

Highlight

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Concept of a Fiber Laser system with 2 selectable wavelengths

PolyBright's main topic is to break new paths in the field of laser polymer welding using high-brilliance laser sources. Work package 2 covers the evaluation of laser concepts, and amongst others things the combination of two wavelengths in one device is advantageous for polymer welding.

A laser source that can provide both Erbium- and Thulium fiber lasers in one device could emit laser radiation adapted to polymer welding by mixing the two wavelengths of 1567 nm and 1964 nm, each at a separate power level.

Following components would be necessary:

1. One or more single mode Erbium fiber laser modules (1567 nm wavelength)
2. One or more single mode Thulium fiber laser modules (1940 nm wavelength)
3. Multiport combiner for combining both Erbium and Thulium single mode fibers
4. Multimode fiber transmitting the 1567/1940 nm wavelength mixture
5. Two separate power supplies for Erbium and Thulium fiber laser modules
6. Cabinet
7. Controller

Figure 1 : Industrial solution of a multi-mode fiber laser.

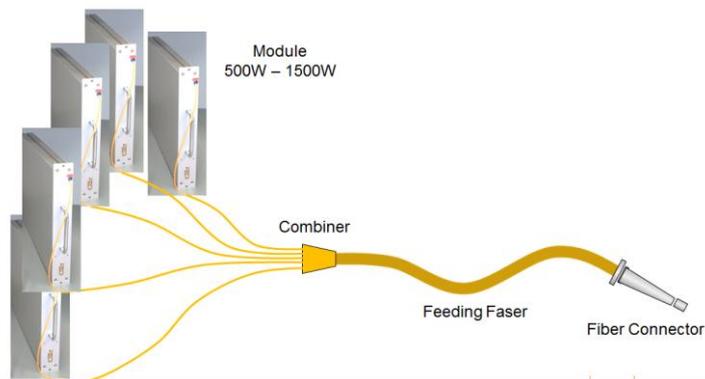


Figure 2: Concept of IPG's 1070 nm multi-mode fiber lasers, applicable as well for 1565nm and 1964nm.

IPG developed a multimode fiber laser concept, where several single mode fibers are bundled in a multiport fiber combiner. Exit of this combiner is a multimode feeding fiber (diameter 50 – 200 µm) that guides the amount of power of all leading-in modules.

Benefits for polymer welding applications are:

- Laser power and part of wavelength could be adjusted for different polymer absorbing behaviour to gain an optimal process result.
- The dominating wavelength could change during the welding process, in case a polymer absorbs differently at solid and liquid state.
- A mixture of Erbium and Thulium wavelengths could lead to more stable conditions during incoupling and welding process, in case a polymer absorbs laser radiation at both wavelengths.

Among current industrial known laser applications, the potential for a laser source with selectable wavelengths would be interesting for polymer welding application.

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