
ROFIN-SINAR

Slab Laser Technology



Diffusion-cooled CO₂ Slab Laser



ROFIN DC 02x



ROFIN DC 03x Compact

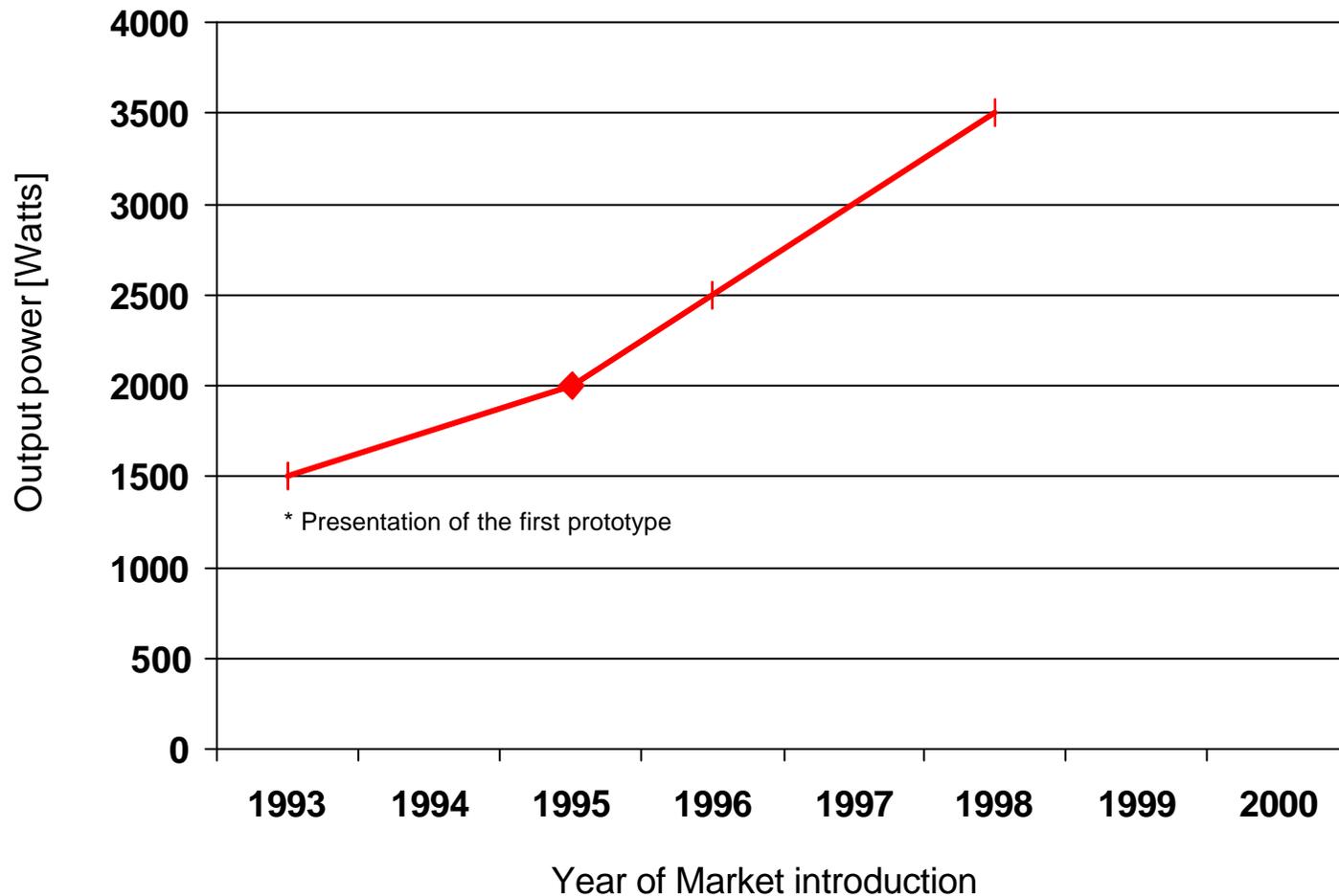
Slab Laser Specifications

| Model | DC010 | DC015 | DC020 | DC025 | DC030 | DC035 |
|--|------------------------------|-----------|-----------|------------------------------|------------|------------|
| Power (Watt) | 100 -1000 | 150 -1500 | 200 -2000 | 250 - 2500 | 300 - 3000 | 350 - 3500 |
| Stability | + / - 2 % | | | | | |
| Beam diam. | < 25 mm at 12 meter distance | | | < 30 mm at 12 meter distance | | |
| K-Factor | > 0.8 | | | | | |
| Pointing stability | ≤ 0.15 mrad | | | | | |
| Pulsing | up to 5 kHz | | | | | |
| Power consumption (max.) | 18 kWatt | 24 kWatt | 28 kWatt | 35 kWatt | 45 kWatt | 50 kWatt |
| Power consumption (stand by) | 2.5 kWatt | | | | | |
| Gas consumption | < 0.3 NI/hour | | | | | |
| Gas cylinder capacity | 1500 NI | | | | | |
| Running costs incl. chiller (50% HV on, 0.21 DM/kWh, 3 shifts) | DM/h 2.95 | DM/h 3.69 | DM/h 4.32 | DM/h 5.11 | DM/h 6.36 | DM/h 6.88 |

