Femtosecond Burst Mode: Utilizing Full Laser Potential in Micromachining Applications

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Femtosecond lasers are essential tools in material processing, offering precise control with minimal thermal impact due to their ultra-short pulse durations. Despite these advantages, the industry demands ever-higher throughput in manufacturing processes. A common approach to increasing throughput is raising the average laser power, with laser systems now reaching hundreds of watts. However, fully utilizing such power presents challenges, as directly applying it to the material usually results in poor quality or in same cases, destruction of the sample. Techniques like increasing the repetition rate or spot size can help to utilize the power but come with their own pros/cons.

One of the latest innovations to address these challenges is burst mode, a technique that splits high-energy pulses into a series of lower-energy pulses at MHz/GHz repetition rates. Burst mode enables higher throughput and, in some cases, improved surface quality. In this study, the FemtoLux 30 laser was used to process various materials using burst mode, demonstrating improved micromachining process in terms of throughput and surface quality.