

Title (en)

Method for cooling sheet metal with a cooling section, cooling section and control and/or regulating device for a cooling section

Title (de)

Verfahren zur Kühlung eines Blechs mittels einer Kühlstrecke, Kühlstrecke und Steuer- und/oder Regeleinrichtung für eine Kühlstrecke

Title (fr)

Procédé de refroidissement d'une tôle à l'aide d'un tunnel de refroidissement, tunnel de refroidissement et dispositif de commande et/ou de réglage pour un tunnel de refroidissement

Publication

EP 2361699 A1 20110831 (DE)

Application

EP 10154802 A 20100226

Priority

EP 10154802 A 20100226

Abstract (en)

The method for cooling a sheet metal (B) using a cooling section (1), which includes first coolant delivery devices (2) for cooling a sheet metal upper side (O) and second coolant delivery devices for cooling a sheet metal lower side (U), comprises achieving a predetermined target state of the sheet metal at a reference point by cooling during and/or after discharging from the cooling section, and determining a coolant delivery for first and second coolant delivery devices, where the first and second coolant delivery devices are oppositely arranged relative to the sheet metal. The method for cooling a sheet metal (B) using a cooling section (1), which includes first coolant delivery devices (2) for cooling a sheet metal upper side (O) and second coolant delivery devices for cooling a sheet metal lower side (U), comprises achieving a predetermined target state of the sheet metal at a reference point by cooling during and/or after discharging from the cooling section, and determining a coolant delivery for first and second coolant delivery devices, where the first and second coolant delivery devices are oppositely arranged relative to the sheet metal. The determination of the coolant delivery of the coolant delivery devices takes place based on a predetermined heat stream to be supplied from the sheet metal side turned towards the respective coolant delivery device, where a surface temperature of the sheet metal is considered for the heat stream to be supplied. A ratio of the heat stream to be supplied from the sheet metal upper side to the sheet metal lower side is adjusted in dependent of a flatness of the sheet metal when it enters into the cooling section, where the ratio is equal to one when the even sheet metal running into the cooling section. The ratio is adjusted when the uneven sheet metal running into the cooling section, so that the flatness of the sheet metal after passing through the cooling section is reduced relative to the unflatness of the sheet metal before passing through the cooling section. The determination step takes place based a specified equation. The coolant delivery for the coolant delivery devices is determined independent of the coolant delivery of the other opposite coolant delivery device relative to the sheet metal. The determination step takes place, so that the sheet metal is virtually divided into a first sheet metal and a second sheet metal parallel to the upper side or lower side, where the coolant delivery is separately determined for the first and second sheet metals. During the respective determination, a heat exchange is considered between the first and second sheet metals. For the first and second sheet metals, an individual temporal progression of a parameter described to an energetic state of the sheet metal is determined. The heat stream to be supplied for the sheet metal upper side and the sheet metal lower side is determined based on the parameter. During the consideration of the determination of the coolant delivery, the temperature of the sheet metal upper side and/or the temperature of the sheet metal lower side is always greater or equal to a predetermined boundary temperature of 350[deg] C during the passage through the cooling section. One of the sheet metal sides has a temperature that is greater or equal to the predetermined boundary temperature and is turned towards the coolant delivery device. Independent claims are included for: (1) a control- and/or regulating device for a cooling section; (2) a machine-readable program code for a control- and/or regulating device for a cooling section; (3) a storage medium with a machine-readable program code; and (4) a cooling section for cooling a sheet metal.

Abstract (de)

Die Erfindung betrifft eine Kühlstrecke, eine Steuer-und/oder Regeleinrichtung für eine Kühlstrecke, einen maschinenlesbaren Programmcode, ein Speichermedium und ein Verfahren zur Kühlung eines Blechs mittels einer Kühlstrecke, wobei die Kühlstrecke eine Mehrzahl an Kühlmittelabgabeeinrichtungen zur Kühlung einer Blechoberseite und eine Mehrzahl an Kühlmittelabgabeeinrichtungen zur Kühlung einer Blechunterseite aufweist, wobei mittels der Kühlung ein vorgegebener Zielzustand des Blechs an einem Referenzpunkt bei und/oder nach Austritt aus der Kühlstrecke erreicht wird, wobei eine Kühlmittelabgabe für eine erste und eine zweite Kühlmittelabgabeeinrichtung ermittelt wird, wobei die erste und die zweite Kühlmittelabgabeeinrichtung relativ zum Blech gegenüberliegend angeordnet sind. Indem die Ermittlung der Kühlmittelabgabe für die erste und zweite Kühlmittelabgabeeinrichtung (2) anhand eines vorgegebenen abzuführenden Wärmestroms von der der jeweiligen Kühlmittelabgabeeinrichtung (2) zugewandten Blechseite (O, U) erfolgt, wobei für den jeweils abzuführenden Wärmestrom eine Temperatur, insbesondere Oberflächentemperatur (To, Tu), der jeweiligen Blechseite (O, U) berücksichtigt wird, kann die Planheit von hergestelltem Grobblech bei gleichzeitig hohem Durchsatz der Grobblechstraße weiter erhöht werden.

IPC 8 full level

B21B 37/76 (2006.01); **C21D 1/667** (2006.01); **C21D 11/00** (2006.01)

CPC (source: EP KR US)

B21B 37/28 (2013.01 - KR); **B21B 37/76** (2013.01 - EP KR US); **B21B 38/006** (2013.01 - KR); **B21B 38/02** (2013.01 - KR); **B21B 45/0218** (2013.01 - KR); **C21D 1/667** (2013.01 - EP KR US); **C21D 11/005** (2013.01 - EP KR US); **B21B 37/28** (2013.01 - EP US); **B21B 38/006** (2013.01 - EP US); **B21B 38/02** (2013.01 - EP US); **B21B 45/0218** (2013.01 - EP US); **B21B 2261/20** (2013.01 - EP KR US); **B21B 2263/04** (2013.01 - EP KR US); **C21D 9/46** (2013.01 - EP US)

Citation (applicant)

EP 2070608 A1 20090617 - NIPPON STEEL CORP [JP]

Citation (search report)

- [AD] EP 2070608 A1 20090617 - NIPPON STEEL CORP [JP]
- [A] WO 2009106423 A1 20090903 - SIEMENS AG [DE], et al
- [A] DE 19943403 A1 20010322 - SIEMENS AG [DE]
- [A] JP S61253112 A 19861111 - NIPPON STEEL CORP

Cited by

EP2929949A4; EP2764932A4; JP2021502899A; RU2744406C1; US11484926B2; WO2019101486A1; EP2873469A1; WO2015071200A1

Designated contracting state (EPC)

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR

Designated extension state (EPC)

AL BA RS

DOCDB simple family (publication)

EP 2361699 A1 20110831; BR 112012021178 A2 20160517; CN 102770221 A 20121107; CN 102770221 B 20150520;
EP 2539089 A2 20130102; EP 2539089 B1 20140625; EP 2539089 B2 20220504; KR 101834579 B1 20180305; KR 20120139754 A 20121227;
RU 2012141025 A 20140410; RU 2562565 C2 20150910; US 10220425 B2 20190305; US 2012318478 A1 20121220;
WO 2011104103 A2 20110901; WO 2011104103 A3 20120119

DOCDB simple family (application)

EP 10154802 A 20100226; BR 112012021178 A 20110204; CN 201180011188 A 20110204; EP 11701838 A 20110204;
EP 2011051663 W 20110204; KR 20127025094 A 20110204; RU 2012141025 A 20110204; US 201113581437 A 20110204