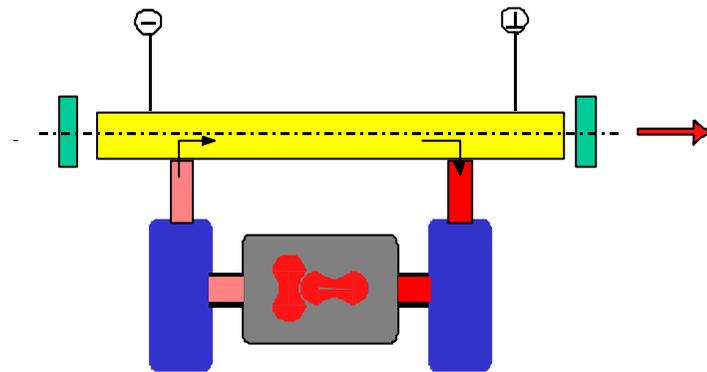
Diffusion-cooled CO₂ Slab laser

ROFIN DC Series

Improvements of output power of CO₂ Slab laser

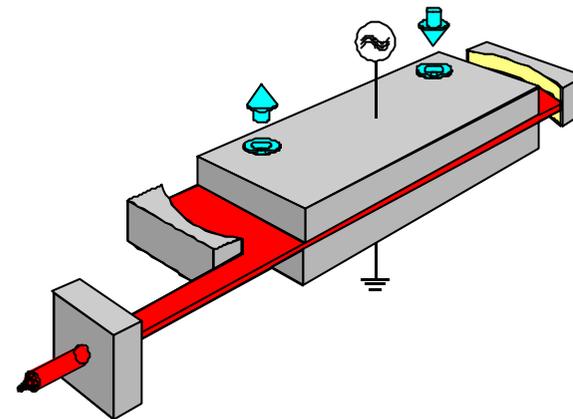


CO_2 laser designs



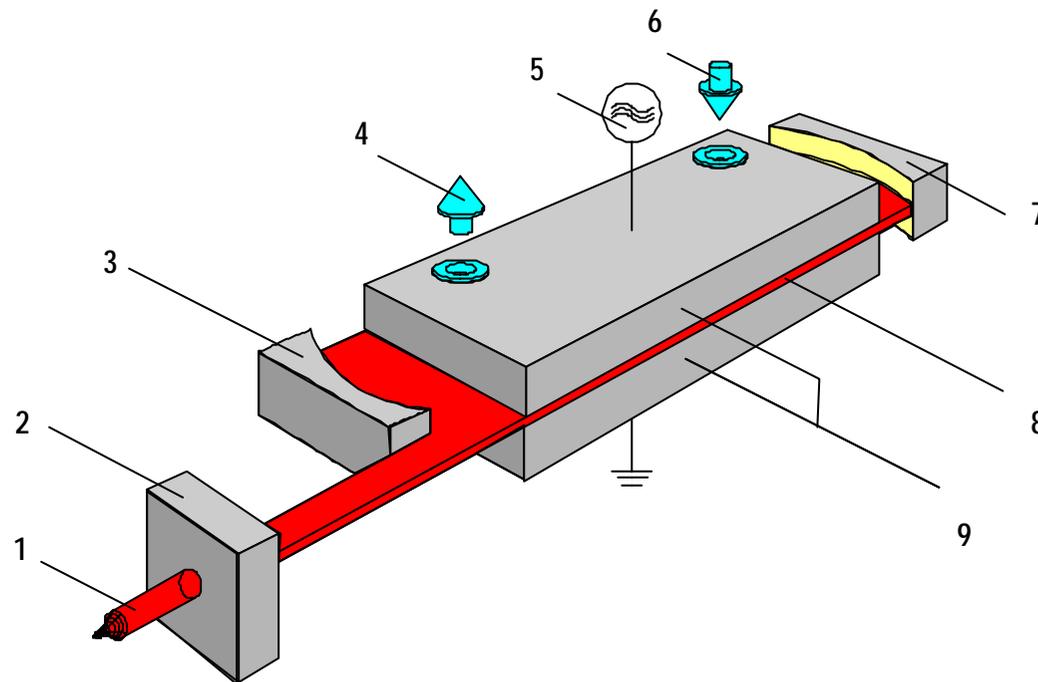
Fast Axial Flow

Diffusion-cooled
Slab



Diffusion-cooled CO₂ Slab laser

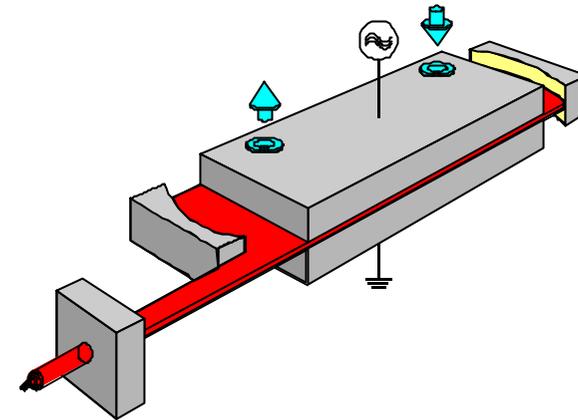
Resonator principle



1. Laser beam
2. Beam shaping
3. Output mirror
4. Cooling water
5. RF-excitation
6. Cooling water
7. Rear mirror
8. Laser gas discharge
9. RF-electrodes

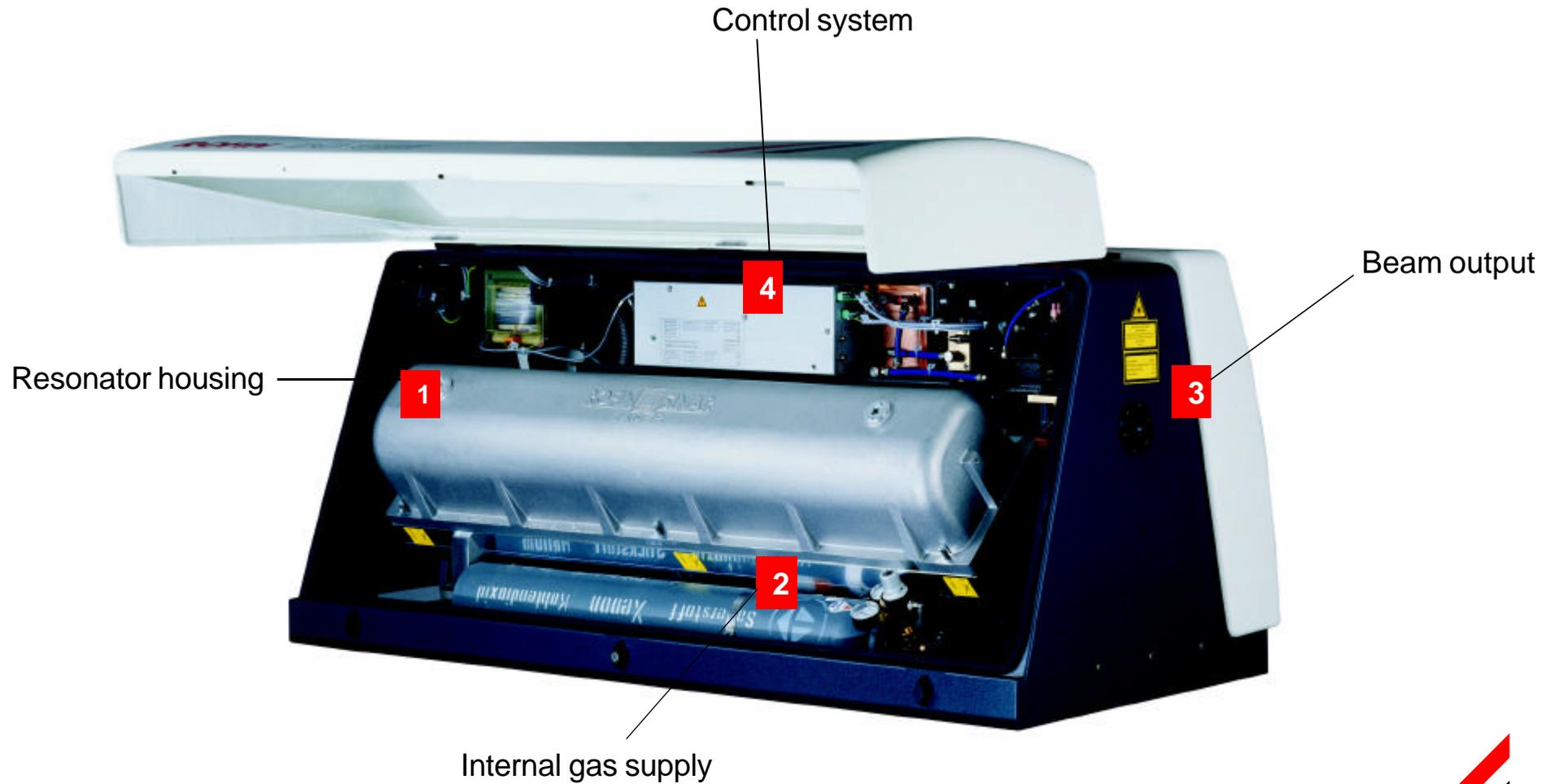
Advantages of Slab-Technology

- ⇒ Compact
- ⇒ Excellent mode structure (K-factor 0.8 or better)
- ⇒ Low service requirements/low cost of ownership
 - * No moving parts
 - * Uncoated copper resonator optics
 - * Diamond window as the only transmissive optic
- ⇒ No gas installation
- ⇒ Very low gas consumption (gas bottle change: once a year)
- ⇒ Low weight, laser head can be moved
- ⇒ Potential for eliminating the external beam telescope



