

Automated data acquisition and deep learning in a laser processing**Univ. of Tokyo °Yohei Kobayashi and Shuntaro Tani****E-mail: yohei@issp.u-tokyo.ac.jp**

Productivity growth by use of internet of things (IoT) is highly demanded in order to realize a smart society. Laser machining is a promising candidate of the key technology for mass customization e.g. high-mix low volume production, because it could realize a cutting, drilling, welding, and even coating, only by changing the parameters of the laser and the scanner. In order to realize this kind of system, we have to know how the parameter change of the lasers or scanners influence on the laser processing. We could realize a simulator of the laser machining if we knew all the results of all the parameter sets. Back in reality, a knowledge of the laser processing is acquired by hand and accumulated in mind, which is called as “experience.” Under this condition, the amount of the data is hard to exceed some critical volume to adopt the data for the big-data analysis including a deep learning.

Here, we discuss how we can realize to acquire the laser processing data automatically and efficiently, and also discuss what kind of data is demanded for some specific needs in the industry. When the number of the data exceeds some volume, we can apply this data to a deep learning method, which is usually the order of 100,000. We have tried to apply the pattern of a scattered light from the surface of the sample for the deep learning, which enabled the prediction of the ablated volume successfully. The deep learning method was also applied to predict the surface shape in a femtosecond ablation. We will discuss some other automated data acquisition systems in a talk.