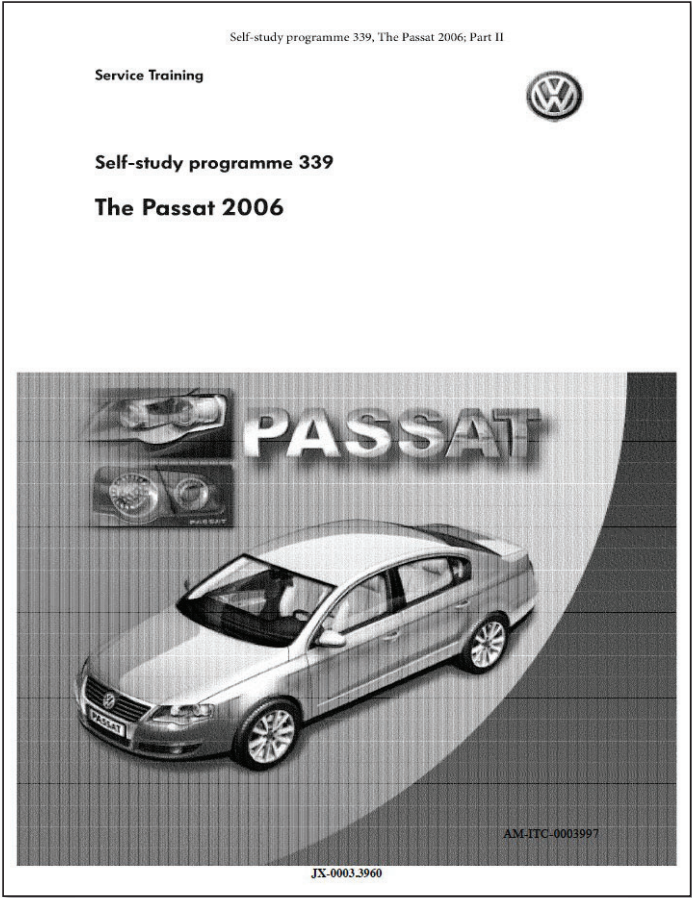
TNORreport 010028844—Analyses on hot-formed coated steel samples, Aug. 20, 2015/Proces-verbaa/ Agin Boeder on sample taking of the Volkswagen Passat, see partial English translation.

10µm

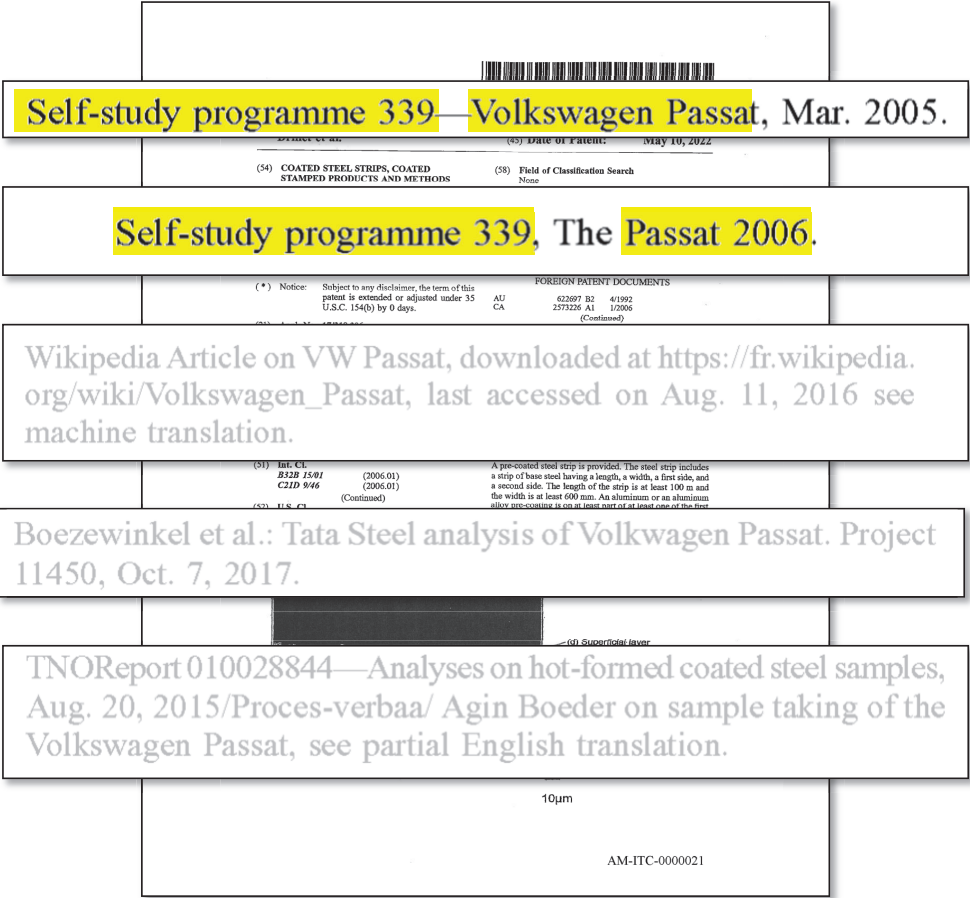
AM-ITC-0000021

Patent Office Already Considered the 2006 VW Passat

Self-Study Programme 339



'227 Patent



Patent Office Already Considered the 2006 VW Passat

Wikipedia Article

Volkswagen Passat — Wikipédia

Page 1 sur 16

Volkswagen Passat

La **Volkswagen Passat** est une automobile familiale routière à cinq places construite par Volkswagen. Son nom vient de l'allemand « *Passat* », qui signifie « alizé ».

Dans la gamme de la marque, elle se situe entre les Golf/Jetta et Phaeton. Elle est fabriquée à Emden, en Allemagne.

En 2015, la Volkswagen Passat est élue « voiture de l'année »^[1].

Depuis 1973, 8 générations ont été créées.