Diffusion-cooled CO₂ Slab laser

Components



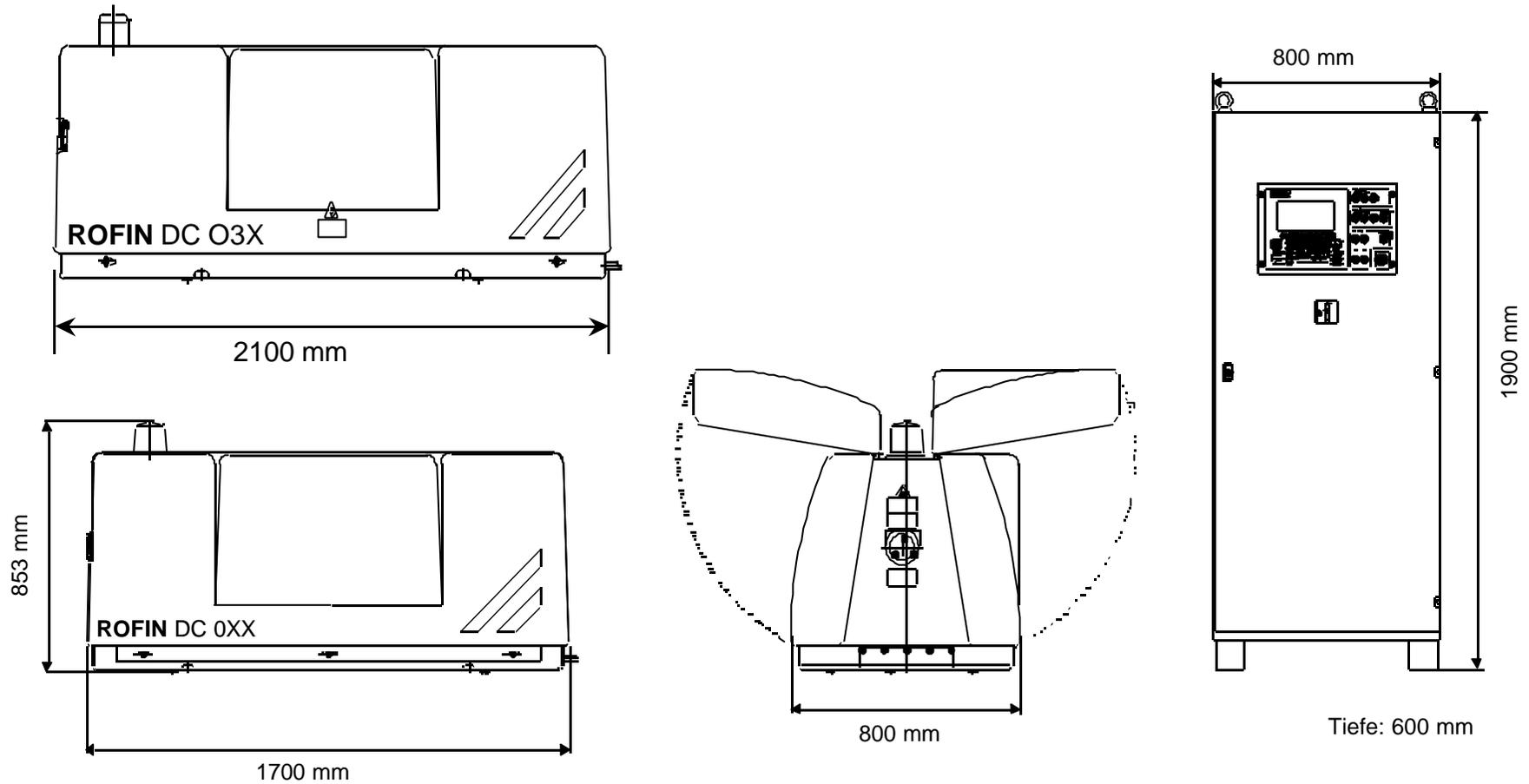
Advantages of diffusion-cooled CO₂ Slab Lasers

- very compact and nearly wear-free construction
- high beam quality (K-Faktor > 0,8)
- no gas heat exchanger required
- low optical loss
- very high thermal stability
- low gas consumption, no external gas cylinders necessary
- no gas flow and therefore no contamination of the resonator optics
- low maintenance



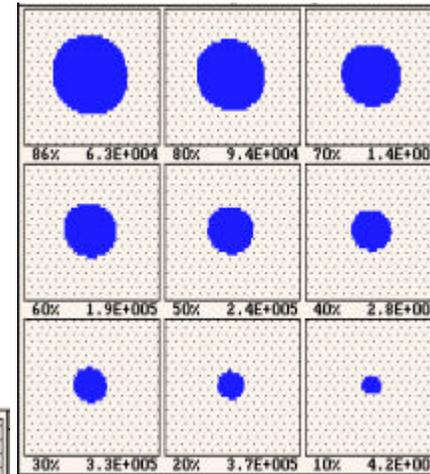
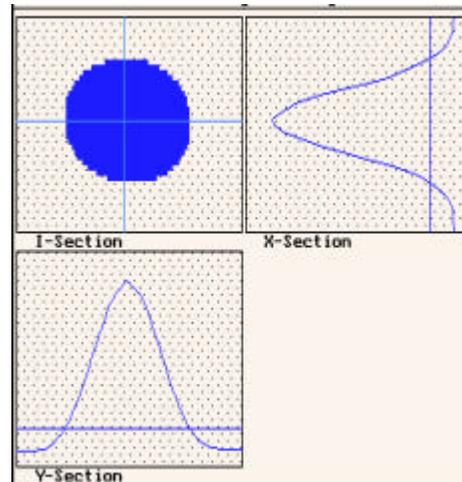
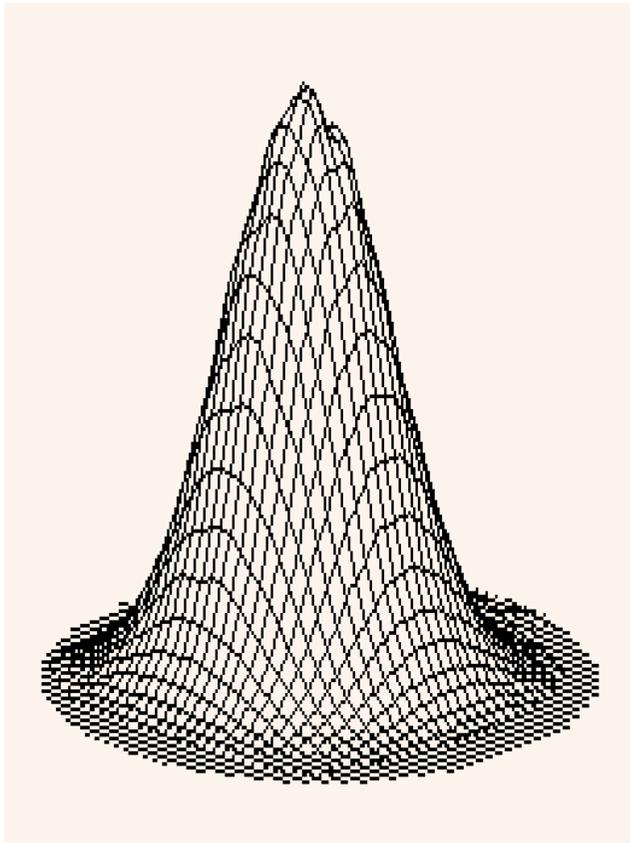
Diffusion-cooled CO₂ Slab laser

