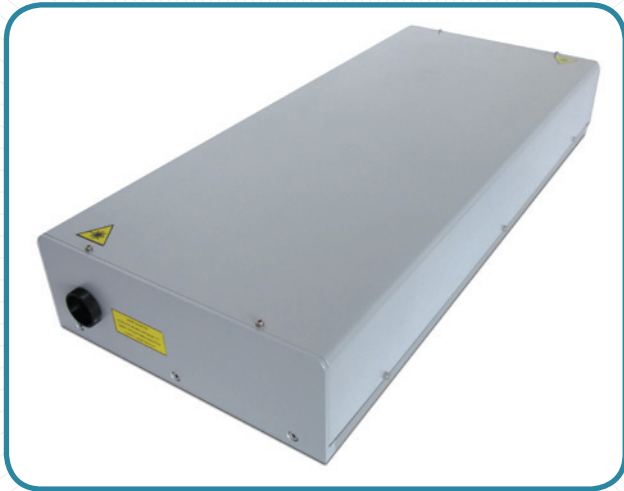




Workshop of Photonics



Beam Shaping Unit BSU-6000

General Description

Beam Shaping Unit is intended to be applied in laser systems for micromachining applications to create round or square laser spots with uniform intensity distribution.

BSU-6000 was developed by AdlOptica and technically implemented by Workshop of Photonics at Altechna R&D.

The BSU-6000 is developed to operate in combination with customer's scanning optics and is based on refractive field mapping beam shaper π Shaper.

Output of the π Shaper is imaged onto a workpiece by imaging optical system composed from an internal collimator and external lens, for example F-theta lens of the customer's equipment.

Examples of Beam Shaping

Final laser spot size and shape depend on customer's requirements

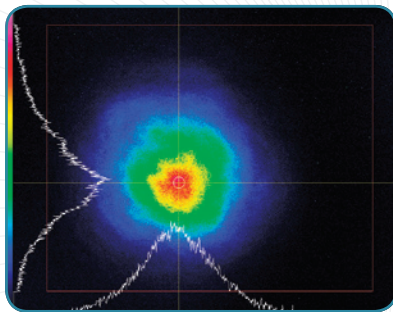


Figure 1. Example of beam shaping: input laser beam.

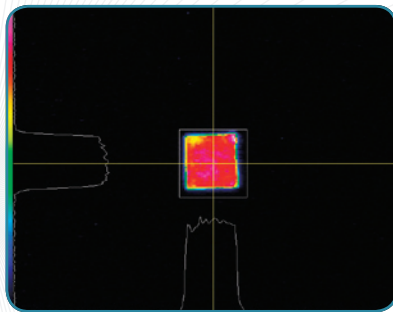


Figure 2. Example of beam shaping: final square spot.

Example of ablation of "blue" AR-coating (SiN) with ps laser

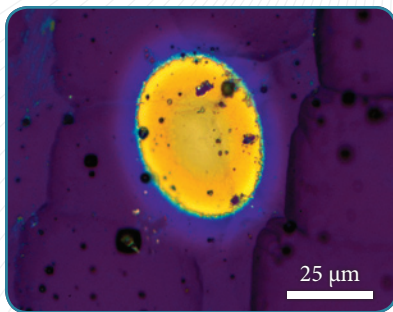


Figure 3. Focused TEM_{00} beam, essential HAZ, elliptic spot.

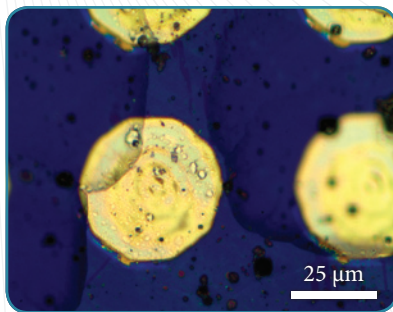


Figure 4. With using BSU-6000, almost no HAZ, round spot shape.

Requirements for the laser and optical scheme

The optical scheme, Fig. 5, with all explanations represents requirements that must be met before the unit installation.

Requirements for the Customer's Laser

Wavelength	257-2050 nm
Average power	up to 200 W CW
Pulse duration	ns, ps, fs
Mode structure	TEM_{00} or multimode
Intensity distribution	Gaussian or similar

Optics

Input beam diameter	6.3 – 6.4 mm
Optical axis height (from bottom)	50 mm
Focal length of internal collimator	6000 mm
Beam shaper model	π Shaper 6_6 (unit type dependent)
Spot shape	Depends on aperture shape
Spot size	- depends on magnification of the composed imaging system being defined as ratio of focal lengths of F-theta lens and internal collimator, - variable in case of Iris diaphragm

Mechanics

Dimensions (LxWxH)	585x251x97 mm
Input aperture diameter	20 mm
Output aperture diameter	20 mm
Weight	< 6 kg
Aperture placement	see figures 2, 3
Mounting points	see figures 2, 3

Requirements for the Customer's Scanner

Input aperture diameter	≥ 14 mm
Distance from BSU-6000	< 500 mm
Focal length of F-theta lens	60, 100 mm

Optical scheme of the Beam Shaping Unit (BSU)

For easier installation the optical path should be prepared similar as in Figure 5. Distance between M' mirrors has to be 170 mm. Mirrors M' will be removed during the installation and replaced with the BSU.

Center of the input aperture is located 36.5 mm from the left side, and output aperture is located 44.5 mm from the right side, height of the beam should be 50 mm.

Distance from the installed unit to galvano scanner ($c_1 + c_2 + c_3$) should not exceed 500 mm.

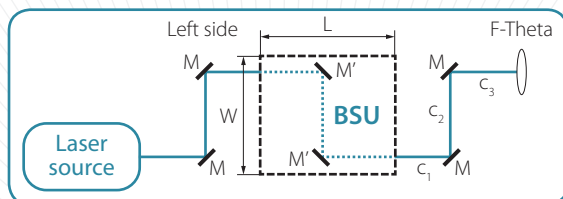


Figure 5. Principal optical scheme of BSU installation

Drawings of the BSU-6000

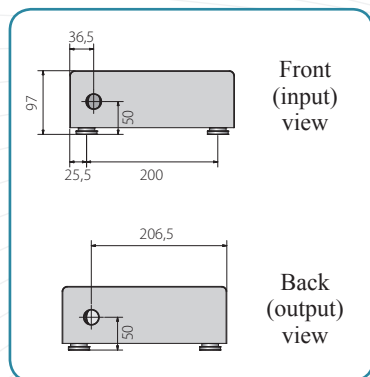


Figure 6. Front and back side view

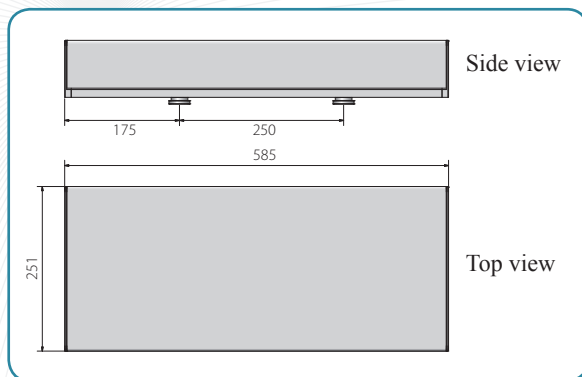


Figure 7. Side and top view

All dimensions are in millimeters.

The unit will be installed and adjusted by an engineer from WOP. Any additional requirements from the customer should be noted as early as possible.

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