Passat B8, voiture de l'année 2015 en Europe

Sommaire

- 1 Passat B1 (1973-1980)
 - 1.1 B1 en Europe
 - 1.2 B1 au Brésil
 - 1.3 B1 en Amérique du Nord
- 2 Passat B2 (1980-1988)
 - 2.1 Restylage de 1985
- 3 Passat B3 "35i" (1988-1993)
 - 3.1 Motorisations
 - 3.2 Finitions
- 4 Passat B4 (restylage) (1993-1996)
 - 4.1 Moteurs
- 5 Passat B5 (1996-2005)
 - 5.1 Motorisations
 - 5.2 Passat B5.5 (restylage)
 - 5.2.1 B5.5 versions
- 6 Passat B6 (2005-2010)
 - 6.1 Passat R36
 - 6.2 Passat CC
- 7 Passat B7 (2010- 2015)
 - 7.1 Types de carrosseries
 - 7.1.1 Berline
 - 7.1.2 Break
 - 7.1.3 Alltrack
- 8 Passat B8 (2015 -)
 - 8.1 Motorisations
 - 8.2 Finitions
 - 8.3 Autres Variantes
 - 8.3.1 GTE
- 9 Notes et références
- 10 Voir aussi

AM-ITC-0002365

https://fr.wikipedia.org/wiki/Volkswagen_Passat

JX-0003.2328

11/08/2016

'227 Patent

Self-study programme 339—Volkswagen Passat, Mar. 2005.

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

Self-study programme 339, The Passat 2006.

(*) 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

Wikipedia Article on VW Passat, downloaded at https://fr.wikipedia.org/wiki/Volkswagen_Passat, last accessed on Aug. 11, 2016 see machine translation.

(51) Int. Cl. B21C 1/81 C21D 9/46 (2006.01) (2006.01) (Continued)

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 most of at least one of the first

Boezewinkel et al.: Tata Steel analysis of Volkswagen Passat. Project 11450, Oct. 7, 2017.

(c) Superficial layer

TNORreport 010028844—Analyses on hot-formed coated steel samples, Aug. 20, 2015/Proces-verbaa/ Agin Boeder on sample taking of the Volkswagen Passat, see partial English translation.

10µm

AM-ITC-0000021

Patent Office Already Considered the 2006 VW Passat

Boezewinkel

TATA STEEL

DS

Project number: 11450

Author(s): J. Boezewinkel, G.C. Hensen

Approved by: G.C. Hensen

Date of issue: 7-10-2014

Programme manager/ Jan Bottema, G.C. Hensen

Project leader:

Circulation approved: Yes

Keywords: Boron steel Patent opposition

Subject: Analysis of known products related to AM patent EP2242863

Tata Steel does not accept any liability for damages that might arise as a result of use of the information in this document

Research & Development / Limuiden Technology Centre
PO Box 10200 1570 CA Limuiden The Netherlands

Tata Steel Nederland Technology B.V. Trade register 34053341

AM-ITC-0002057

JX-0003.2020

'227 Patent

Self-study programme 339—Volkswagen Passat, Mar. 2005.

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

(55) DATE OF PATENT: May 10, 2022

(58) Field of Classification Search: None

Self-study programme 339, The Passat 2006.

(*) 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 623897 B2 4/1992

CA 2573226 A1 1/2006

(Continued)

Wikipedia Article on VW Passat, downloaded at https://fr.wikipedia.org/wiki/Volkswagen_Passat, last accessed on Aug. 11, 2016 see machine translation.

(31) Int. Cl. (2006.01) B21D 15/01 (2006.01) C21D 9/46 (2006.01) (Continued)

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

Boezewinkel et al.: Tata Steel analysis of Volkswagen Passat. Project 11450, Oct. 7, 2017.

(6) Superficial layer

10µm

AM-ITC-0000021

TNOReport 010028844—Analyses on hot-formed coated steel samples, Aug. 20, 2015/Proces-verbaa/ Agin Boeder on sample taking of the Volkswagen Passat, see partial English translation.

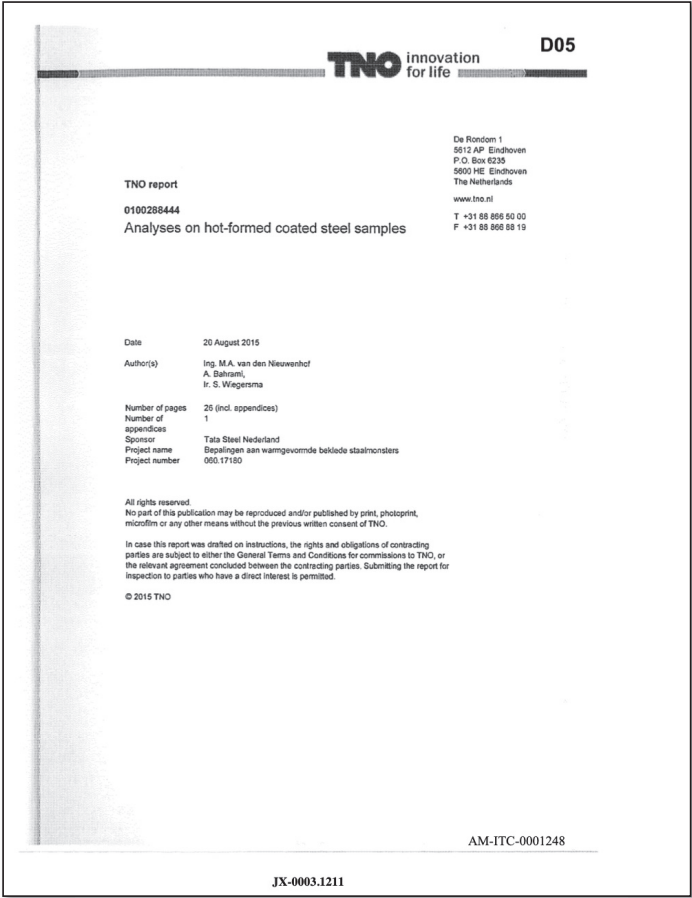
JX-0001 ('227 Patent); CX-0082C (Raabe Rpt.) ¶¶ 77–110, 121–187; JX-0003.2020–34 (Boezewinkel)

