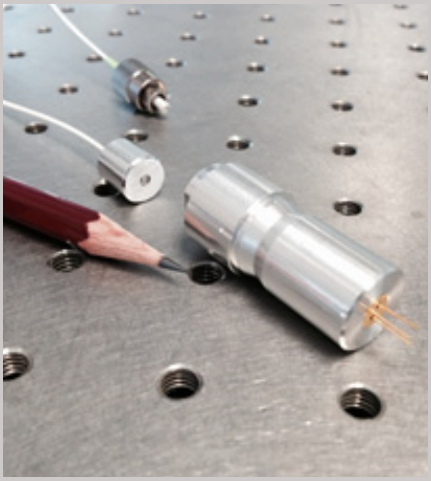
Case Study

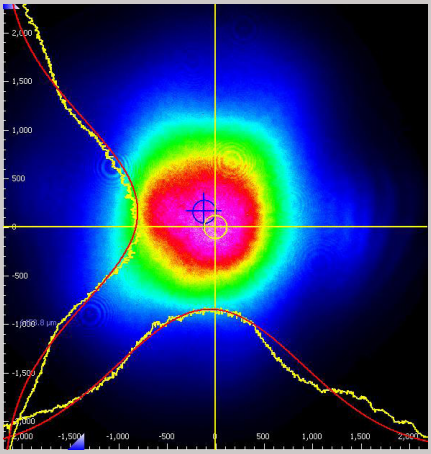
Industry: Computer-to Plate Printing

Product: Custom Fiber Coupled Laser Module Array

Description: Water-cooled, 32 channel, 405nm fiber coupled laser module array



Prototype laser module



Photodetector image of Gaussian beam profile

ProPhotonix designs and manufactures custom laser modules and arrays used in Computer-to-Plate (CtP) systems. With this technology, an image created in a desktop publishing application is output directly to a printing plate for use in a printing press for volume printing. A one dimensional (1D) array of laser beam spots are raster scanned across the plate to create the desired pattern.

Requirement

A Customer required a 1D array of 10µm diameter spots with a pitch of 127um. Each spot was required to deliver at least 180mW of output power at the plate, at 405nm wavelength. The customer required a robust, reliable and field serviceable system.

Solution

ProPhotonix' designed a 32-channel 405nm fiber-coupled laser diode module array that is scalable from one to thousands of modules. Each of the laser modules is connected to a fiber v-groove array assembly that forms a highly accurate 1D line of 10µm spots.

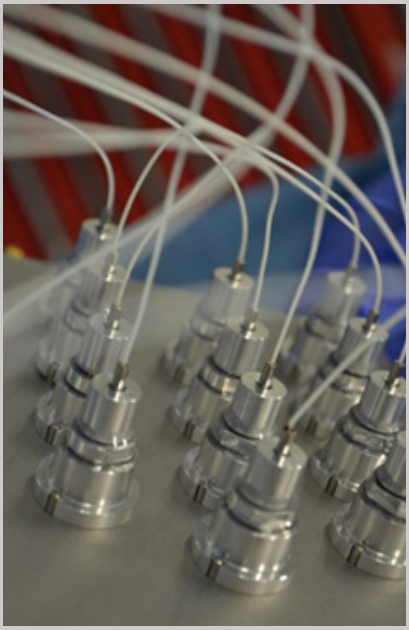
Optical Performance

To achieve the output power required for this project, a multimodal laser diode wais utilized. The laser photons in the fiber cause a spatial mode mix resulting in a uniform beam profile and high output power of >180mW to the plate. To ensure accurate coupling into the optical fiber, expert design and precision machining of the laser module parts was necessary. Custom designed optical fiber provides transmission in the near-UV and high precision lenses minimize optical losses.

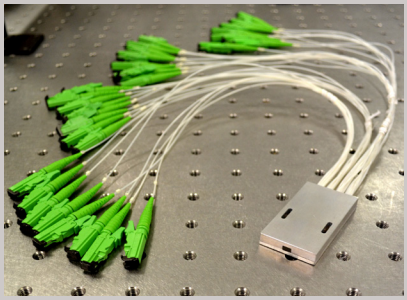
Reliable

Due to the higher power densities experienced at the fiber interface, the fiber can burn resulting in degradation of the optical signal. Appending a glass end-cap to the fiber interface reduces the power density at the fiber without reducing the optical efficiency while removing the risk of damage to the fiber. A custom ferrule and chassis is attached to the fiber for further protection. The

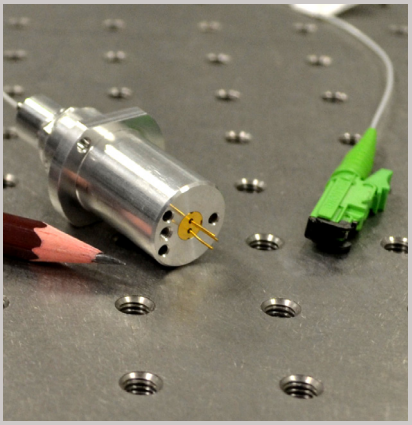
PRO PHOTONIX



Prototype laser modules in heat sink array



V-groove array



Alpha laser modules

For more information visit
www.prophotonix.com
or contact
sales@prophotonix.com

laser modules are temperature controlled in a custom designed water-cooled heat sink to ensure that the laser diodes, located in the laser module housing, are maintained to within 1°C to maximize the laser modules lifetime.

Field Registrable

The array design allows for easy removal and field replacement of the fiber-coupled modules from the external electronic driver board. It is necessary to ensure the laser diode pins connect to their correct terminals on the electronic driver board and that there is no misalignment of modules in the heat sink. A combination of laser diode placement in a specific orientation within the laser module during manufacture and a custom designed registration system for each laser module is utilized.

Field Replaceable

The heat sink is designed to allow easy removal of the laser modules via a spring loaded quick-release mechanism. The laser modules can be disconnected from the v-groove array via low loss, IP68 connectors.

Robust

The compact form factor of the laser modules ensures the module's suitability for placement within OEM systems. The optical fiber is enclosed in an intubated loose tube to protect the fiber from vibrations, jarring, and physical knocks often occurring in industrial environments.

The v-groove assembly is placed within an aluminum alloy housing to provide environmental protection and limit strain on the optical fibers at the entry end of the v-groove array. The housing contains a glass window to allow light to exit the v-groove into the external environment with 100% transmission and 0% reflection of UV light.

Cost-effective

ProPhotonix has the ability to deliver cost-effective solutions; fast. Our relationships with laser diode suppliers coupled with our ability to manufacture parts in-house, allows us to deliver excellent value in custom solutions. Our laser module design bank, developed over our many years of experience, ensures that we can deliver designs quickly for your applications. ProPhotonix is ISO-certified and our production facilities and processes have been audited by some of the world's most demanding and leading manufacturers.

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