



Cost Comparison: Fiber Laser vs. Nd:YAG Laser – Low Power Marking & Cutting

| | 20 Watt TEM₀₀ Fiber Laser | 50-100 Watt Multimode (Lamp or Diode) 20 Watt TEM₀₀ Diode Nd:YAG Laser |
|---|--|--|
| Laser System • Laser and power supplies • Computer and software • Q-switch RF driver • Scan head and control cards | \$47,500 | \$55,000 - \$65,000 |
| Reliability MTBF (Mean Time Between Failure) | 50,000 to 100,000 Hours | 500 to 1,000 Hours (Lamp-pumped) 10,000 to 20,000 Hours (Diode-pumped) |
| Consumables | \$0 Note: Fiber Laser modules can be repaired – average repair costs range from \$1,000 to \$5,000 USD | \$2,000 - \$15,000 (Lamps - \$100 each) (Diode packs - \$5,000 to \$12,000 each) |
| Power Consumption (Two eight hour shifts running 365 days at \$.04 kW) | \$39.71 yearly 170 W an hour | \$1,401.60 yearly 6 kw an hour |
| Maintenance | • No maintenance • No consumables • No cleaning or aligning of mirrors or beam path • No filters (Chiller) Cost: \$0.00 | • Optical path requires often adjustments to optimize power output • Periodic replacement of flash lamps, diode packs and solid state crystals • Extremely temperamental diode packs often require factory-trained technicians–takes several hours in many cases • Cleaning, replacement and aligning of laser mirrors Cost: \$1,500 - \$10,000 (Individual results may vary, diode pumped systems require significant training for replacement procedure) |
| Power Efficiency | Up to 50% | 2-3% (0.2% with 3x Nd:YAG) |
| Beam Quality | Round & concentric Near M2=1 (<1.05) | Not symmetric on both axes |
| Spot Size | Due to the excellent M2, spot size is 50% smaller than Nd: YAG. Requires less power for the same result in comparison with the Nd:YAG system. | Significantly bigger than the Fiber Laser. Requires more lasing power to achieve the same result. |
| Optical Path/Beam Path | Flexible Cable (up to 50m) | Mirrors and optical path Loss of beam quality and significant power drop-off with fiber delivery scan head system |
| Cooling | Air cooled | De-ionized (DI) water |
| Size | 19" rack mount unit | Large footprint |
| Chiller | No Chiller necessary up to 200 watt Q-switched (pulsed) or CW. Cost: \$0 | 30x watt to laser output power Cost: \$5,000 - \$8,000 (Replacement required every 1 – 2 yrs) |
| Total Cost of Ownership First Year | \$47,539.71 | \$99,400.00 |
| You Save First Year | \$51,860.29 | |