CDX–0001C.62

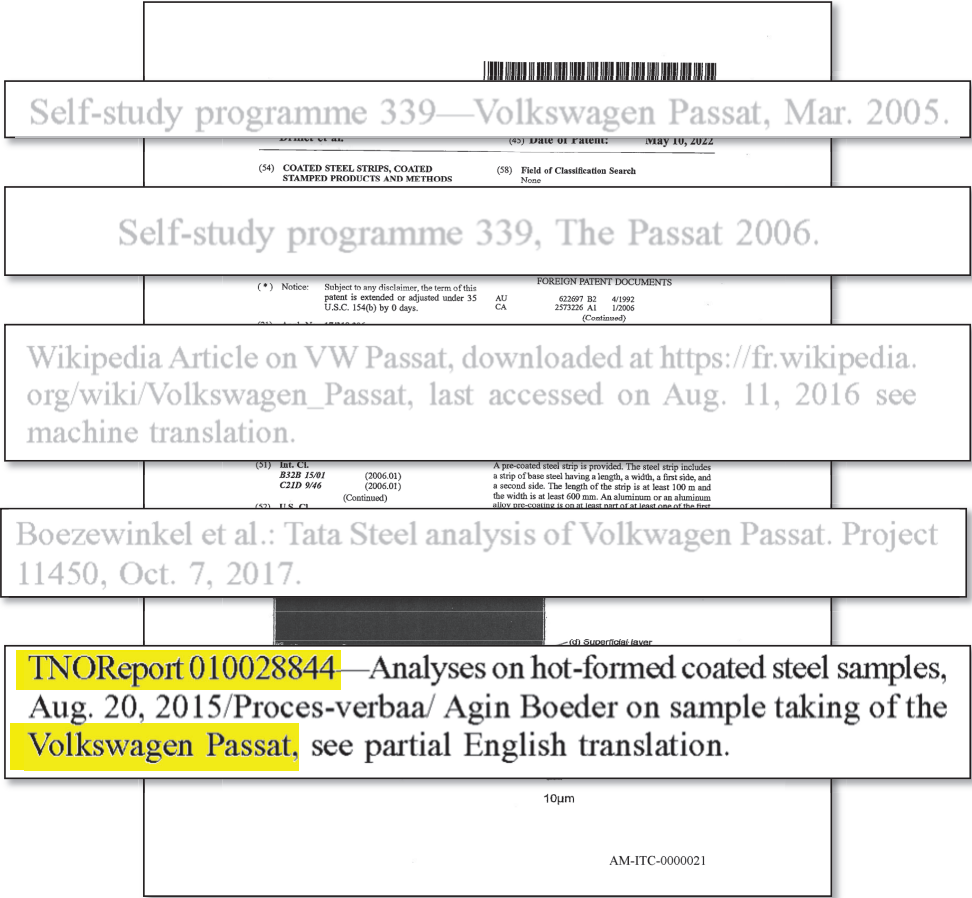
ArcelorMittal Ex. 2007
Posco Co. LTD. v. ArcelorMittal
IPR2024-01376
Page 8 of 17

Patent Office Already Considered the 2006 VW Passat

TNO Report



'227 Patent

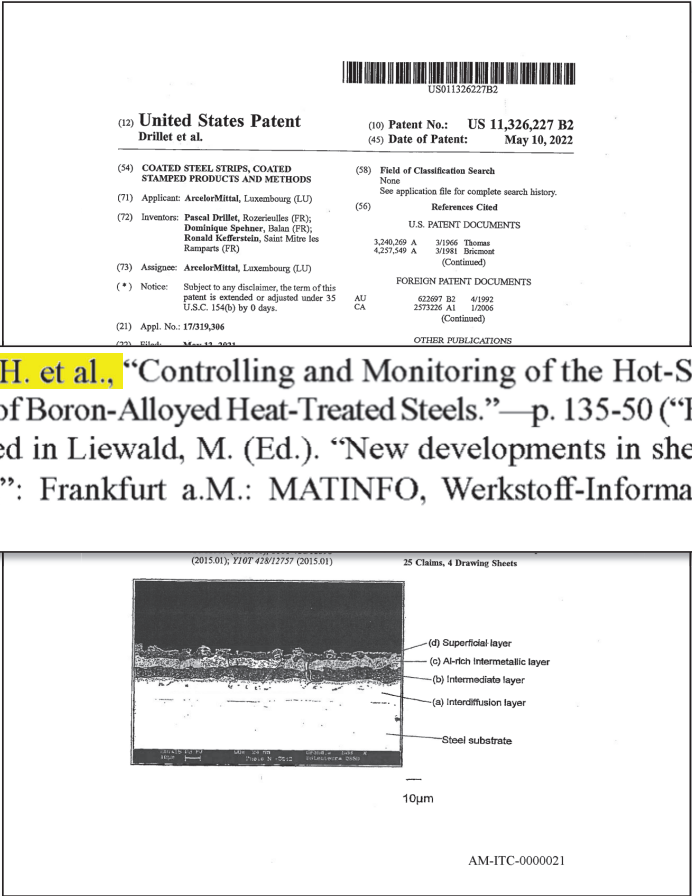


Patent Office Already Considered Engels

Engels



'227 Patent



Patent Office Already Considered Cornette

Cornette

'227 Patent

SAE TECHNICAL
PAPER SERIES

D6
Neumann Müller
Oberwalleney & Partner
Patentanwälte

2001-01-0078

High Strength Steels for Automotive Safety Parts

D. Cornette, T. Hourman, O. Hudin, J. P. Laurent and A. Reynaert
Usinor Research

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

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

AM-ITC-0014498

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

(71) Applicant: ArcelorMittal, Luxembourg (LU)

(72) Inventors: Pascal Drillet, Ronczielles (FR);
Dominique Spehner, Balon (FR);
Ronald Kefferstein, Saint Mire les
Ramparts (FR)

(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.: 17/319,306

(22) Filed: May 13, 2021

(65) Prior Publication Data
US 2021/0362055 A1 Aug. 26, 2021

(38) Field of Classification Search
None
See application file for complete search history.