ROFIN DC Series



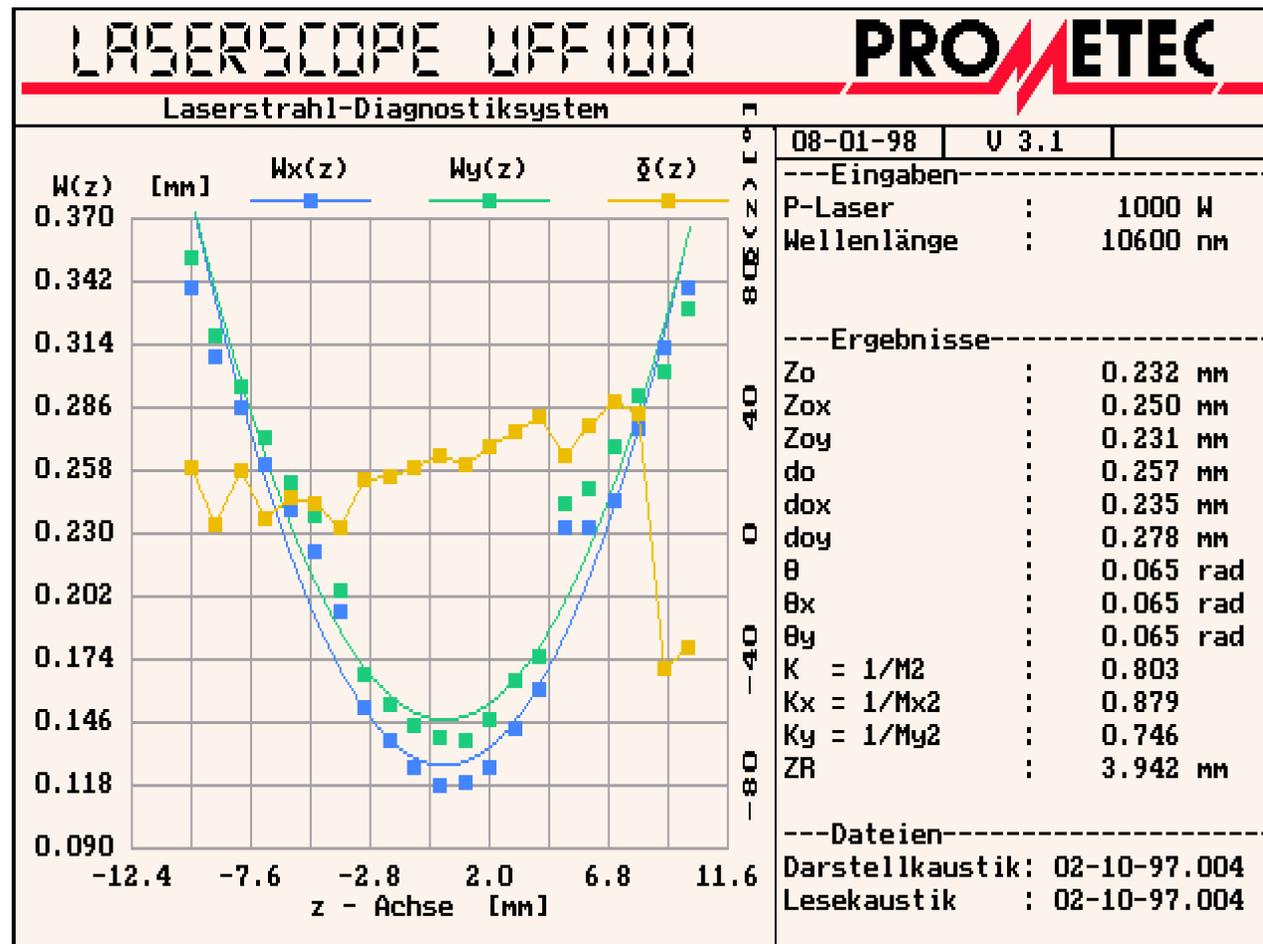
Power distribution

ROFIN DC 025



Power distribution

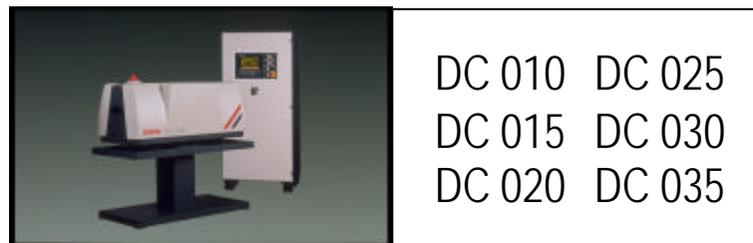
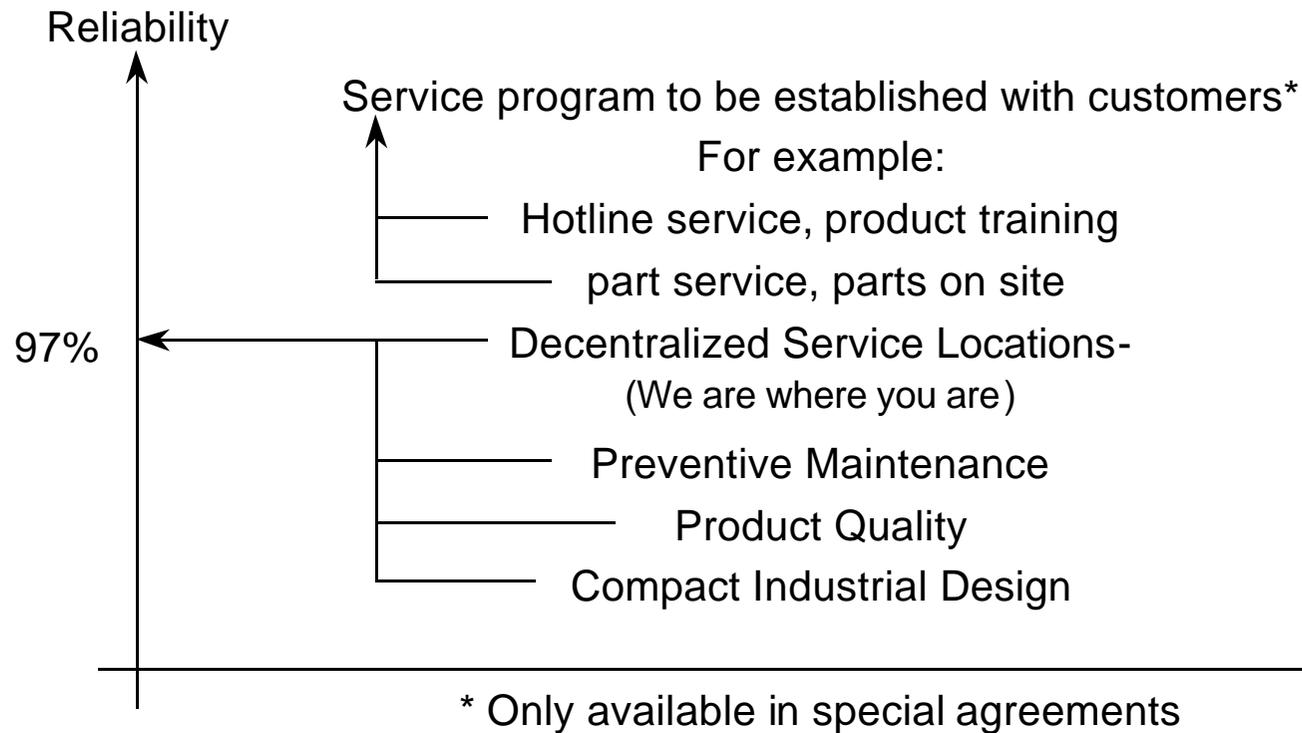
ROFIN DC 025



