

## Title (en)

Process for heat treating metallic articles and heat treated article

## Title (de)

Verfahren zur Wärmebehandlung metallischer Werkstücke sowie wärmebehandeltes Werkstück

## Title (fr)

Procédé pour le traitement thermique d'articles métalliques et article traité thermiquement

## Publication

**EP 1333105 A1 20030806 (DE)**

## Application

**EP 02002530 A 20020204**

## Priority

EP 02002530 A 20020204

## Abstract (en)

Process for heat treating metallic workpieces comprises: heating workpieces to a first temperature in a vacuum or in a neutral or reducing gas atmosphere; carburizing the workpieces at the first temperature reached at the end of the heating up phase; cooling the workpieces to a second temperature; boriding the workpieces; cooling the workpieces to third temperature; and quenching the workpieces. Process for heat treating metallic workpieces comprises: heating the workpieces to a first temperature in a vacuum or in a neutral or reducing gas atmosphere during the heating up phase; carburizing the workpieces at the first temperature reached at the end of the heating up phase and at a first pressure for a first time period in a gas atmosphere containing a hydrocarbon during an enriching phase next to the heating up phase; cooling the workpieces to a second temperature; boriding the workpieces; cooling the workpieces to a third temperature; and quenching the workpieces from the third temperature to a temperature of less than 150 degreesC. Independent claims are also included for the following: (a) a device for carrying out the heat treating process; and (b) a heat treated workpiece. Preferred Features: The workpieces are heated in the first step to 800-1100 degreesC and cooled to 800-950 degreesC. The workpieces are cooled to room temperature during quenching. During boriding, the gas atmosphere contains boron trichloride, boron trifluoride and/or diboran.

## Abstract (de)

Ein Verfahren zur Wärmebehandlung metallischer Werkstücke, insbesondere zum kombinierten Aufkohlen, Borieren und Härten von Eisenwerkstoffen, weist in Hinsicht auf eine effiziente Verfahrensführung die nachstehenden, unmittelbar aufeinanderfolgenden Verfahrensschritte auf: a) eine Aufheizphase (A); b) eine Anreicherungsphase (B); c) eine erste Abkühlungsphase (C); d) eine Borierungsphase (D); e) eine zweite Abkühlungsphase (E) und f) eine abschließende Abschreckphase (F). Die durch ein derartiges Verfahren behandelten Werkstücke zeichnen sich durch eine vergleichsweise große Zeit- und Dauerfestigkeit bei zugleich hoher Verschleißbeständigkeit aus. <IMAGE>

## IPC 1-7

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## Citation (search report)

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- [A] EP 1078996 A1 20010228 - ABB ALSTOM POWER CH AG [CH] & JP S4930620 B1 19740814
- [A] PATENT ABSTRACTS OF JAPAN vol. 1996, no. 10 31 October 1996 (1996-10-31)
- [A] DATABASE CA [online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; KONDO, TAKAO ET AL: "Surface hardening treatment", XP002204293, retrieved from STN Database accession no. 83:135713 CA
- [A] PATENT ABSTRACTS OF JAPAN vol. 011, no. 357 (C - 458) 20 November 1987 (1987-11-20)
- [A] PATENT ABSTRACTS OF JAPAN vol. 015, no. 173 (C - 0828) 2 May 1991 (1991-05-02)
- [A] PATENT ABSTRACTS OF JAPAN vol. 015, no. 072 (C - 0808) 20 February 1991 (1991-02-20)

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