(56) References Cited
U.S. PATENT DOCUMENTS
3,240,269 A 3/1966 Thomas
4,237,549 A 3/1981 Brismont
(Continued)

FOREIGN PATENT DOCUMENTS
AU 623897 B2 4/1992
CA 2573226 A1 1/2006
(Continued)

OTHER PUBLICATIONS
Mahesh C. Somani, et al., "Dimensional Changes and Microstructural
Evolution in a B-bearing Steel in the Simulated Forming and
Quenching Process," ISIJ International, 2001, vol. 41, Issue 4, pp.

CPC C21D 9/46 (2013.01); B22B 15/012
(2013.01); C23C 2/12 (2013.01); C23C 2/26
(2013.01); C23C 2/44 (2013.01); Y10T
428/12389 (2015.01); Y10T 428/12396
(2015.01); Y10T 428/12757 (2015.01)

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-rich intermetallic layer
(b) Intermediate layer
(a) Interdiffusion layer
Steel substrate

10µm

AM-ITC-0000021

Patent Office Already Considered Lachmann

Lachmann

'227 Patent

DVS Lecture, ifs, 18.01.2005

Developments of High-Strength Sheet Steel Qualities and Joining-Related Aspects for Use in Automotive Construction
...the materials perspective!

Carsten Lachmann

VOLKSWAGEN AG

Central Laboratory

1/6

AM-ITC-0010994

US011326227B2

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

(71) Applicant: ArcelorMittal, Luxembourg (LU)

(72) Inventors: Pascal Drillet, Roncières (FR); Dominique Spehner, Balon (FR); Ronald Kefferstein, Saint Mire les Ramparts (FR)

(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.: 17/319,306

(22) Filed: May 13, 2021

(65) Prior Publication Data US 2021/0362055 A1 Aug. 26, 2021

(38) Field of Classification Search: None
See application file for complete search history.

(56) References Cited: U.S. PATENT DOCUMENTS
3,240,269 A 3/1966 Thomas
4,237,549 A 3/1981 Brismont
(Continued)

FOREIGN PATENT DOCUMENTS
AU 623897 B2 4/1992
CA 2573226 A1 1/2006
(Continued)

OTHER PUBLICATIONS
Mahesh C. Somani, et al., "Dimensional Changes and Microstructural Evolution in a B-bearing Steel in the Simulated Forming and Quenching Process," ISIJ International, 2001, vol. 41, Issue 4, pp.

vehicle and the metallographic preparation").

DVS Presentation by Carsten Lachmann, Jan. 18, 2008.

Application report: Examination of body components with AISi

CPC C21D 9/46 (2013.01); B21B 15/012 (2013.01); C23C 2/12 (2013.01); C23C 2/26 (2013.01); C23C 2/44 (2013.01); Y10T 428/1289 (2015.01); Y10T 428/1296 (2015.01); Y10T 428/12757 (2015.01)

or second sides of the strip of base steel. A thickness t_f of the pre-coating is from 20 to 35 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-rich intermetallic layer
(b) Intermediate layer
(a) Interdiffusion layer
Steel substrate

10µm

AM-ITC-0000021

JX-0001 ('227 Patent); RX-0005 (Lachmann (Ger.)); RX-0062 (Lachmann (Eng.)) CX-0082C (Raabe Rpt.) ¶¶ 185–187

CDX–0001C.66

ArcelorMittal Ex. 2007

Posco Co. LTD. v. ArcelorMittal

IPR2024-01376

Page 12 of 17

Patent Office Already Considered Suehiro II

Suehiro II

'227 Patent

Inv. No. 337-TA-1402
RX-0022

D14
Neumann Müller
Oberwalleney & Partner
Patentanwälte

USDC 609, 718, 3, 609, 14, 108, 205 - 415

NIPPON STEEL TECHNICAL REPORT No. 88 JULY 2003

Properties of Aluminum-coated Steels for Hot-forming

Masayoshi SUEHIRO*
Kazuhisa KUSUMI*
Toshihiro MIYAKOSHIM*

Jun MAMI*
Masahiro CHIGAMI*

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 treatment³⁻⁵⁾. In Europe, Arcelor has developed and commercially launched an aluminized steel sheet product called USIBOR 1500 for that application. It has excellent hot-pressible properties and corrosion resistance qualities⁶⁻¹⁰⁾. 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 A₁ 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 then quenched. At the forming work, the press machine is retained at the lower dead point until the entire steel sheet is quenched sufficiently.

AM-ITC-0014691

RX-0022.0001

US011326227B2

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
(71) Applicant: ArcelorMittal, Luxembourg (LU)
(72) Inventors: Pascal Drillet, Roncières (FR); Dominique Spehner, Bâton (FR); Ronald Kefferstein, Saint Mère les Ramparts (FR)
(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.: 17/019,306
(22) Filed: May 13, 2021
(65) Prior Publication Data
US 2021/0362055 A1 Aug. 26, 2021

(38) Field of Classification Search
None
See application file for complete search history.
(56) References Cited
U.S. PATENT DOCUMENTS
3,240,269 A 3/1966 Thomas
4,237,549 A 3/1981 Bicomet
(Continued)
FOREIGN PATENT DOCUMENTS
AU 623897 B2 4/1992
2573226 A1 1/2006
(Continued)
OTHER PUBLICATIONS
Mahesh C. Somani, et al., "Dimensional Changes and Microstructural Evolution in a B-bearing Steel in the Simulated Forming and Quenching Process," ISIJ International, 2001, vol. 41, Issue 4, pp. 361-367 ("Somani").

