

New possibilities for efficient laser surface treatment by diodepumped kW-class lasers

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Abstract

*The aim of the HiLASE project is to serve as a platform for development of new lasers based on thin disk laser amplifiers and cryogenically cooled multi-slab laser amplifiers as well as to build state of the art application laboratory. In this paper, applications related to surface treatments will be highlighted. Once is fully equipped the application laboratory will be open for any other advance investigations selected by scientific community or by industrial applications. Efficient application of lasers in the surface treatment of metals requires lasers with high power density and repetition rate over a big spot size [1]. A fully diodepumped 100 J cryogenically cooled Yb:YAG multislabs laser system with pulse duration of 2-10 ns, 10 Hz repetition rate and spot size of 51*51 mm, developed as a part of the HiLASE project, is expected to start a new era in the laser surface treatments. In this paper, we will shortly present the conceptual design of this laser system. Additionally, the beam delivery and a further experimental station for material processing, established around this laser, are also discussed. Beside equipment, the surface treatments also required knowledge related to establishment of laboratory experimental setup and procedures for the process quality characterization. While laser system for surface treatment in the Czech Republic is not finished yet, the cooperation with the institutes which are involved in this technology was established. Our strongest cooperation is with Centro Láser de la Universidad Politécnica de Madrid and Alma Mater University of Bologna. Regarding the process characterization close link is established with the Czech Technical University in Prague [2].*

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