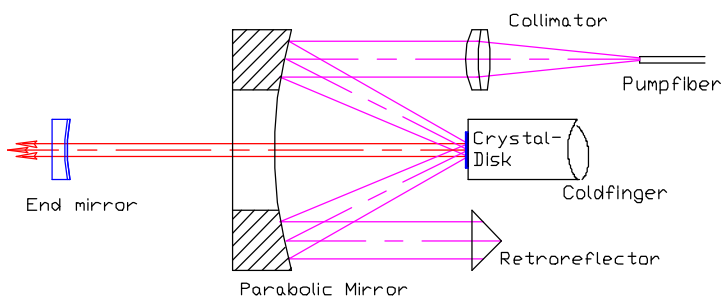


Thin disk laser *VariDisk*

BECK LASER

Beck Lasertechnik presents a new type of laser with the disk-laser *VariDisk*. The output power varies – depending on the model – between 10 and 50 W. In all power ranges a very good beam quality is maintained.

The principle of the Disk Laser is based upon the use of a thin crystal disk of Yb:YAG as active material which is optically pumped with a fiber-coupled laser diode. The thickness of the crystal disk ranges from 0,15 to 0,25 mm. It is placed on a copper cooling finger and is axially irradiated with the pumping light. The back of the disk is provided with a reflecting layer, that maximally reflects the pumping light as well as the laser emission. Because the very thin crystal just absorbs only a small part of the pump light, it has to be made sure that the not absorbed and reflected part is focussed again onto the crystal. Therefore a pump

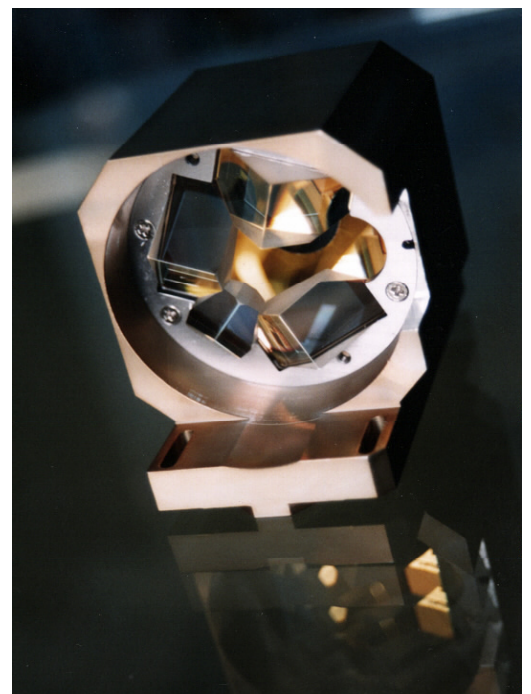


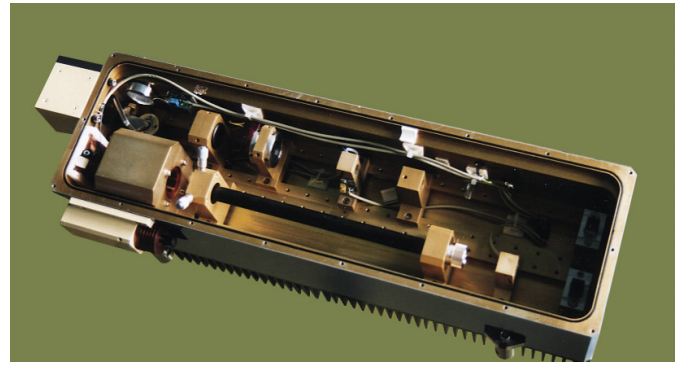
light concentrator is used which consists of a parabolic mirror and an array of totally reflecting prisms. So far, devices with 8- and 16-fold pump light passage have been realised. The good beam quality of the Disk Laser ($M^2 = 1,0 - 1,2$) and the good pump efficiency (50%) result from the optimal cooling of the active material. The dissipated heat is axially conducted to the cooling finger. Thus the formation of a thermal lens can be almost totally avoided. In rod lasers the radial heat flow leads to a distortion of the resonator with a corresponding deterioration of the beam profile. In the future the number pump light passages will be increased to 24 or 32. Thereby the crystal thickness can be further reduced, the efficiency can be improved and the beam quality can be increased.

Typical applications of the Yb:YAG-Disk Laser of BeckLASER are indicated, where output powers of 10-50 W (potentially until 100 W) are needed with optimal ability to be focussed to a very small spot. With external beam modulation the *VariDisk* will be applied in the printing industry for the *engraving of printing cylinders* or *direct digital printing*. With internal modulation (Q-switching), the application sector *marking and labelling* as well as the *precision cutting* of materials in the thickness range until appr. 0,2 mm is accessible. Future applications in the high precision processing can be realised by the operation of the laser in the ultra short pulse regime (femto seconds). In this operating mode adverse thermal effects for the material to be processed can be avoided to a large extent and the precision of the material removal can be greatly improved.

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Prism-array for 16-fold passage of pump light





20-W-Disk-Laser for the engraving of printing rollers

Specifications of the Disk Laser from:



Active material	: Yb:YAG
Wavelength	: 1.030 nm
Output power, CW	: 10 W, 20 W, 30 W or 50 W
Beam quality	: $M^2 < 1,2$
Stability of output	: $< \pm 1\%$
Pulse length with Q-switch	: 300 ns
Repetition rate	: 5-6 kHz max.
Pulse energy	: 1,5 mJ
Pump source	: fiber coupled laser diode
Pump wavelength	: 940 nm
Cooling	: thermo-electric, forced air or water
Dimensions, Laser head	: 500 x 150 x 110 [mm], 700 x 150 x 110 [mm]
Dimensions, Operating unit	: 19" x 3HU x 420 mm, 19" x 4HU x 420 mm
Control	: PC or Micro-controller
Connections	: CAN-Bus, RS232, Analog 0-10VDC
Options	: single frequency operation ultra short pulse operation (planned) higher harmonics (planned)