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

(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 2/44 (2013.01); Y10T 428/12389 (2015.01); Y10T 428/12396 (2015.01); Y10T 428/12757 (2015.01)
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-rich intermetallic layer
(b) Intermediate layer
(a) Interdiffusion layer
Steel substrate

10µm

AM-ITC-0000021

Patent Office Already Considered GMW14400

GMW14400

'227 Patent



**WORLDWIDE
ENGINEERING
STANDARDS**

Material Specification
Metals

GMW14400

Low Carbon, Heat-Treatable Boron Steel – Uncoated or Aluminized Pre-Coated

1 Scope

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

blank or pre-stamped part, and rapid cooling (quenching) the stamped part in the die. The cooled part may be subsequently shot blasted to 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 5.

GM WORLDWIDE	NORTH AMERICA	EUROPE	LATIN AMERICA	ASIA PACIFIC
GMW14400M-ST-T HT1475T/1170Y MS	GM4396M Type 1 (Subex)			
GMW14400M-ST-S 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

Copyright General Motors
Printed by GM. No other source with General Motors
Registration, distribution or publication of these materials is expressly prohibited.

Order Number: 10211084
Sent to: 315200000010001 (2004/2005/2006/2007/2008/2009/2010/2011/2012/2013/2014/2015/2016/2017/2018/2019/2020/2021/2022/2023/2024/2025/2026/2027/2028/2029/2030/2031/2032/2033/2034/2035/2036/2037/2038/2039/2040/2041/2042/2043/2044/2045/2046/2047/2048/2049/2050/2051/2052/2053/2054/2055/2056/2057/2058/2059/2060/2061/2062/2063/2064/2065/2066/2067/2068/2069/2070/2071/2072/2073/2074/2075/2076/2077/2078/2079/2080/2081/2082/2083/2084/2085/2086/2087/2088/2089/2090/2091/2092/2093/2094/2095/2096/2097/2098/2099/2100/2101/2102/2103/2104/2105/2106/2107/2108/2109/2110/2111/2112/2113/2114/2115/2116/2117/2118/2119/2120/2121/2122/2123/2124/2125/2126/2127/2128/2129/2130/2131/2132/2133/2134/2135/2136/2137/2138/2139/2140/2141/2142/2143/2144/2145/2146/2147/2148/2149/2150/2151/2152/2153/2154/2155/2156/2157/2158/2159/2160/2161/2162/2163/2164/2165/2166/2167/2168/2169/2170/2171/2172/2173/2174/2175/2176/2177/2178/2179/2180/2181/2182/2183/2184/2185/2186/2187/2188/2189/2190/2191/2192/2193/2194/2195/2196/2197/2198/2199/2200/2201/2202/2203/2204/2205/2206/2207/2208/2209/2210/2211/2212/2213/2214/2215/2216/2217/2218/2219/2220/2221/2222/2223/2224/2225/2226/2227/2228/2229/2230/2231/2232/2233/2234/2235/2236/2237/2238/2239/2240/2241/2242/2243/2244/2245/2246/2247/2248/2249/2250/2251/2252/2253/2254/2255/2256/2257/2258/2259/2260/2261/2262/2263/2264/2265/2266/2267/2268/2269/2270/2271/2272/2273/2274/2275/2276/2277/2278/2279/2280/2281/2282/2283/2284/2285/2286/2287/2288/2289/2290/2291/2292/2293/2294/2295/2296/2297/2298/2299/2300/2301/2302/2303/2304/2305/2306/2307/2308/2309/2310/2311/2312/2313/2314/2315/2316/2317/2318/2319/2320/2321/2322/2323/2324/2325/2326/2327/2328/2329/2330/2331/2332/2333/2334/2335/2336/2337/2338/2339/2340/2341/2342/2343/2344/2345/2346/2347/2348/2349/2350/2351/2352/2353/2354/2355/2356/2357/2358/2359/2360/2361/2362/2363/2364/2365/2366/2367/2368/2369/2370/2371/2372/2373/2374/2375/2376/2377/2378/2379/2380/2381/2382/2383/2384/2385/2386/2387/2388/2389/2390/2391/2392/2393/2394/2395/2396/2397/2398/2399/2400/2401/2402/2403/2404/2405/2406/2407/2408/2409/2410/2411/2412/2413/2414/2415/2416/2417/2418/2419/2420/2421/2422/2423/2424/2425/2426/2427/2428/2429/2430/2431/2432/2433/2434/2435/2436/2437/2438/2439/2440/2441/2442/2443/2444/2445/2446/2447/2448/2449/2450/2451/2452/2453/2454/2455/2456/2457/2458/2459/2460/2461/2462/2463/2464/2465/2466/2467/2468/2469/2470/2471/2472/2473/2474/2475/2476/2477/2478/2479/2480/2481/2482/2483/2484/2485/2486/2487/2488/2489/2490/2491/2492/2493/2494/2495/2496/2497/2498/2499/2500/2501/2502/2503/2504/2505/2506/2507/2508/2509/2510/2511/2512/2513/2514/2515/2516/2517/2518/2519/2520/2521/2522/2523/2524/2525/2526/2527/2528/2529/2530/2531/2532/2533/2534/2535/2536/2537/2538/2539/2540/2541/2542/2543/2544/2545/2546/2547/2548/2549/2550/2551/2552/2553/2554/2555/2556/2557/2558/2559/2560/2561/2562/2563/2564/2565/2566/2567/2568/2569/2570/2571/2572/2573/2574