

Title (en)
A METHOD OF PRODUCING DUAL-PHASE HIGH-STRENGTH STEEL SHEETS HAVING HIGH IMPACT ENERGY ABSORPTION PROPERTIES

Title (de)
VERFAHREN ZUR HERSTELLUNG VON ZWEIPHASEN HOCHFESTEN STAHLBLECHEN MIT ERHÖHTEN EIGENSCHAFTEN ZUR ABSORPTION VON AUFPRALLENERGIE

Title (fr)
PROCEDE DE PREPARATION DES TOLES D'ACIER BIPHASEES A HAUTE RESISTANCE MECANIQUE ET A HAUTE CAPACITE D'ABSORPTION D'ENERGIE DE CHOCK

Publication
EP 0969112 B2 20170308 (EN)

Application
EP 98907247 A 19980316

Priority
• JP 9801101 W 19980316
• JP 8243497 A 19970317
• JP 19029797 A 19970715
• JP 19029997 A 19970715
• JP 22300897 A 19970806
• JP 25893897 A 19970924

Abstract (en)
[origin: EP0969112A1] The invention relates to dual-phase type high-strength steel sheets, for automobiles, which have excellent dynamic deformation properties and exhibit impact absorption properties, and are intended to be used as structural members and reinforcing materials primarily for automobiles, as well as to a method of producing them, which dual-phase type high-strength steel sheets with excellent dynamic deformation properties are characterized in that the final microstructure of the steel sheets is a composite microstructure wherein the dominating phase is ferrite, and the second phase is another low temperature product phase containing martensite at a volume fraction between 3% and 50% after 5% deformation of the steel sheet, wherein the difference between the quasi-static deformation strength as when deformed in a strain rate range of 5×10^{-4} - 5×10^{-3} (s⁻¹) after pre-deformation of more than 0% and less than or equal to 10% of equivalent strain, and the dynamic deformation strength σ_d when deformed in a strain rate range of 5×10^{-2} - 5×10^{-3} (s⁻¹) after the aforementioned pre-deformation, i.e. ($\sigma_d - \sigma_s$), is at least 60 MPa, and the work hardening coefficient at 5 SIMILAR 10% strain is at least 0.13. <IMAGE>

IPC 8 full level
C22C 38/00 (2006.01); **C21D 8/02** (2006.01); **C21D 9/46** (2006.01); **C22C 38/50** (2006.01)

CPC (source: EP KR US)
C21D 8/02 (2013.01 - EP); **C21D 9/46** (2013.01 - EP); **C22C 38/00** (2013.01 - KR); **C22C 38/002** (2013.01 - EP); **C22C 38/02** (2013.01 - EP); **C22C 38/04** (2013.01 - EP); **C22C 38/06** (2013.01 - EP); **C23C 2/02** (2013.01 - EP KR US); **C23C 2/0224** (2022.08 - EP KR US); **C23C 2/024** (2022.08 - EP KR US); **C21D 2211/005** (2013.01 - EP); **C21D 2211/008** (2013.01 - EP)

Citation (opposition)
Opponent :
• US 5123969 A 19920623 - CHOU TUNG-SHENG [TW]
• O. MAID ET AL.: "Herstellung von Warmband aus Dualphasen-Stahl mit Haspelttemperaturen unterhalb der Martensitstart-Temperatur", THYSSEN TECHNISCHE BERICHTE, no. 1/85, 1985, pages 28 - 33
• G. BÉRANGER ET AL.: "The Book of Steel", vol. 59, 1996, LAVOISIER PUBLISHERS, PARIS, pages: 1208 - 1211
• S. MASATOSCHI ET AL.: "Influence of Microstructure on Yielding Behavior in Continuous-Annealed Multi-Phase Sheet Steels", 1985, THE METALLURGICAL SOCIETY OF AIME, PENNSYLVANIA, pages: 341 - 360

Cited by
US7959747B2; EP1201780A4; FR2834722A1; EP2374910A1; EP1918405A1; AU777321B2; US7396420B2; RU2617075C1; EP1362930A4; EP1443124A1; EP1227167A4; EP2781615A4; US2015337408A1; EP1595965A4; EP1319726A1; FR2833617A1; EP1338667A4; EP1493832A1; EP1191114A4; EP3998359A4; FR2855184A1; EP1398390A1; RU2638479C1; EP3196326A4; DE10327383A1; DE10327383B4; DE10327383C5; RU2704049C1; US7591917B2; GB2445749A; GB2445749B; FR2850671A1; EP2060646A4; US7425240B2; US11155902B2; WO2004079022A1; WO2016174020A1; WO03057928A1; WO2004104254A1; US8882938B2; US9677150B2; US6475305B1; US10655192B2; US8337643B2; US8366844B2; US7608155B2; US7252724B2; US8002016B2; US11225697B2; US7780797B2; US7879160B2; US10513749B2; US8631853B2; US8875777B2; US9120147B2; US8435363B2; US9157138B2; WO2008052921A1; WO2011076383A1; WO2011120550A1; WO2011121118A3

Designated contracting state (EPC)
DE FR GB NL

DOCDB simple family (publication)
EP 0969112 A1 20000105; **EP 0969112 A4 20030521**; **EP 0969112 B1 20110817**; **EP 0969112 B2 20170308**; AU 6311898 A 19981012; AU 717294 B2 20000323; CA 2283924 A1 19980924; CA 2283924 C 20061128; CN 1080321 C 20020306; CN 1251140 A 20000419; EP 2314729 A1 20110427; EP 2314729 B1 20120208; EP 2314729 B2 20170308; KR 100334949 B1 20020504; KR 20000076372 A 20001226; TW 426742 B 20010321; WO 9841664 A1 19980924

DOCDB simple family (application)
EP 98907247 A 19980316; AU 6311898 A 19980316; CA 2283924 A 19980316; CN 98803465 A 19980316; EP 10181225 A 19980316; JP 9801101 W 19980316; KR 19997008474 A 19990917; TW 87103834 A 19980316