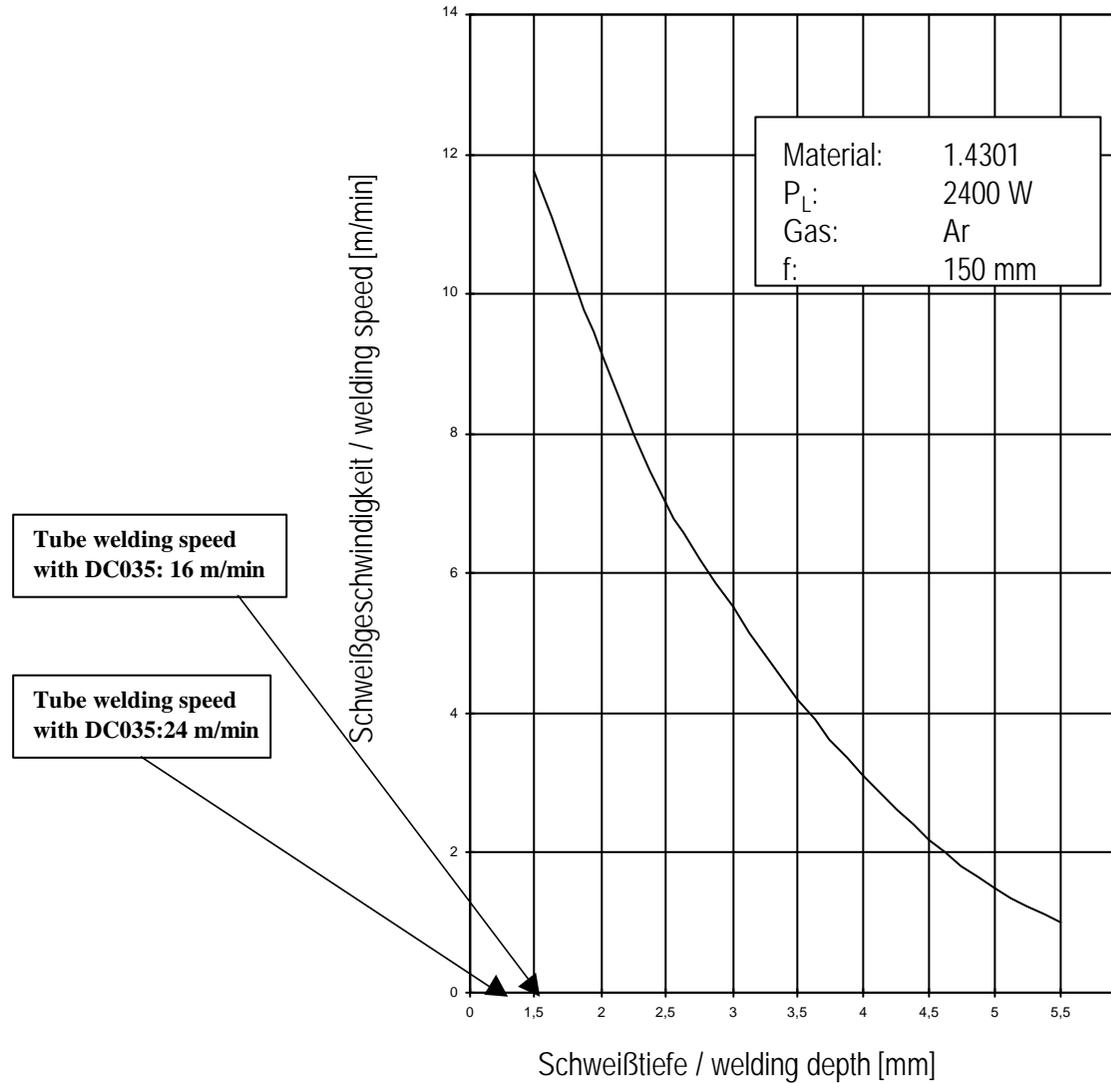
ROFIN-SINAR Slab Laser Production



CO₂ Slab laser reliability

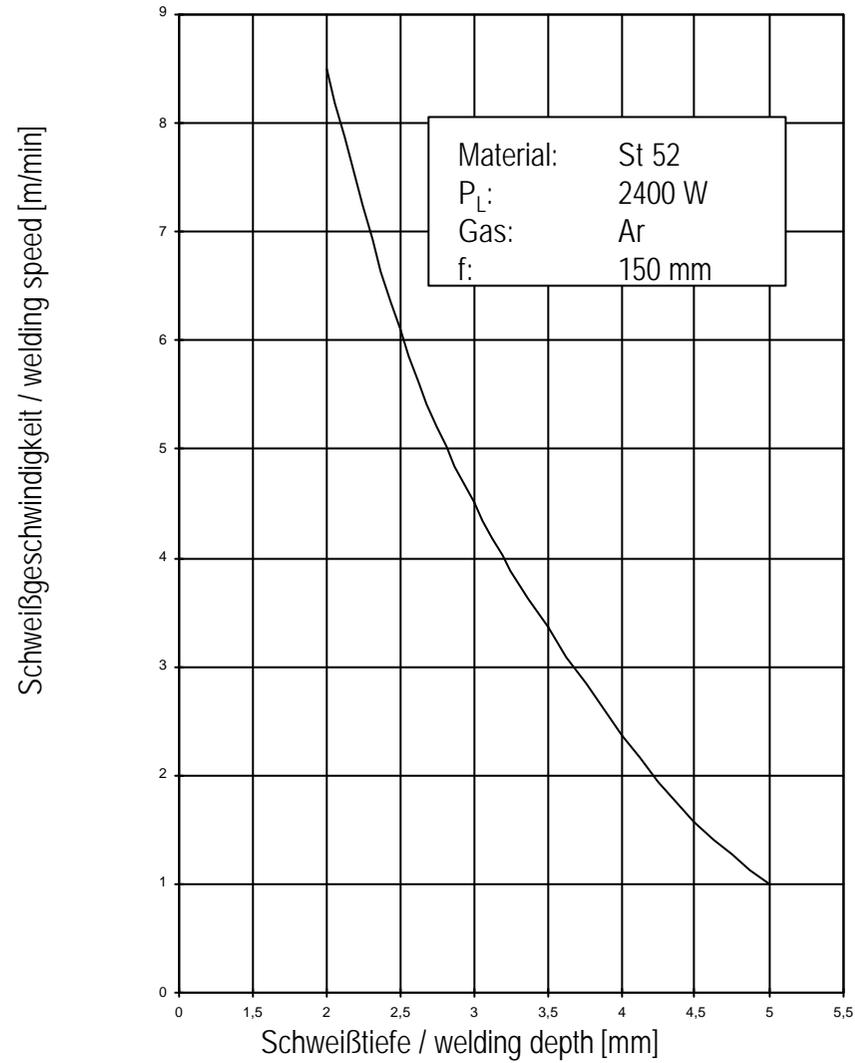


Welding of stainless steel, DC025 laser



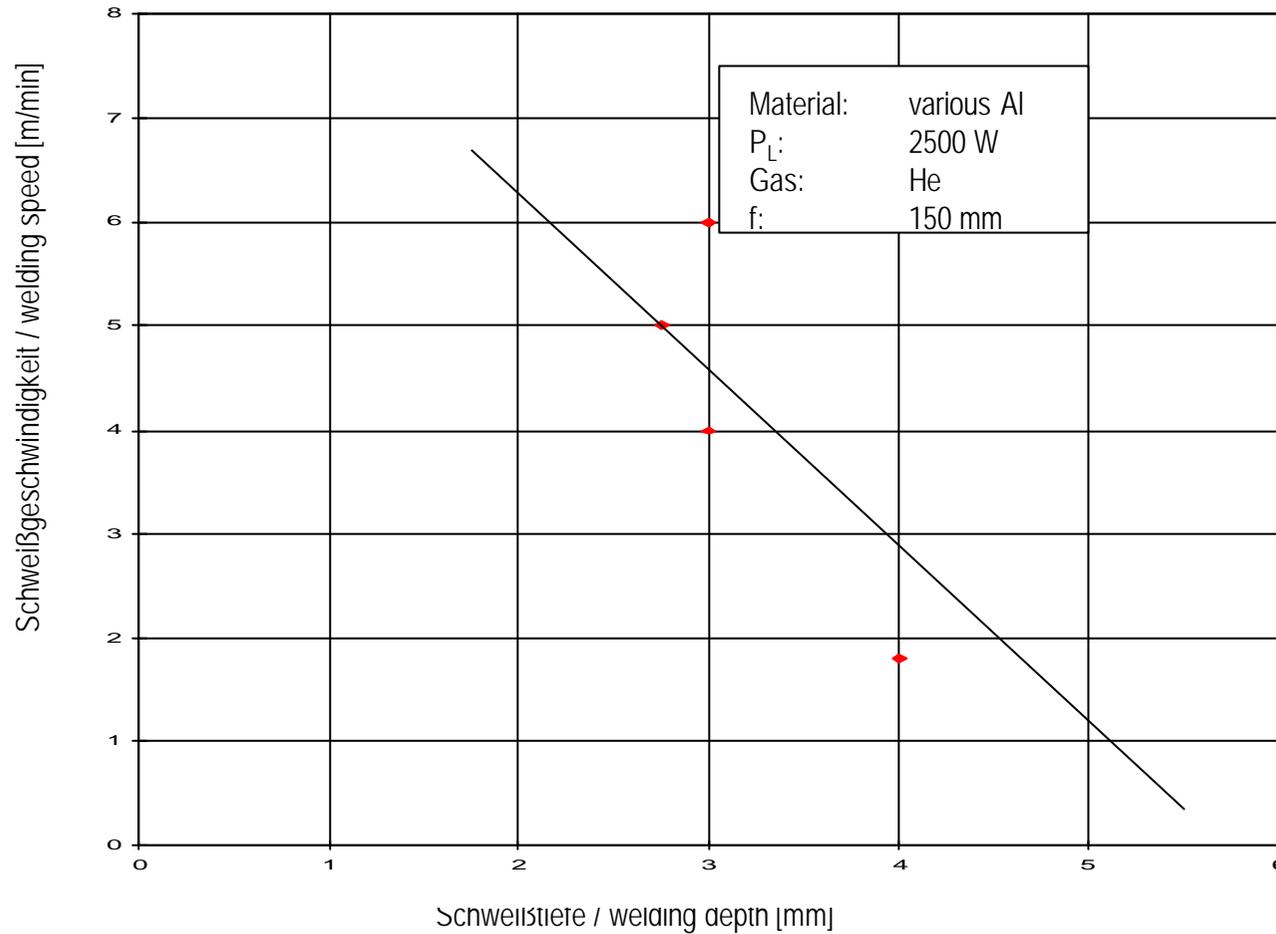
Diese Werte basieren auf Versuchen, die mit der bei ROFIN-SINAR installierten Systemtechnik durchgeführt wurden. Bei Verwendung kundenspezifischer Systemtechnik können die Werte abweichen.

Welding of mild steel, DC025 SLAB laser



Diese Werte basieren auf Versuchen, die mit der bei ROFIN-SINAR installierten Systemtechnik durchgeführt wurden. Bei Verwendung kundenspezifischer Systemtechnik können die Werte abweichen.

