

Title (en)
Method for producing an armouring component and armouring component

Title (de)
Verfahren zur Herstellung eines Panzerungsbauteils und Panzerungsbauteil

Title (fr)
Procédé de fabrication d'un composant de blindage et composant de blindage

Publication
EP 2623617 A2 20130807 (DE)

Application
EP 13153012 A 20130129

Priority
DE 102012001862 A 20120201

Abstract (en)

The method of producing an armor component by partial carburizing of a sheet steel circuit board (10) or sheet steel preform having a minimum thickness of 2 mm and partial carburizing of a three-dimensional hot forming and subsequently stamping in a die press, where the circuit board or preform is thermochemically treated before carburization having a carbon of minimum 0.8 mass% and maximum 1.5 mass% and/or the board or preform and the component have a silicon (0.45 mass%), comprises introducing the circuit board or preform into a carburizing plant for the purpose of carburizing. The method of producing an armor component by partial carburizing of a sheet steel circuit board (10) or sheet steel preform having a minimum thickness of 2 mm and partial carburizing of a three-dimensional hot forming and subsequently stamping in a die press, where the circuit board or preform is thermochemically treated prior to the carburization having a carbon content of minimum 0.8 mass% and maximum 1.5 mass% and/or the circuit board or preform and the produced armor component have a silicon content of 0.45 mass%, comprises introducing the circuit board or preform into a carburizing plant for the purpose of carburizing and then heating to or above a carburizing temperature that is greater than or equal to a workpiece-specific Ac 3-temperature, maintaining the temperature over a period of time by contact with a medium, which emits carbon at surface portions of the circuit board or preform, where the surface portions are introduced into a carburizing area of the carburizing plant, are not protected from a diffusing action of the medium and are carburized at its total or partial surface to a surface layer depth of 2 mm such that the carburized layer and/or the circuit board or preform has a carbon content of minimum 0.5 mass% and maximum 1.5 mass%, and the complete carburized and thermochemically treated circuit board or preform with respect to any reference-point of its total surface has a core zone in which the amount of the carbon is less than 0.5 mass%, terminating the diffusing action of the medium after the period of time for the board or preform, and subjecting the circuit board or the preform to forming steps. The heated circuit board or preform is cooled to a room temperature for the purpose of hot forming by a heating apparatus or a surface area of the heating apparatus is completely or partially heated to or above a workpiece-specific Ac 1 temperature. The heated board or preform is placed in an opened mold cavity of the die press. At the beginning of the forming step, the circuit board or preform is completely or partially present at or above the workpiece-specific Ac 1 temperature. A non carburized layer is cooled to below a martensite start temperature of the carburized layer beginning with or after forming a mold component in the die press. The cooling step is carried out at a cooling rate of greater than or equal to a workpiece-specific lower critical cooling rate of the non carburized layer. The die press is temporarily closed during cooling process. The carburizing plant is a gas carburizing furnace. The medium is present in gaseous form, and emits the carbon and nitrogen at the circuit board or preform. The carburizing area is a carburizing bath and a salt bath, and the medium is present in liquid form and further emits nitrogen at the circuit board or preform. The cooling step is further carried out at a cooling rate of greater than or equal to an upper workpiece-specific critical cooling rate of the thermochemically treated layer. The circuit board or preform relative to its external dimensions has a minimum surface area of 22,500 cm² with a minimum dimension in a plane direction of 150 cm. The board or preform: is quenched by water or oil as quenching medium; and is started after thermochemical treatment and in the case of forming a separate quenching by press hardening after the quenching process prior to heating for the purpose of hot forming. An independent claim is included for an armor component.

Abstract (de)

Die Erfindung betrifft Verfahren zur Herstellung eines Panzerungsbauteils durch zumindest partielle thermochemische Behandlung, und zwar partielles Aufkohlen oder partielles Carbonitrieren, zumindest einer/s Stahlblechplatine (10) oder Stahlblechvorformlings mit einer Mindestdicke von 2 mm und dem Aufkohlen oder Carbonitrieren zeitlich nachgelagertes, insbesondere dreidimensionales, zumindest partielles Warmumformen und anschließendes zumindest partielles Presshärten in einer Gesenkpresse (50). Dabei weist die/der zumindest eine Platine (10) oder Vorformling vor dem Aufkohlen einen Kohlenstoff-Gehalt kleiner 0,5 Massenprozent auf, und sowohl die/der zumindest eine Platine (10) oder Vorformling als auch das hergestellte Panzerungsbauteil weisen einen Silicium-Gehalt größer oder gleich 0,2 Massenprozent auf.

IPC 8 full level
C21D 1/673 (2006.01); **C21D 9/42** (2006.01); **C23C 8/04** (2006.01); **C23C 8/22** (2006.01); **C23C 8/46** (2006.01); **C23C 8/76** (2006.01)

CPC (source: EP)
C21D 1/673 (2013.01); **C21D 9/42** (2013.01); **C23C 8/02** (2013.01); **C23C 8/22** (2013.01); **C23C 8/32** (2013.01); **C23C 8/80** (2013.01); **C21D 2221/00** (2013.01)

Citation (applicant)
DE 102005014298 B4 20061130 - BENTELER AUTOMOBILTECHNIK GMBH [DE]

Cited by
CN107617855A; CN109906278A; EP3533886A4; WO2015000740A1

Designated contracting state (EPC)
AL 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 RS SE SI SK SM TR

Designated extension state (EPC)
BA ME

DOCDB simple family (publication)
EP 2623617 A2 20130807; DE 102012001862 A1 20130801; DE 102012001862 B4 20151029

DOCDB simple family (application)
EP 13153012 A 20130129; DE 102012001862 A 20120201