

LightTrans' Talk at Virtual WOST 2021

Virtual Product Optimization for Laser Material Processing Systems

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The consideration of a coupling between the thermal-mechanical and the optical domain in a multi-physical analysis is essential for an efficient product development of a laser material processing system. Thermal-mechanical simulations have been performed using FEM-algorithms while the optical modeling is done by connecting different specialized field solvers, such as the ones for graded-index media and optical surfaces. To accelerate the virtual product development of using mechanical and optical simulation software at the same time, the Robust Design Optimization approach is very promising. Optical designs can be explored thoroughly by means of sensitivity analysis. This includes the identification of relevant input parameters and the modelling of inputs vs. outputs to understand their dependencies and interactions. Based on a calibrated simulation model a design optimization was done in a very smart and efficient way in order to achieve the smallest possible focus shift on a lens system for a laser material processing system.

