

## Title (en)

Method and device for producing hardened moulded components

## Title (de)

Verfahren und Vorrichtung zur Herstellung von gehärteten Formbauteilen

## Title (fr)

Procédé et dispositif destinés à la fabrication de pièces moulées durcies

## Publication

**EP 2446978 A1 20120502 (DE)**

## Application

**EP 12151528 A 20110323**

## Priority

- EP 11159354 A 20110323
- DE 102010012579 A 20100323

## Abstract (en)

The method for the production of hardened mold components (5) such as structural- or body making parts of motor cars, comprises heating a metal printed circuit board, subsequently transforming in mold cavity (4) of a thermoforming tool (1) to mold component and then hardening through contact with a coolant in the mold cavity of the thermoforming tool, where the coolant is guided through flow channels (7, 8) into the mold cavity. The aggregate condition of the coolant is adjustable. The coolant is supplied with a pressure of up to 25 MPa into mold cavity. The method for the production of hardened mold components (5) such as structural- or body making parts of motor cars, comprises heating a metal printed circuit board, subsequently transforming in mold cavity (4) of a thermoforming tool (1) to mold component and then hardening through contact with a coolant in the mold cavity of the thermoforming tool, where the coolant is guided through flow channels (7, 8) into the mold cavity. The aggregate condition of the coolant is adjustable. The coolant is supplied with a pressure of up to 25 MPa into mold cavity. The mold component is partially cooled with the coolant, whose pressure lies above the vapor pressure of the coolant. The time duration of the coolant supply and/or the height of the pressure are varied. The component temperature of the mold component is measured in the mold cavity and the tool temperature is measured in the area of the contact surface (9) of the mold cavity. The starting time and end time of the coolant supply is controlled in dependent upon the component temperature and/or the tool temperature. The coolant distribution is variably controllable in the mold cavity. The first area of the mold component is subjected with the coolant and the second area of the mold component is not subjected with the coolant or the first area or the second area is subjected with the coolant. The mold component is fixedly held after the reception from the thermoforming tool in a cooling station. The coolant is supplied with a pressure in the mold cavity, and the pressure is adapted during the cooling phase at the vapor pressure of the coolant in control-technical manner. The pressure and/or temperature control is adjusted in dependent upon a temperature measurement on mold component in the thermoforming tool and/or temperature measurement on the thermoforming tool. The coolant is intermittently sprayed in the mold cavity. An independent claim is included for a thermoforming tool for transforming and hardening of metal sheet.

## Abstract (de)

Die Erfindung betrifft ein Verfahren und ein Warmformwerkzeug zur Herstellung von gehärteten Formbauteilen, insbesondere von Struktur- oder Karosseriebauteilen von Kraftfahrzeugen. Eine Metallplatte wird bis auf eine Temperatur im spezifischen Austenitisierungstemperaturbereich des Werkstoffs erwärmt, anschließend im Formraum (4) des Warmformwerkzeugs (1) zum Formbauteil (5) warm umgeformt und durch Kontakt mit einem Kühlmittel (KM) im Formraum (4) des Warmformwerkzeugs (1) gehärtet. Hierzu wird das Kühlmittel (KM) durch Zuflusskanäle (7, 8) in den Formraum (4) geleitet. Nach einem ersten Aspekt der Erfindung wird das Formbauteil (5) zumindest teilweise mit einem Kühlmittel (KM) gekühlt, dessen Druck (p<sub>KM</sub>) oberhalb des Dampfdrucks (p<sub>D</sub>) des Kühlmittels (KM) liegt. Ein zweiter Aspekt der Erfindung sieht vor, dass der Aggregatzustand des Kühlmittels (KM) einstellbar ist.

## IPC 8 full level

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## Citation (applicant)

- DE 2452486 A1 19750507 - NORRBOTTENS JAERNVERK AB
- DE 102005028010 B3 20060720 - BENTELER AUTOMOBILTECHNIK GMBH [DE]
- DE 2603618 A1 19761223 - KENEBUC GALT LTD

## Citation (search report)

- [A] DE 2603618 A1 19761223 - KENEBUC GALT LTD
- [A] US 6443214 B1 20020903 - MATSUO NOBUKI [JP], et al
- [AP] EP 2289694 A2 20110302 - HYUNDAI STEEL CO [KR]
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- [A] DE 19520138 A1 19961205 - WSP INGENIEUR GMBH [DE]
- [A] WO 2007084089 A2 20070726 - TERZIAKIN MEHMET [TR]

## Citation (third parties)

Third party :

- JP 2002282951 A 20021002 - TOYOTA MOTOR CORP, et al
- WO 2011115539 A1 20110922 - GESTAMP HARDTECH AB [SE], et al
- DE 102010048209 B3 20120105 - BENTELER AUTOMOBILTECHNIK GMBH [DE]
- DE 102010011087 A1 20110915 - VOLKSWAGEN AG [DE], et al
- EP 2392419 A1 20111207 - FUKAI SEISAKUSHO CO LTD [JP]

## Cited by

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