

January 20, 2012

Highlight

High power fiber laser source ELS-500 with adapted wavelength for polymer welding

The fact that most polymers possess high laser radiation absorptivity at longer wavelengths in the infra-red spectral range is well known. However, commercially available laser sources emitting at these wavelengths have not been available until recently. In order to extend the limits of polymer welding, laser producer IPG Laser GmbH, located in Burbach/Germany aims within the frame of the European POLYBRIGHT project to further develop such laser sources and to enhance their optical power output. After two years of the project a new laser source with an optical power of 500 W has been developed: an Erbium multimode fiber laser (ELS-500) emitting at 1567 nm.

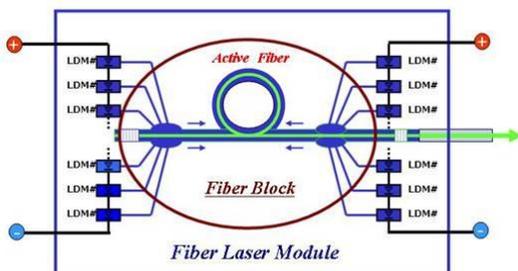


Figure 1:
Typical layout for a diode pumped fiber laser



Figure 2:
500 W Erbium fiber laser system ELS-500, emitting at $\lambda=1567\text{nm}$

The first two laser sources that have been developed for the European POLYBRIGHT project supplied 120 W of single mode output power at 1567 nm and 1940 nm. Those sources are currently in use to evaluate absorption behaviour of different polymers for additive-free welding applications.

If welding applications with 1567 nm approach to industrial use, more power and bigger spot sizes are needed in order to overcome demands for positioning accuracy. Furthermore, "top hat" beam profiles are wanted in order to get similar results on the spot size area during welding processes.

To achieve these demands, IPG Laser GmbH developed a new laser source called ELS-500. This source combines several single mode Erbium fiber lasers and feeds their outputs into a single 200 μm diameter multimode fiber.

The laser is ready since February 2012, will be sent to a POLYBRIGHT partner for polymer overlap welding tests, preferably using the TWIST configuration.



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