Claims

[Claim 1]

A processing system (1) for processing an object (2) by irradiating the object (2) with irradiation light, the processing system (1) comprising:

a supporting apparatus (10), and

an irradiation unit (20) movably supported by the supporting apparatus (10) and configured to irradiate the object (2) with the irradiation light,

the supporting apparatus (10) comprising:

at least a first base member (11) and a second base member (12), at least one of the first and second base members (11, 12) being movable with respect to the other one of the first and second base members (11, 12),

a carrier member (13) held by the first base member (11) and the second base member (12) and having a first end (131) and a second end (132), and

a holding unit (14) configured to hold the irradiation unit (20),

wherein the supporting apparatus (10) is convertible at least between a first configuration and a second configuration, wherein

in the first configuration, the holding unit (14) is positionable at the carrier member (13) between the first base member (11) and the second base member (12) so that one of the first and second base members (11, 12) is positioned closer to one of the first and second ends (131, 132) than the holding unit (14) and the other one of the first and second base members (11, 12) is positioned closer to the other one of the first and second ends (131, 132) than the holding unit (14),

in the second configuration, at least one of the first end (131) and the second end (132) of the carrier member (13) protrudes from the respective one of the first and second base members (11, 12), and the holding unit (14) is positionable at the carrier member (13) so that one of the first and second base members (11, 12) is positioned between the other one of the first and second base members (11, 12) and the holding unit (14).

[Claim 2]

The processing system (1) according to claim 1,

wherein both of the first and second base members (11, 12) are movable with respect to each other.

[Claim 3]

The processing system (1) according to claim 1 or 2,

wherein the first and second base members (11, 12) extend in an extending direction that crosses a floor surface on that the first and second base members (11, 12) are placeable.

[Claim 4]

The processing system (1) according to claim 3,

wherein the carrier member (13) is extended in a direction which crosses the extending direction of the first and second base members (11, 12).

[Claim 5]

The processing system (1) according to any one of the preceding claims,

wherein the supporting apparatus (10) further comprises

a light input location (15) and a light output location (16),

a light conveying system (17) arranged to convey the irradiation light from the light input location (15) to the light output location (16), the light input location (15) being for receiving the irradiation light into the light conveying system (17) and the light output location (16) being for outputting the irradiation light from the light conveying system (17), wherein

the holding unit (14) is configured to hold the irradiation unit (20) at a position for outputting the irradiation light from the light output location (16) into the irradiation unit (20).

[Claim 6]

The processing system (1) according to any one of the preceding claims,

wherein the holding unit (14) is movably held by the carrier member (13) so as to be movable along a first direction, the first direction being parallel or

oblique to a direction from the first end (131) to the second end (132) of the carrier member (13), and

wherein the carrier member (13) is movably held by the first and second base members (11, 12) so as to be movable along a second direction that crosses the first direction, and so as to be movable along a third direction that crosses the first and second directions.

[Claim 7]

The processing system (1) according to claim 6,

wherein the first and second base members (11, 12) comprise a movable platform (111, 121) on which the carrier member (13) is disposed for moving the carrier member (13) along the third direction and/or have a telescopic configuration (113, 123) for moving the carrier member (13) along the third direction.

[Claim 8]

The processing system (1) according to claim 6 or 7,

wherein the supporting apparatus (10) further comprises a tracking system (105) configured to track a movement of the holding unit (14) relative to the object (2) to be irradiated along the first, second, and/or third direction.

[Claim 9]

The processing system (1) according to any one of claims 6 to 8,

wherein a movement range of the holding unit (14) along the first direction is between 3 m and 20 m, preferably between 5 m and 15 m, more preferably 6 m, and

a movement range of the carrier member (13) along the second direction is between 0.1 m and 7 m, preferably between 1 m and 5 m, more preferably 1.5 m.

[Claim 10]

The processing system (1) according to any one of claims 6 to 9,

wherein the supporting apparatus (10) further comprises a linear motor drive (101) for movement of the holding unit (14) in the first direction.

[Claim 11]

The processing system (1) according to any one of the preceding claims,

wherein each of the first base member and the second base member (11, 12) is provided with wheels (112, 122) or chains (114, 124) for moving the first and second base members (11, 12) over a floor.