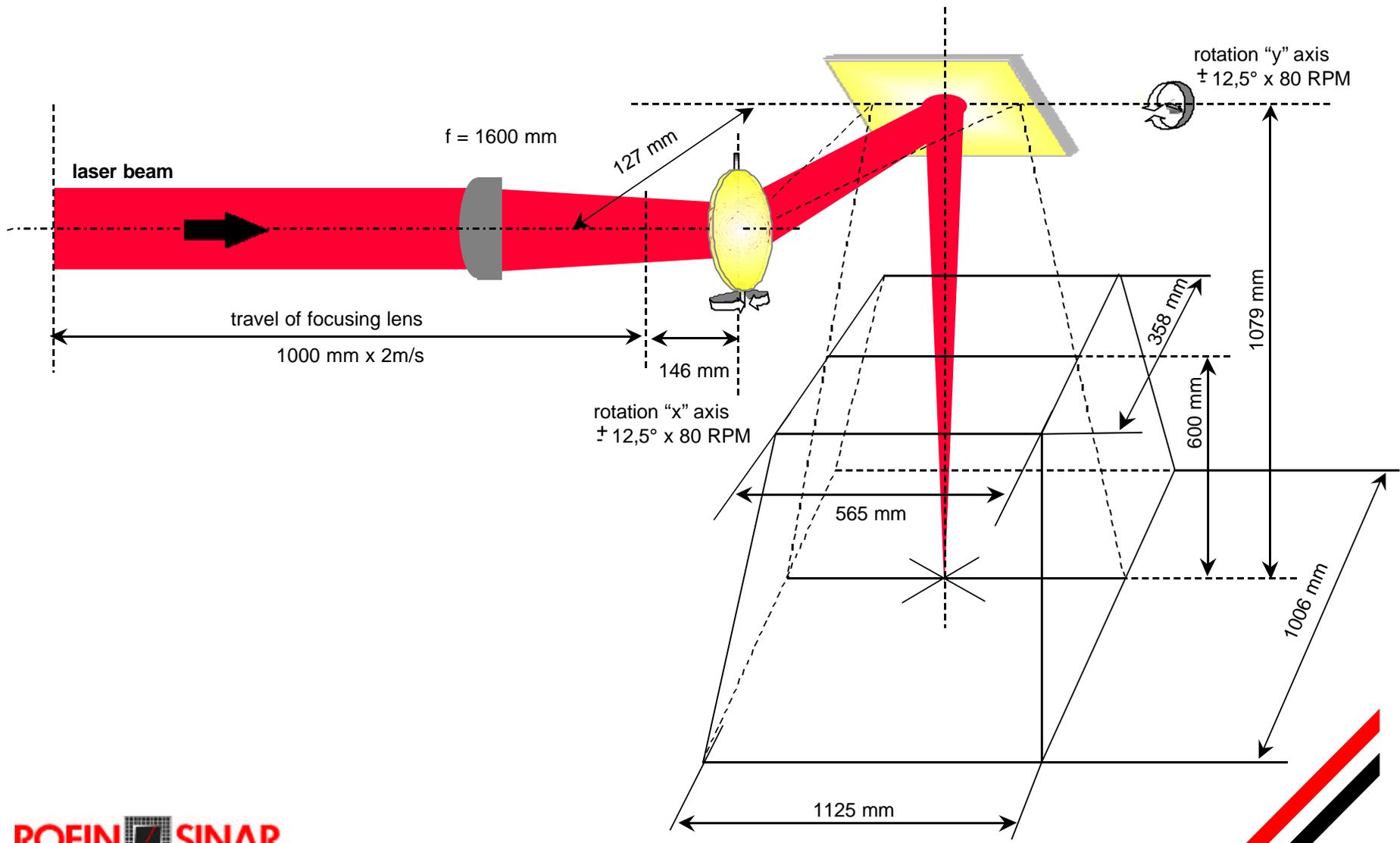
Welding of aluminum, DC025 SLAB laser



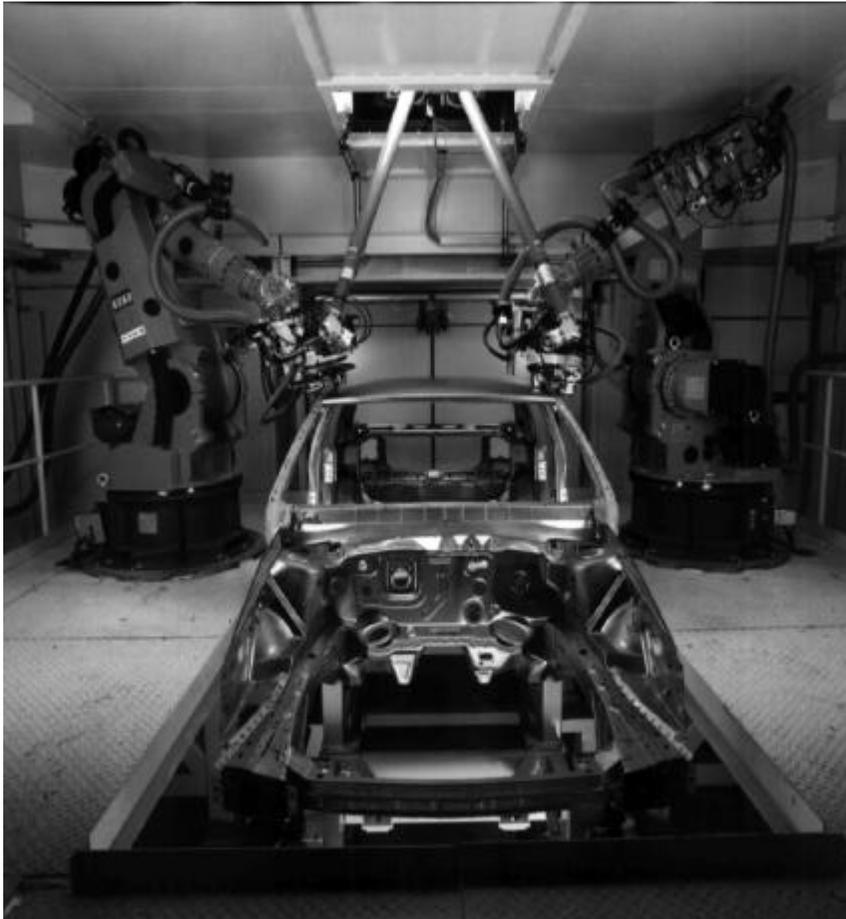
Diese Werte basieren auf Versuchen, die mit der bei ROFIN-SINAR installierten Systemtechnik durchgeführt wurden. Bei Verwendung kundenspezifischer Systemtechnik können die Werte abweichen.

These values base on trials taken with application units installed at ROFIN-SINAR. Customer results may differ depending on components installed.

Principle of a Remote Welding System



Laser roof welding of a Volvo car body

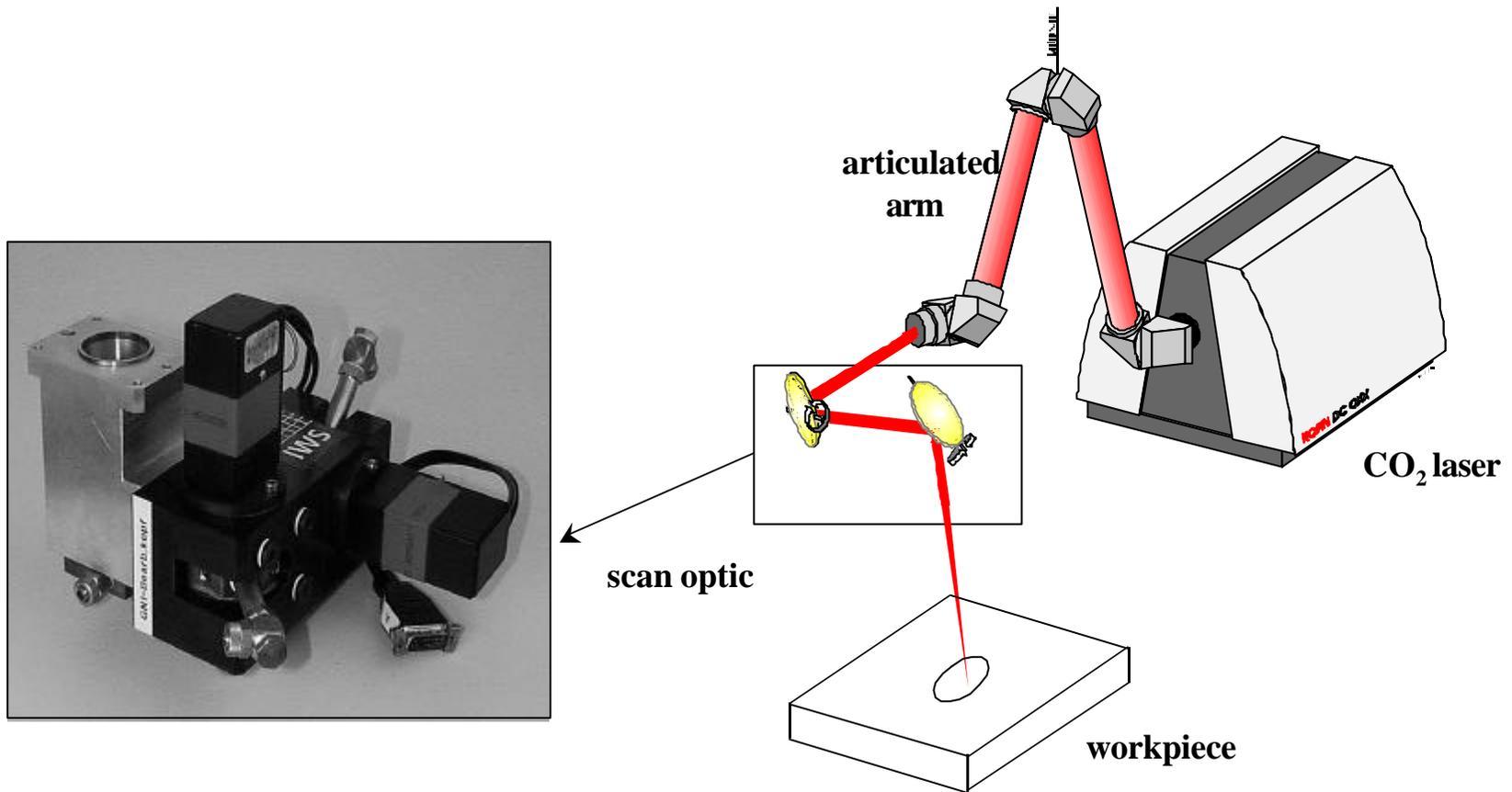


(source: Kuka Roboter GmbH)

Advantages:

