Title (en)

Method for casting 3-D freely formable shapes with microstructured surfaces

Title (de)

Verfahren zur Abformung von dreidimensionalen Freiformflächen mit mikrostrukturierten Oberflächen

Title (fr)

Procédé de prise d'empreinte de surfaces de forme libre en trois dimensions dotées de surfaces microstructurées

Publication

EP 1854568 B1 20100915 (DE)

Application

EP 07008963 A 20070503

Priority

DE 102006021477 A 20060509

Abstract (en)

[origin: EP1854568A1] The modelling of microstructured, three-dimensional free-form surface (12) for the production of mold and mold basins, casting models and/or core sockets, comprises preparing a core (30), whose surface is adapted to contour of the free-form surface, coating the free-form surface with polymer layer under external pressure with a thickness corresponding to the depth of the micro-structured surface, placing the coated surface on the core, and removing the coated surface as model from the core by which the polymeric layer remains on the core.
The modelling of microstructured, three-dimensional free-form surface (12) for the production of mold and mold basins, casting models and/or core sockets, comprises preparing a core (30), whose surface is adapted to contour of the free-form surface, coating the free-form surface with polymer layer under external pressure with a thickness corresponding to the depth of the micro-structured surface, placing the coated surface on the core, removing the coated surface as model from the core by which the polymeric layer remains on the core, chemically, electrically or physically depositing metallic layers on the free-lying polymeric layer by evaporation of first metallic layer with minimal layer thickness of 10 mu m and reinforcement of the first layer by the second metallic layer with homogeneous layer thickness of 50-150 mu m, chemically, physically or electrically depositing a hard material layer with intermediate layers directly on the polymer layer by high-velocity gas flame spray coating, plasma spray coating, kerosene flame spray coating or other spray-coating techniques, preparing a prototype, whose contour corresponds to the free-lying surface of the hard material layer and/or to a reinforcement of the hard polymer layer, connecting the free-lying surface present on the core with the prototype at a temperature that is higher than the decomposition temperature of the polymer layer by decomposing the layer, removing the decomposed layer and optionally removing the additional layers so that the hard material layer lies freely with the microstructured surface. The hard material layer is applied with a thickness of 100-1000 mu m. The coated model bevels on the core. The hard material layer is applied in an inert gas atmosphere or under vacuum and is electrically or chemically reinforced. A barrier layer, which is not attacked chemically or electrically, is applied on the metallic layers with a layer thickness of 3-8 mu m. The hard material layer and/or the reinforcement are machined on the free-lying surface facing the microstructured surface to produce a cast shell with a defined surface contour. The free-lying surface is soldered, adhesively bonded and/or sintered with the prototype by the application of pressure. The adhesive has a higher decomposition temperature than the polymeric layer. The free-lying surface and/or the prototype are chemically, physically or electrically coated. The cast shell and the prototype are pressed under pressure at a temperature that is lower than the melting temperature of the prototype and the cast shell, which is thermostatically pressed before the connection of prototype for the reduction of the stresses.

IPC 8 full level

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CPC (source: EP)

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Cited by

CN110480800A; WO2016087237A1

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