/2575/2576/2577/2578/2579/2580/2581/2582/2583/2584/2585/2586/2587/2588/2589/2590/2591/2592/2593/2594/2595/2596/2597/2598/2599/2600/2601/2602/2603/2604/2605/2606/2607/2608/2609/2610/2611/2612/2613/2614/2615/2616/2617/2618/2619/2620/2621/2622/2623/2624/2625/2626/2627/2628/2629/2630/2631/2632/2633/2634/2635/2636/2637/2638/2639/2640/2641/2642/2643/2644/2645/2646/2647/2648/2649/2650/2651/2652/2653/2654/2655/2656/2657/2658/2659/2660/2661/2662/2663/2664/2665/2666/2667/2668/2669/2670/2671/2672/2673/2674/2675/2676/2677/2678/2679/2680/2681/2682/2683/2684/2685/2686/2687/2688/2689/2690/2691/2692/2693/2694/2695/2696/2697/2698/2699/2700/2701/2702/2703/2704/2705/2706/2707/2708/2709/2710/2711/2712/2713/2714/2715/2716/2717/2718/2719/2720/2721/2722/2723/2724/2725/2726/2727/2728/2729/2730/2731/2732/2733/2734/2735/2736/2737/2738/2739/2740/2741/2742/2743/2744/2745/2746/2747/2748/2749/2750/2751/2752/2753/2754/2755/2756/2757/2758/2759/2760/2761/2762/2763/2764/2765/2766/2767/2768/2769/2770/2771/2772/2773/2774/2775/2776/2777/2778/2779/2780/2781/2782/2783/2784/2785/2786/2787/2788/2789/2790/2791/2792/2793/2794/2795/2796/2797/2798/2799/2800/2801/2802/2803/2804/2805/2806/2807/2808/2809/2810/2811/2812/2813/2814/2815/2816/2817/2818/2819/2820/2821/2822/2823/2824/2825/2826/2827/2828/2829/2830/2831/2832/2833/2834/2835/2836/2837/2838/2839/2840/2841/2842/2843/2844/2845/2846/2847/2848/2849/2850/2851/2852/2853/2854/2855/2856/2857/2858/2859/2860/2861/2862/2863/2864/2865/2866/2867/2868/2869/2870/2871/2872/2873/2874/2875/2876/2877/2878/2879/2880/2881/2882/2883/2884/2885/2886/2887/2888/2889/2890/2891/2892/2893/2894/2895/2896/2897/2898/2899/2900/2901/2902/2903/2904/2905/2906/2907/2908/2909/2910/2911/2912/2913/2914/2915/2916/2917/2918/2919/2920/2921/2922/2923/2924/2925/2926/2927/2928/2929/2930/2931/2932/2933/2934/2935/2936/2937/2938/2939/2940/2941/2942/2943/2944/2945/2946/2947/2948/2949/2950/2951/2952/2953/2954/2955/2956/2957/2958/2959/2960/2961/2962/2963/2964/2965/2966/2967/2968/2969/2970/2971/2972/2973/2974/2975/2976/2977/2978/2979/2980/2981/2982/2983/2984/2985/2986/2987/2988/2989/2990/2991/2992/2993/2994/2995/2996/2997/2998/2999/3000/3001/3002/3003/3004/3005/3006/3007/3008/3009/3010/3011/3012/3013/3014/3015/3016/3017/3018/3019/3020/3021/3022/3023/3024/3025/3026/3027/3028/3029/3030/3031/3032/3033/3034/3035/3036/3037/3038/3039/3040/3041/3042/3043/3044/3045/3046/3047/3048/3049/3050/3051/3052/3053/3054/3055/3056/3057/3058/3059/3060/3061/3062/3063/3064/3065/3066/3067/3068/3069/3070/3071/3072/3073/3074/3075/3076/3077/3078/3079/3080/3081/3082/3083/3084/3085/3086/3087/3088/3089/3090/3091/3092/3093/3094/3095/3096/3097/3098/3099/3100/3101/3102/3103/3104/3105/3106/3107/3108/3109/3110/3111/3112/3113/3114/3115/3116/3117/3118/3119/3120/3121/3122/3123/3124/3125/3126/3127/3128/3129/3130/3131/3132/3133/3134/3135/3136/3137/3138/3139/3140/3141/3142/3143/3144/3145/3146/3147/3148/3149/3150/3151/3152/3153/3154/3155/3156/3157/3158/3159/3160/3161/3162/3163/3164/3165/3166/3167/3168/3169/3170/3171/3172/3173/3174/3175/3176/3177/3178/3179/3180/3181/3182/3183/3184/3185/3186/3187/3188/3189/3190/3191/3192/3193/3194/3195/3196/3197/3198/3199/3200/3201/3202/3203/3204/3205/3206/3207/3208/3209/3210/3211/3212/3213/3214/3215/3216/3217/3218/3219/3220/3221/3222/3223/3224/3225/3226/3227/3228/3229/3230/3231/3232/3233/3234/3235/3236/3237/3238/3239/3240/3241/3242/3243/3244/3245/3246/3247/3248/3249/3250/3251/3252/3253/3254/3255/3256/3257/3258/3259/3260/3261/3262/3263/3264/3265/3266/3267/3268/3269/3270/3271/3272/3273/3274/3275/3276/3277/3278/3279/3280/3281/3282/3283/3284/3285/3286/3287/3288/3289/3290/3291/3292/3293/3294/3295/3296/3297/3298/3299/3300/3301/3302/3303/3304/3305/3306/3307/3308/3309/3310/3311/3312/3313/3314/3315/3316/3317/3318/3319/3320/3321/3322/3323/3324/3325/3326/3327/3328/3329/3330/3331/3332/3333/3334/3335/3336/3337/3338/3339/3340/3341/3342/3343/3344/3345/3346/3347/3348/3349/3350/3351/3352/3353/3354/3355/3356/3357/3358/3359/3360/3361/3362/3363/3364/3365/3366/3367/3368/3369/3370/3371/3372/3373/3374/3375/3376/3377/3378/3379/3380/3381/3382/3383/3384/3385/3386/3387/3388/3389/3390/3391/3392/3393/3394/3395/3