Claims

[Claim 1] A component manipulator for the dynamic positioning of a substrate(2) to be treated in a thermal treatment process, wherein the component manipulator includes a main drive axle (30) rotatable about a main rotary axis (3), a first connection element (4) and a substrate holder (5) connectable to the first connection element (4), characterized in that the first connection element (4) is a ceramic connection element (4) and a connection segment (51) of the substrate holder (5) is connectable to the first connection element (4) in a pull resistant and rotationally fixed manner by means of a plug and rotate connection with regard to a connection axis (V) of the plug and rotate connection and the substrate holder (5) is arranged rotatable about the connection axis (V).

[Claim 2] A component manipulator in accordance with claim 1, wherein a base plate (6) is provided which is rotationally fixedly connected to the main drive axle (30) for receiving the first connection element (4) with the substrate holder (5).

[Claim 3] A component manipulator in accordance with claim 2, wherein the base plate (6) is rotationally fixedly connected to the main drive axle (30) via a second connection element (32) for the supply of a cooling fluid (KF).

[Claim 4] A component manipulator in accordance with claim 1 or claim 2, wherein a plurality of first connection elements (4) are eccentrically provided at the base plate (6) with regard to the main rotary axis (3) for receiving a plurality of substrate holders (5).

[Claim 5] A component manipulator in accordance with claim 4, wherein the first connection element (4) is in operative connection with a contact element (8) as a stationary toothed wheel via a drive unit (7) as a toothed wheel for the rotation of the substrate holder (5) so that the rotation of the base plate (6) rotates the first connection element (4) about the connection axis (V).

[Claim 6] A component manipulator in accordance with claim 5, wherein the main drive axle (30) is rotatably arranged with regard to the contact element (8).

[Claim 7] A component manipulator in accordance with one of the claims 5 or 6,

wherein the contact element (8) is a toothed wheel arranged at a shaft jacket (31) stationary with regard to the main drive axle (30) and which is toothed for the drive of the first connection element (4) by means of the drive unit (7).

[Claim 8] A component manipulator in accordance with any one of the preceding claims, wherein the connection axis (V) of the plug and rotate connection is tilted at a predefinable angle of tilt (on) with regard to the main rotary axis (3).

[Claim 9] A component manipulator in accordance with any one of the claims 3 to 8, wherein the cooling fluid (KF) is suppliable to the first connection element (4) and to the connection segment (51) of the substrate holder (5) via a cooling distributor (9) arranged on the base plate (6) and a cooling line (KL).

[Claim 10] A component manipulator in accordance with any one of the preceding claims, wherein the first connection element (4) is supported in a bearing housing (41) by a bearing element (42), wherein the bearing element (42) can be cooled by means of an indirect contact with the cooling fluid (KF).

[Claim 11] A component manipulator in accordance with claim 10, wherein three bearing elements (42) are provided in the bearing housing (41) which form a three point bearing.

[Claim 12] A component manipulator in accordance with any one of the preceding claims, wherein the connection segment (51) is secured against a twist with regard to the first connection element (4) by means of a security against rotation (l0), wherein the security against rotation (10) is a locking pin, which is secured by means of a safety tape provided at the first connection element (4).

[Claim 13] A component manipulator in accordance with claim 12, wherein The locking pin is made of metal or ceramic.

[Claim 14] A coating method for use of a component manipulator (1) in accordance with any one of the claims 1 to 13.

[Claim 15] A coating method in accordance with claim 14 for the manufacture of a functional structured layer (20) on a substrate (2), in which a coating material (200) is

sprayed onto a surface of a substrate (2) in the form of a coating beam (BS) in a process chamber at a predefined low process pressure (P) by means of a plasma spray method, wherein the coating material (200) is injected into a plasma defocussing the coating beam (BS) at a low process pressure (P), which is less than 200 mbar, and a plasma with sufficiently high specific enthalpy is generated, so that a substantial part of the coating material (200), a part of at least 5 percent by weight of the amount of the coating material, is transferred into the vapor phase and the structured layer (20) is formed on the substrate (2) wherein the substrate (2) to be coated is arranged with the substrate holder (5) rotatable about a main rotary axis (3), such that a first surface (211) of the substrate (2) and a second surface (212) of the substrate are aligned with each other so that at least a part of the coating material (200) transferred into the vapor phase is deflected from the first surface (211) of the substrate (2) onto the second first surface (211) of the substrate (2) onto the second surface (212) of the substrate (2) on plasma spraying.

[Claim 16] A coating apparatus for carrying out a method in accordance with claim 14 or claim 15 for the manufacture of a functional structured layer (20) on a substrate (2), which coating apparatus includes a process chamber in which a coating material (200) is sprayable onto the surface of a substrate (2) in the form of a coating beam (BS) at a predefinable low process pressure (P) by means of a plasma spray method, wherein the coating material (200) is injectable into a plasma defocussing the coating beam (BS) at a low process pressure (P), which is less than 200 mbar, and is partially or completely meltable there, and wherein a plasma source (Q) and/or a spray pistol including a plasma source (Q) is/are provided by means of which a plasma with a sufficiently high enthalpy is generatable, so that a substantial part of the coating material (200), a part of at least 5 percent by weight of the amount of the coating material, is transferable into the vapor phase and the structured layer (20) is formable on the substrate (2), characterized in that a component manipulator in accordance with any one of the claims 1 to 13 is provided for the dynamic positioning of the substrate (2) to be treated.

[Claim 17] A use of a component manipulator (1) in accordance with any one of the claims 1 to 13 or of a coating apparatus in accordance with claim 16 for coating a substrate (2) with a coating method in accordance with claim 14 or claim 16, wherein the substrate (2) is a turbine vane for an airplane turbine, for a gas turbine, for a vapor turbine or for a water turbine.