Claims

1. Laser illumination unit (10) for illuminating a target object with high-power laser radiation (60), the laser illumination unit comprising:

multiple rigidly-interconnected laser beam modules (16a, 16b) that are designed to emit laser radiation (60, 86), wherein a bundling unit (14) bundles the modules (16a, 16b) by means of a rigid frame (20) into a parallel bundle,

an aiming unit (12) to aim the laser beam modules (16a, 16b) at the target object,

wherein each of the laser beam modules (16a,16b) includes an optical element (63) that is designed to aim laser radiation (60, 86) at a target point of the target object,

wherein the optical element (63) of a laser beam module (16a, 16b) includes a semitransparent mirror (68, 68') that reflects emitted laser radiation of a first wavelength and is transparent to incoming radiation of a second wavelength,

multiple laser sources (32) that are designed to generate laser radiation and that are each connected by an optical fiber (34a, 34b) to a laser beam module (16a, 16b),

wherein the aiming unit (12) is designed to move the laser beam modules (16a, 16b) independently of the laser sources (32),

multiple first laser beam modules (16a) that are designed to emit first laser radiation (60) of the first wavelength,

a second laser beam module (16b) that is designed to emit second laser radiation (86) of the second wavelength and focus the radiation on a target point,

wherein the first laser beam modules (16a) are designed to detect the second laser radiation (86) by means of a detector (90),

wherein the first laser beam modules (16a) include an adjustable optical element (63) that aims the incoming second laser radiation (86) at the detector (90) and simultaneously aims the first laser radiation (60) at the target point.

2. Laser illumination unit (10) according to Claim 1,

wherein the optical element (63) of a laser beam module (16a, 16b) includes a detector (90, 94) for detecting incoming radiation (86, 88).

3. Laser illumination unit (10) according to Claims 1 or 2,

wherein the optical element (63) of a laser beam module (16a, 16b) includes an adjustable telescope (78) that is designed to focus emitted laser radiation (60, 86) onto the target point, and to focus incoming radiation (86, 92) onto a detector (90, 94).

4. Laser illumination unit (10) according to one of the preceding claims,

wherein the optical element (63) of a laser beam module (16a, 16b) includes an adjustable deflection mirror (72,72) that is designed to aim emitted laser radiation at the target point and aim incoming radiation at a detector (90, 94).

~~5. Laser illumination unit (10) according to one of the preceding claims,~~

~~wherein the optical element (63) of a laser beam module (16a, 16b) includes a semitransparent mirror (68, 68') that reflects emitted laser radiation and is transparent to incoming radiation.~~

5.~~6.~~ Laser illumination unit (10) according to one of the preceding claims,

wherein a laser beam module (16a, 16b) includes a controller (82) that is designed to control an actuator (80) of an adjustable telescope (78) and/or an actuator (84) of and adjustable deflection mirror (72).

~~7. Laser illumination unit (10) according to one of the preceding claims, further comprising:~~

~~multiple laser sources (32) that are designed to generate laser radiation and that are each connected by an optical fiber (34a, 34b) to a laser beam module (16a, 16b),~~

~~wherein the aiming unit (12) is designed to move the laser beam modules (16a, 16b) independently of the laser sources (32).~~

~~8. Laser illumination unit (10) according to one of the preceding claims, further comprising:~~

~~multiple first laser beam modules (16a) that are designed to emit first laser radiation (60) of a first wavelength,~~

~~a second laser beam module (16b) that is designed to emit second laser radiation (86) of a second wavelength and focus the radiation on a target point,~~

~~wherein the first laser beam modules (16a) are designed to detect the second laser radiation (86) by means of a detector (90),~~

~~wherein the first laser beam modules (16a) include an adjustable optical element (63) that aims the incoming second laser radiation (86) at the detector (90) and simultaneously aims the first laser radiation (60) at the target point.~~

6.~~9.~~ Laser illumination unit (10) according to Claim ~~8~~ 1,

wherein the first laser radiation (60) is able to process the target object.

7.~~10.~~ Laser illumination unit (10) according to Claims ~~8 or 9~~ 1 or 6,

wherein the second laser beam module (16b) is designed to detect an illumination beam (92) by means of a detector (94),

wherein the second laser beam module (16b) includes an adjustable optical element (63) that aims the incoming illumination radiation (92) at the detector (94) and simultaneously aims the emitted second laser radiation (86) at the target point.

8.~~11.~~ Laser illumination unit (10) according to one of the preceding claims,

wherein the optical element (63) of the laser beam modules (16a, 16b) are of identical constructive design.

9.~~12.~~ Laser illumination unit (10) according to one of the preceding claims, further comprising:

a target illumination laser module (16c) rigidly attached to the laser beam modules (16a, 16b), which target illumination laser module includes an illumination source (96) to generate illumination radiation (92) and a telescope (78) to focus the illumination radiation.

10.~~13.~~ Laser illumination unit (10) according to one of the preceding claims, further comprising:

a camera module (16d) that is rigidly attached to the laser beam modules, which

camera module includes a camera (98) and a telescope (78).

11.~~14.~~ Laser illumination unit (10) according to one of the preceding claims, wherein the laser beam modules (16a, 16b) each include a tubular housing (18), wherein the tubular housings (18) are combined to form a bundle that can be moved by the aiming unit (12).

~~15. Method for illuminating a target object with high-power laser radiation (60), which method comprises the steps:~~

~~detecting a target point of the target object by means of a detector (94), wherein the detector (94) is designed to detect a wavelength that differs from a wavelength of target acquisition laser radiation (86),~~

~~aiming a target-marking laser beam (86) at the target point by means of the target-marking laser beam module (16b),~~

~~adjusting an optical element (63) of a processing laser beam module (16a) so that target-marking laser radiation (86) is aimed at a detector (90) of the processing laser beam module (16a), wherein the detector (90) is designed to detect a wavelength of the target-marking laser radiation (86),~~

~~illuminating the target point by means of a processing laser beam (60), wherein the processing laser beam (60) is aimed by the optical element (63) of the processing laser beam module (16a), which optical element also aims the target-marking laser radiation (86) at the detector (90) of the processing laser beam module (16a).~~