396/3397/3398/3399/3400/3401/3402/3403/3404/3405/3406/3407/3408/3409/3410/3411/3412/3413/3414/3415/3416/3417/3418/3419/3420/3421/3422/3423/3424/3425/3426/3427/3428/3429/3430/3431/3432/3433/3434/3435/3436/3437/3438/3439/3440/3441/3442/3443/3444/3445/3446/3447/3448/3449/3450/3451/3452/3453/3454/3455/3456/3457/3458/3459/3460/3461/3462/3463/3464/3465/3466/3467/3468/3469/3470/3471/3472/3473/3474/3475/3476/3477/3478/3479/3480/3481/3482/3483/3484/3485/3486/3487/3488/3489/3490/3491/3492/3493/3494/3495/3496/3497/3498/3499/3500/3501/3502/3503/3504/3505/3506/3507/3508/3509/3510/3511/3512/3513/3514/3515/3516/3517/3518/3519/3520/3521/3522/3523/3524/3525/3526/3527/3528/3529/3530/3531/3532/3533/3534/3535/3536/3537/3538/3539/3540/3541/3542/3543/3544/3545/3546/3547/3548/3549/3550/3551/3552/3553/3554/3555/3556/3557/3558/3559/3560/3561/3562/3563/3564/3565/3566/3567/3568/3569/3570/3571/3572/3573/3574/3575/3576/3577/3578/3579/3580/3581/3582/3583/3584/3585/3586/3587/3588/3589/3590/3591/3592/3593/3594/3595/3596/3597/3598/3599/3600/3601/3602/3603/3604/3605/3606/3607/3608/3609/3610/3611/3612/3613/3614/3615/3616/3617/3618/3619/3620/3621/3622/3623/3624/3625/3626/3627/3628/3629/3630/3631/3632/3633/3634/3635/3636/3637/3638/3639/3640/3641/3642/3643/3644/3645/3646/3647/3648/3649/3650/3651/3652/3653/3654/3655/3656/3657/3658/3659/3660/3661/3662/3663/3664/3665/3666/3667/3668/3669/3670/3671/3672/3673/3674/3675/3676/3677/3678/3679/3680/3681/3682/3683/3684/3685/3686/3687/3688/3689/3690/3691/3692/3693/3694/3695/3696/3697/3698/3699/3700/3701/3702/3703/3704/3705/3706/3707/3708/3709/3710/3711/3712/3713/3714/3715/3716/3717/3718/3719/3720/3721/3722/3723/3724/3725/3726/3727/3728/3729/3730/3731/3732/3733/3734/3735/3736/3737/3738/3739/3740/3741/3742/3743/3744/3745/3746/3747/3748/3749/3750/3751/3752/3753/3754/3755/3756/3757/3758/3759/3760/3761/3762/3763/3764/3765/3766/3767/3768/3769/3770/3771/3772/3773/3774/3775/3776/3777/3778/3779/3780/3781/3782/3783/3784/3785/3786/3787/3788/3789/3790/3791/3792/3793/3794/3795/3796/3797/3798/3799/3800/3801/3802/3803/3804/3805/3806/3807/3808/3809/3810/3811/3812/3813/3814/3815/3816/3817/3818/3819/3820/3821/3822/3823/3824/3825/3826/3827/3828/3829/3830/3831/3832/3833/3834/3835/3836/3837/3838/3839/3840/3841/3842/3843/3844/3845/3846/3847/3848/3849/3850/3851/3852/3853/3854/3855/3856/3857/3858/3859/3860/3861/3862/3863/3864/3865/3866/3867/3868/3869/3870/3871/3872/3873/3874/3875/3876/3877/3878/3879/3880/3881/3882/3883/3884/3885/3886/3887/3888/3889/3890/3891/3892/3893/3894/3895/3896/3897/3898/3899/3900/3901/3902/3903/3904/3905/3906/3907/3908/3909/3910/3911/3912/3913/3914/3915/3916/3917/3918/3919/3920/3921/3922/3923/3924/3925/3926/3927/3928/3929/3930/3931/3932/3933/3934/3935/3936/3937/3938/3939/3940/3941/3942/3943/3944/3945/3946/3947/3948/3949/3950/3951/3952/3953/3954/3955/3956/3957/3958/3959/3960/3961/3962/3963/3964/3965/3966/3967/3968/3969/3970/3971/3972/3973/3974/3975/3976/3977/3978/3979/3980/3981/3982/3983/3984/3985/3986/3987/3988/3989/3990/3991/3992/3993/3994/3995/3996/3997/3998/3999/4000/4001/4002/4003/4004/4005/4006/4007/4008/4009/4010/4011/4012/4013/4014/4015/4016/4017/4018/4019/4020/4021/4022/4023/4024/4025/4026/4027/4028/4029/4030/4031/4032/4033/4034/4035/4036/4037/4038/4039/4040/4041/4042/4043/4044/4045/4046/4047/4048/4049/4050/4051/4052/4053/4054/4055/4056/4057/4058/4059/4060/4061/4062/4063/4064/4065/4066/4067/4068/4069/4070/4071/4072/4073/4074/4075/4076/4077/4078/4079/4080/4081/4082/4083/4084/4085/4086/4087/4088/4089/4090/4091/4092/4093/4094/4095/4096/4097/4098/4099/4100/4101/4102/4103/4104/4105/4106/4107/4108/4109/4110/4111/4112/4113/4114/4115/4116/4117/4118/4119/4120/4121/4122/4123/4124/4125/4126/4127/4128/4129/4130/4131/4132/4133/4134/4135/4136/4137/4138/4139/4140/4141/4142/4143/4144/4145/4146/4147/4148/4149/4150/4151/4152/4153/4154/4155/4156/4157/4158/4159/4160/4161/4162/4163/4164/4165/4166/4167/4168/4169/4170/4171/4172/4173/4174/4175/4176/4177/4178/4179/4180/4181/4182/4183/4184/4185/4186/4187/4188/4189/4190/4191/4192/4193/4194/4195/4196/4197/4198/4199/4200/4201/4202/4203/4204/4205/4206/4207/4208/4209/4210/4211/4212/4213/4214/4215/4216/