[Claim 12]

The processing system (1) according to any one of the preceding claims,

wherein the supporting apparatus (10) further comprises a third and a fourth base member (102, 103) as a substitution for the first and second base members (11, 12), wherein the third and fourth base members (102, 103) have a different height than the first and second base members (11, 12).

[Claim 13]

The processing system (1) according to any one of the preceding claims,

wherein the supporting apparatus (10) further comprises an irradiation source (201) configured to produce the irradiation light.

[Claim 14]

The processing system (1) according to any one of the preceding claims,

wherein the supporting apparatus (10) further comprises an irradiation light enclosure structure (18) for at least partly enclosing an irradiation light beam (B).

[Claim 15]

The processing system (1) according to claim 14,

wherein the irradiation light enclosure structure (18) comprises a folding bellows (181) and a rigid structure (182), the folding bellows (181) being at least partly surrounded by the rigid structure (182),

wherein the rigid structure (182) comprises differently oriented walls (1821) so as to have, in its cross-sectional profile, at least two, preferably at least three, corners, and has a textured structure (1822) on a surface facing the folding bellows (181), the textured structure (1822) being configured to diffusely reflect the processing light.

[Claim 16]

The processing system (1) according to claim 14 or 15,

wherein the supporting apparatus (10) further comprises a purge gas means (104) configured to provide purge gas to the irradiation light enclosure structure (18) and/or the irradiation unit (20).

[Claim 17]

The processing system (1) according to any one of the preceding claims,

wherein at least one of the first base member (11), the second base member (12), the carrier member (13), the irradiation unit (20), and the holding unit (14) comprises a vibration reduction means (300) for reducing vibration of the supporting apparatus (10).

[Claim 18]

The processing system (1) according to claim 17,

wherein the vibration reduction means (300) comprises

passive vibration reduction means comprising rubber elements (301) and/or springs (302), and/or

active vibration reduction means comprising a sensor (303) configured to detect a vibration of the supporting apparatus (10) and an actuator (304) configured to move a vibrating part of the supporting apparatus (10) based on a detection signal of the sensor (303) to thereby compensate a vibration of the

supporting apparatus (10).

[Claim 19]

The processing system (1) according to any one of the preceding claims,

wherein the carrier member (13) is rotatably held by the first and second base members (11, 12) so as to be rotatable around a rotation axis, the rotation axis being parallel to a direction from the first end (131) to the second end (132) of the carrier member (13).

[Claim 20]

The processing system (1) according to any one of the preceding claims,

wherein the holding unit (14) is configured to hold the irradiation unit (20) at opposite sides of the carrier member (13), the opposite sides being opposite in a direction perpendicular to a direction from the first end (131) to the second end (132) of the carrier member (13).

[Claim 21]

The processing system (1) according to any one of the preceding claims,

wherein the holding unit (14) comprises a rotation mount (142) configured to rotatably hold the irradiation unit (20).

[Claim 22]

The processing system (1) according to any one of the preceding claims,

wherein the irradiation light is laser light, wherein the irradiation unit is configured to produce a laser light interference pattern on the surface of the object (2).

[Claim 23]

The processing system (1) according to claim 22,

wherein the laser light has a power of more than 500 W and a wavelength of between 8 micrometers and 12 micrometers, preferably wherein the laser light

is produced by a carbon-dioxide laser.

[Claim 24]

A method for modifying a surface of an object (2), the method comprising:

providing the processing system (1) according to any one of the preceding claims,

positioning the processing system (1) relative to the surface,

modifying the surface by irradiating the surface with the irradiation light to form a surface structure.

[Claim 25]

The method of claim 24,

wherein the object (2) is positioned between the first base member (11) and the second base member (12), or

wherein the first and second base members (11, 12) are positioned on the same side of the object (2).

[Claim 26]

The method according to claim 24 or 25,

wherein the surface is a surface of an aircraft, a surface of a helicopter blade (401), a surface of a ship (402), a surface of a land vehicle (403), a surface of a turbine blade (404), or a surface of a pipeline (405).