



Lasers in Manufacturing Conference 2021

Study of pointing stabilization unit for femtosecond fiber beam delivery system

Benoit Beaudou^{a,*}, Pierre Guay^a, Fetah Benabid^a, Ivan Gusachenko^b, Clément Jacquard^b, Gwenn Pallier^b, Guillaume Labroille^b

^a*GLOphotonics, France*

^b*Cailabs, France*

Abstract

Recent development of hollow-core inhibited coupling fibres paves the way to fibre beam delivery for femtosecond laser manufacturing applications. Nevertheless, reaching sufficient quality and reliability for such a functionality in industrial environment requires a laser-fiber coupling system immune to thermal and vibration fluctuations. As the microstructure hollow-core fiber damage threshold is dependent of beam pointing stability of the laser system, beam stabilization sub-system has to be implemented to insure stable operation. This study attempts to qualify two beam stabilisation systems. The first one is two piezo motors coupled with four quadrant detectors. The second one is Cailabs' all-optical mode-cleaner system based Multi-Plane Light Conversion (MPLC) technology. MPLC enables a high control of modes propagation: a misaligned beam is projected on an adapted mode basis and the unwanted energy is then dumped. To do such output fibre transmission efficiency and beam quality are investigated under controlled fluctuation of beam pointing.

Keywords: Fiber coupling; beam pointing

* Corresponding author.

E-mail address: benoitbeaudou@glophotonics.fr .