Patent Office Already Considered Laurent

Laurent

'227 Patent

US00626805B1

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

(10) **Patent No.:** **US 6,296,805 B1**
(45) **Date of Patent:** **Oct. 2, 2001**

(54) **COATED HOT- AND COLD-ROLLED STEEL SHEET COMPRISING A VERY HIGH RESISTANCE AFTER THERMAL TREATMENT**

(96) 1995121 • 710997 (JP)

OTHER PUBLICATIONS

(75) Inventors: **Jean-Pierre Laurent, Intex, Jean-Paul Hennechart, Flotig, Dominique Spelher, Sedan, Jacques Devree, Saise de Provence, all of (FR)**

Patent Abstracts of Japan, vol. 15, No. 17, Jan. 14, 1991; & JP 02 203954, Oct. 26, 1990.
Patent Abstracts of Japan, vol. 13, No. 457, Oct. 16, 1989; & JP 01 175055, Jul. 12, 1989.
Patent Abstracts of Japan, vol. 18, No. 523, Oct. 4, 1994; & JP 00 170944, Jan. 26, 1994.
Patent Abstracts of Japan, vol. 18, No. 004, Jan. 6, 1994; & JP 03 247588, Sep. 24, 1993.

(73) Assignee: **Sollac, Puteaux (FR)**

* cited by examiner

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

Primary Examiner—Edwina Jones

Assistant Examiner—Jason Savage

74 Attorney, Agent, or Firm—Oblon, Spivak, McClelland, Mair & Neustadt, P.C.

(21) Appl. No. **09/350,100**

(22) Filed: **Jul. 9, 1999**

(30) **Foreign Application Priority Data**

Jul. 9, 1998 (FR) 98 08763

(51) Int. Cl. **C21D 8/02, B32B 15/08;**

C22E 38/00, C22E 38/18

(52) U.S. Cl. **420/104; 428/653; 428/699;**

148/531; 148/537

(56) **Field of Search** **428/653; 959;**

420/104; 148/537; 531

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,891,274 • 1/1990 Higuchi et al.

5,133,841 • 7/1992 Hoshino et al.

5,178,008 • 1/1993 Yu et al.

5,656,102 • 8/1997 Taylor et al.

FOREIGN PATENT DOCUMENTS

2 625 227 • 6/1989 (FR)

09-025551 • 1/1997 (JP)

(57) **ABSTRACT**

Hot-rolled steel sheet which then can be cold-rolled, coated, the steel in the sheet having the following composition by weight:

0.15%-carbon<0.5%

0.5%-manganese<5%

0.1%-silicon<0.5%

0.01%-chromium<1%

tin<0.005%

aluminum<0.1%

phosphorus<0.1%

sulfur<0.05%

0.0005%-boron<0.005%, the remainder being iron and

impurities inherent in processing, the sheet ensuring a very high mechanical resistance after thermal treatment and the aluminum-based coating ensuring a high resistance to corrosion.

10 Claims, No Drawings

1

POSCO-1023

VINFAST1402-00004533

5,495,736 A 3/1996 Nishi et al.

6,296,805 B1 10/2001 Laurent et al.

6,815,087 B2 11/2004 Takagi et al.

Laurent et al.

(73) Assignee: Arevo/Mittal, Luxembourg (LU)

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

FOREIGN PATENT DOCUMENTS

(52) Filed: May 13, 2021

(55) Prior Publication Data: Mabeih C. Sommi, et al., "Dimensional Changes and Microstructural Evolution in Boron-Coated Steels," *Metallurgical Transactions A*, 2019, 50(12), 3500-3510.

(60) Confirmation of application No. 16/413,825, filed on May 16, 2019, now Pat. No. 11,041,226, which is a

Primary Examiner — Daniel J. Schleit

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

7,708,843 B2 5/2010 Laurent et al.

2008/0283156 A1 11/2008 Laurent et al.

Laurent J.-P. "Hot formed Pre-coated boron steels: A solution of the resistance-formability's dilemma"—1st European Conference of Experts, Oct. 14, 2003.

Laurent J.-P., "Hot formed Pre-coated boron steels, A solution of the resistance-formability's dilemma"—1st European Conference of experts, Hot Forming and Casting Technologies for Lightweight Automobile Design, 27 /28. Nov. 2003.



(b) Intermediate layer

(a) Interdiffusion layer

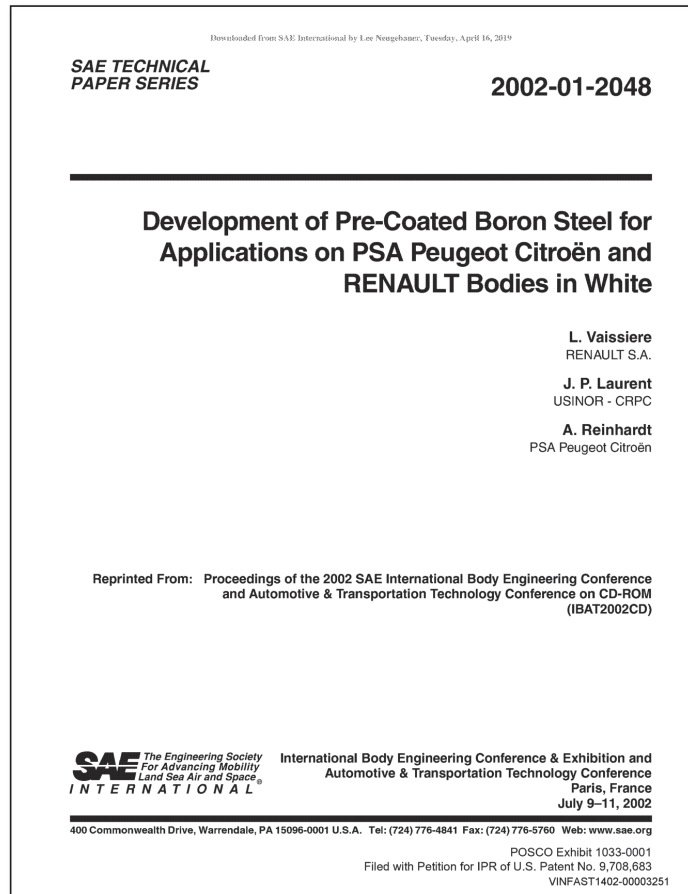
Steel substrate

10µm

AM-ITC-0000021

Patent Office Already Considered Vaissiere

Vaisselle



'227 Patent

