

Title (en)

Process for hardening of work pieces unter the action of plasma-pulses

Title (de)

Verfahren zum Härten von Werkstücken in einer Impuls-Plasmaentladung

Title (fr)

Procédé de traitement thermochimique de pièces par des impulsions à plasma

Publication

EP 0552460 B1 19960214 (DE)

Application

EP 92121129 A 19921211

Priority

- DE 4201325 A 19920120
- DE 4238993 A 19921119

Abstract (en)

[origin: EP0552460A1] Workpieces made of steel are hardened by carburising the surface and subsequent quenching. Carburisation is carried out by means of a plasma discharge in vacuo in the presence of gaseous hydrocarbons at voltages between 200 and 2000 volts, preferably between 300 and 1000 volts, and preferably with the admixture of argon. The plasma is generated by electrodes operated in vacuo, of which the cathode serves as the workpiece holder and is operated in a pulsed manner. So as to achieve, in the process, a uniform hardness distribution even for irregularly shaped workpieces and to reduce the carbon mass flow, a) carburisation is carried out at an overall pressure between 14 and 30 mbar (1400 to 3000 Pa), b) a pulse duration of between 110 and 10,000 μ s (microseconds) is chosen, c) an internal duration of between 30 and 10,000 μ s is chosen and d) the mean power supplied to the plasma discharge is decreased, after completion of the start-up phase, by reducing the pulse duration and/or extending the interval duration, either continuously or in a stepwise manner, in such a way that the carbon content at said surface, without interruption of the pulsed operation, does not exceed at any time the saturation limit of the material for carbon in the austenitic domain. o

IPC 1-7

C23C 8/38

IPC 8 full level

C21D 1/06 (2006.01); **C23C 8/38** (2006.01)

CPC (source: EP)

C23C 8/38 (2013.01)

Citation (examination)

EP 0269251 A1 19880601 - ELECTRICITY COUNCIL [GB]

Cited by

EP0645461A1; US5833918A; EP0695813A2; WO2006050696A1

Designated contracting state (EPC)

AT DE ES FR GB IT

DOCDB simple family (publication)

EP 0552460 A1 19930728; EP 0552460 B1 19960214; AT E134222 T1 19960215; DE 4238993 C1 19930701; DE 59205356 D1 19960328; ES 2083663 T3 19960416; JP H0657404 A 19940301

DOCDB simple family (application)

EP 92121129 A 19921211; AT 92121129 T 19921211; DE 4238993 A 19921119; DE 59205356 T 19921211; ES 92121129 T 19921211; JP 639193 A 19930119