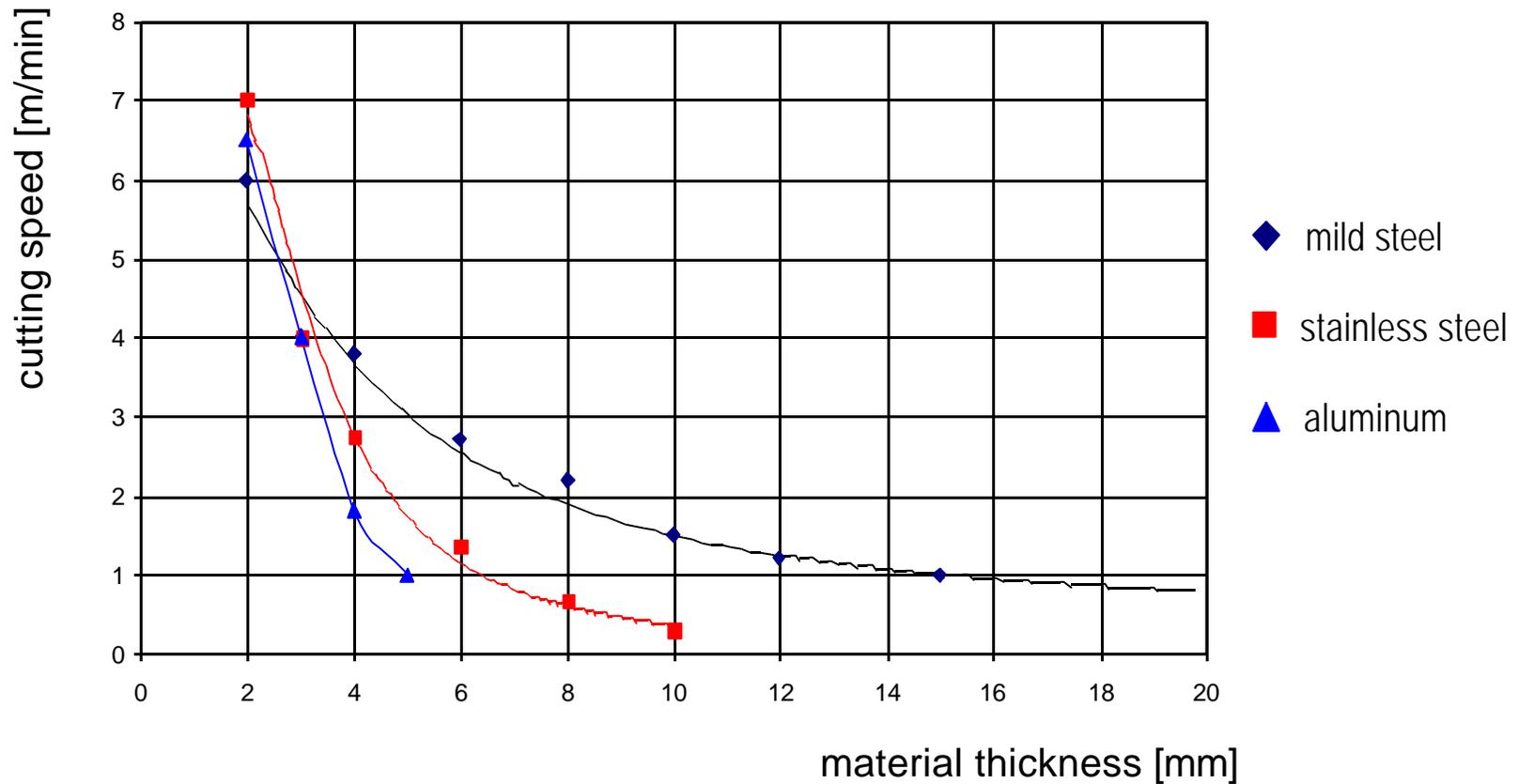
- **necessity of access from one side only**
- **new design and construction opportunities**
- **reduced joint deformation**
- **high static strength and fatigue strength**
- **closer, more consistent body tolerances**
- **tighter seam-welded joints**

Scanner welding processor head



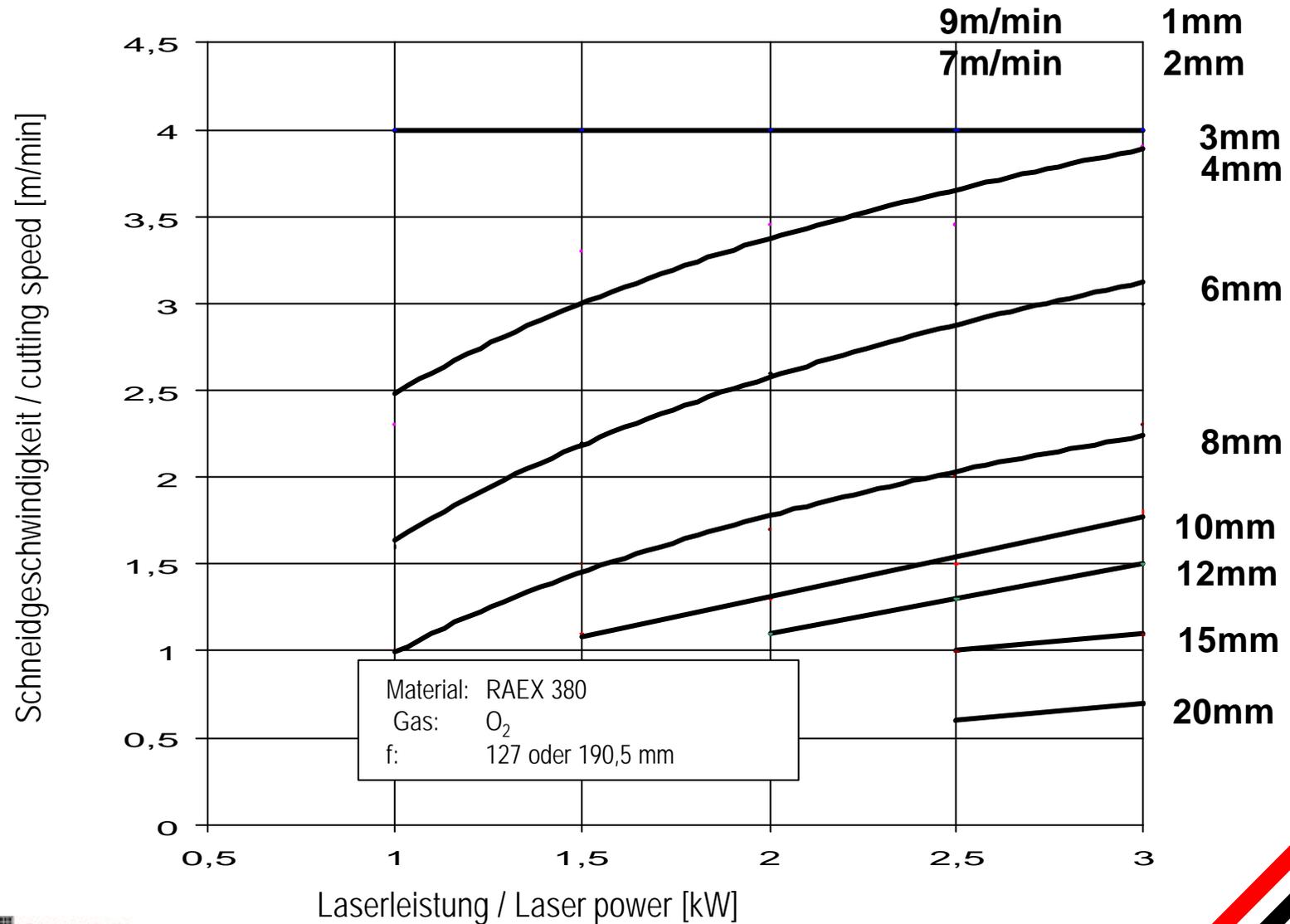
DC 025 Cutting Parameters

Moving optics system; 7.5 inch focal length



1 mm mild and stainless steel, high pressure: 18 meters/min

Cutting of mild steel DC 010 - 030



Cutting of stainless steel DC 010 - 030

