

Title (en)
Single crystal turbine blade

Title (de)
Einkristall-turbinenschaufel

Title (fr)
Aube de turbine monocristalline

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EP 2071125 A1 20090617 (FR)

Application
EP 08171584 A 20081212

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Abstract (en)

The monocrystalline turbine blade for a wheel of a turbomachine, comprises a propeller (11) having a leading edge (BA), a lower face (FI), an upper face (FE), a trailing edge (BF), a skeleton (S) and longitudinal axis (ZZ), and a connection area (11E) between the propeller and the side of the blade. The blade is prepared by direct solidification of foundry parts. The sides (FI) and (FE) have a pass line, and respective lower pass (CI) and upper pass (CE) with respect to the adjacent blade in the turbomachine wheel of which it constitutes an element. The monocrystalline turbine blade for a wheel of a turbomachine, comprises a propeller (11) having a leading edge (BA), a lower face (FI), an upper face (FE), a trailing edge (BF), a skeleton (S) and longitudinal axis (ZZ), and a connection area (11E) between the propeller and the side of the blade. The blade is prepared by direct solidification of foundry parts. The sides (FI) and (FE) have a pass line, and respective lower pass (CI) and upper pass (CE) with respect to the adjacent blade in the turbomachine wheel of which it constitutes an element. An end part (20) of the propeller such as a stud or platform has a face of rib forming an angle with the longitudinal axis. The connection area extends around the leading edge between a point P1 located on the upper face of the blade and on the face of the upstream stud end with reference to the direction of the fluid flow and a point P3 located on the upper face of the blade and on the face of the upstream stud end of the lower pass. A section of the propeller in the connection area is measured perpendicularly to the leading edge of the theoretical profile, and extends towards the stud. Pointed line P2 is located in upstream of the blade with respect to the direction of the fluid flow in the connection area and in the extension of the leading edge of the propeller on the skeleton, and forms an angle of lower than 90[deg] with end face of the blade. The curvature of the connection area in a perpendicular plane that is cut at the leading edge of the theoretical profile depends on the curvature of the theoretical leading edge BAV and the distance separating the point P2 from the theoretical leading edge of the blade in the cut plane. The radius of curvature of point of the line P2 is equal to radius of curvature corresponding to the theoretical profile BAV, and is more than one-third of the distance. The surface of the connection area at point P1 is tangential along its upper surface end of the blade. The surface of the connection area in P3 is tangential along its lower surface end of the blade. A surface of the connection area has a profile C1 between the pointed line P2 and the pointed line P1. The upper surface of the blade is changed by geometrical transformations such as rotation, proportional transformation and/or affinity. The center of gravity of the connecting area defined by the surface located in upstream of the points P1 and P3 with respect to the direction of fluid flow, is on the axis of the smallest inertia of the theoretical profile surface, and close to the center of gravity of the theoretical profile surface.

Abstract (fr)

L' aube de turbomachine monocristalline conforme à l'invention réalisée de fonderie en solidification dirigée, comprenant : une pale (11) avec une bord d'attaque (BA), une face intrados (FI), une face extrados (FE), un bord de fuite (BF), un squelette (S) et d'axe longitudinal (ZZ), les faces (FI) et (FE) présentant une ligne de col, respectivement col d'intrados (CI) et col d'extrados (CE) par rapport à l'aube adjacente dans la roue de turbomachine dont elle constitue un élément, une pièce d'extrémité (20) de la pale, telle qu'un talon ou une plateforme, présentant une face d'extrémité de pale (21), côté veine, formant un angle avec l'axe ZZ et une zone de raccordement (11 E) entre la pale (11) et ladite face d'extrémité de pale, ladite zone de raccordement formant un engraissement de la pale, est caractérisée par le fait que ladite zone de raccordement (11E) s'étend autour du bord d'attaque (BA) entre un point P1 situé sur l'extrados (FE) de la pale en amont du col d'extrados (CE) et un point P3 situé sur l'intrados (FI) de la pale en amont du col d'intrados (CI).

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Citation (applicant)

- EP 0833060 A2 19980401 - TOSHIBA KK [JP]
- EP 0441097 A1 19910814 - UNITED TECHNOLOGIES CORP [US]
- EP 1688586 A1 20060809 - TOSHIBA KK [JP]

Citation (search report)

- [PX] US 2008099177 A1 20080501 - GRAHAM STEPHEN DANIEL [US], et al
- [DX] EP 0833060 A2 19980401 - TOSHIBA KK [JP]
- [DX] EP 0441097 A1 19910814 - UNITED TECHNOLOGIES CORP [US]
- [DX] EP 1688586 A1 20060809 - TOSHIBA KK [JP]

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