

Title (en)

Wear-resistant and oxidation-resistant turbine blade

Title (de)

Verschleiss- und oxidationsbeständige Turbinenschaufel

Title (fr)

Aube de turbine résistant à l'usure et à l'oxydation

Publication

EP 2316988 A1 20110504 (DE)

Application

EP 10188806 A 20101026

Priority

DE 102009051661 A 20091102

Abstract (en)

The turbine blade for the rotor of a turbine, comprises a blade (2) extending in radial direction, having a blade tip (9), where the blade is formed at the blade tip as crown (3) with an inner and outer crown edge extending in the radial direction, or as a shroud having a radially extending web with lateral edges, where the blade on its surface in certain areas is provided with a first protective layer (4) made of oxidation-resistant material. The first oxidation-resistant protective layer is a metallic layer such as MCrAlY layer. The turbine blade for the rotor of a turbine, comprises a blade (2) extending in radial direction, having a blade tip (9), where the blade is formed at the blade tip as crown (3) with an inner and outer crown edge extending in the radial direction, or as a shroud having a radially extending web with lateral edges, where the blade on its surface in certain areas is provided with a first protective layer (4) made of oxidation-resistant material. The first oxidation-resistant protective layer is a metallic layer such as MCrAlY layer. The first protective layer is arranged on the inner and/or outer crown edge or on the web edges and does not exist on the radially outwardly located blade tip of the turbine blade. The blade tip consists of a known laser hard surfacing layer constructed out of second wear- and oxidation-resistant protective layer (5). The second protective layer on the blade tip along the outer and/or inner crown edge or web edges overlaps partially with the first metallic protective layer. The metallic protective layer is covered by a ceramic thermal barrier layer, where the second oxidation and wear resistant protective layer partially overlaps with the metallic protective layer, but not with the ceramic thermal barrier layer. The wear- and oxidation resistant protective layer consists of an abrasive material and an oxidation-resistant metal binder material. The abrasive material is cubic boron nitride. The oxidation-resistant binder material contains a chemical composition having chromium (15-30 wt.%), aluminum (5-10 wt.%), yttrium (0.3-1.2 wt.%), silicon (0.1-1.2 wt.%), and nickel and cobalt (0-2 wt.%). The proportion of abrasive material in the protective layer increases in the radial direction to the outside. Between the first metallic protective layer and the second wear- and oxidation-resistant protective layer, an intermediate layer, which exclusively consists of oxidation-resistant binder material, is arranged, where the intermediate layer partially overlaps the first protective layer, and the second protective layer partially overlaps the intermediate layer. The turbine blade is a reconditioned turbine blade. The turbine blade in a previous service interval of the turbine is inserted without abrasive blade tip. The turbine blade is a new component. The turbine blade has a length, which is varied using the laser hard surfacing layer. An independent claim is included for a method for the production of a turbine blade.

Abstract (de)

Die Erfindung betrifft eine verschleiss- und oxidationsbeständige Turbinenschaufel (1) sowie ein Verfahren zur Herstellung dieser Schaufel. Das Schaufelblatt (2) ist auf seiner Oberfläche zumindest in bestimmten Zonen mit mindestens einer ersten Schutzschicht (4, 4a) aus oxidationsbeständigem Material versehen, wobei diese erste oxidationsbeständige Schutzschicht eine metallische Schicht (4), insbesondere eine MCrAlY-Schicht ist, die wahlweise von einer keramischen Wärmedämmschicht (5) bedeckt sein kann. Die metallische erste Schutzschicht (4) ist zumindest an der inneren und äusseren Kronenkante der Schaufelspitze (9) angeordnet, aber nicht an der radial aussen gelegenen Schaufelspitze (9). Die radial aussen gelegene Schaufelspitze (9) der Turbinenschaufel (1) besteht aus einer mittels eines bekannten Laserauftragsschweissens aufgebauten zweiten ein- oder mehrlagigen verschleiss- und oxidationsbeständigen Schutzschicht (5) aus Abrasivmaterial (6) und Bindermaterial (7), wobei diese zweite Schutzschicht (5) auf der Schaufelspitze (9) entlang der äusseren und/oder inneren Kronenkante zumindest teilweise mit der dort angeordneten ersten metallischen Schutzschicht (4) überlappt.

IPC 8 full level

C23C 24/10 (2006.01); **C23C 28/00** (2006.01); **C23C 28/02** (2006.01); **F01D 5/20** (2006.01); **F01D 5/28** (2006.01); **F01D 11/12** (2006.01)

CPC (source: EP US)

C23C 24/10 (2013.01 - EP US); **C23C 28/00** (2013.01 - EP US); **C23C 28/02** (2013.01 - EP US); **F01D 5/20** (2013.01 - EP US); **F01D 5/284** (2013.01 - EP US); **F01D 5/288** (2013.01 - EP US); **F01D 11/12** (2013.01 - EP US); **Y10T 29/49337** (2015.01 - US)

Citation (applicant)

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- DE 102004059904 A1 20060614 - ALSTOM TECHNOLOGY LTD [CH]
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Citation (search report)

- [A] DE 102004059904 A1 20060614 - ALSTOM TECHNOLOGY LTD [CH]
- [YA] GB 2075129 A 19811111 - GEN ELECTRIC
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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 2316988 A1 20110504; **EP 2316988 B1 20150708**; CA 2719273 A1 20110502; CA 2719273 C 20170328; DE 102010049398 A1 20110505; JP 2011099437 A 20110519; JP 5693149 B2 20150401; US 2011103968 A1 20110505; US 8740572 B2 20140603

DOCDB simple family (application)

EP 10188806 A 20101026; CA 2719273 A 20101026; DE 102010049398 A 20101026; JP 2010245232 A 20101101; US 91711410 A 20101101