

***FlexBurst™***

**Picosecond micro-machining lasers offer “burst mode” with full user control of intra-burst pulse energy distribution**

[ now available for Duetto™ and Fuego™ laser models ]

Zurich (Switzerland), 17<sup>th</sup> July 2009: Time-Bandwidth Products expands its technology leadership in picosecond micro-machining lasers with the introduction of a *flexible* pulse burst mode – *FlexBurst™* – to enable better processing performance in micromachining applications.

The term “burst” refers to a group of picosecond pulses with a temporal spacing on the order of tens of nanoseconds. It has recently been demonstrated that such bursts have the potential to improve material processing performance. The leading pulses pre-condition the material such that trailing pulses hit the material in a different state, resulting in improved processing speed and surface quality.

In current picosecond micro-machining lasers, the pulse energy distribution within the burst can not be controlled by the user. As indicated in Figure 1, the pulse energy decreases due to gain depletion in the amplifier. Such a distribution is typically not ideal for material processing applications.

Figure 2 gives an example of the impact of the *FlexBurst™* technique, allowing for the generation of bursts with *arbitrary* pulse energy distribution to better match the processing requirements and optimize process performance.

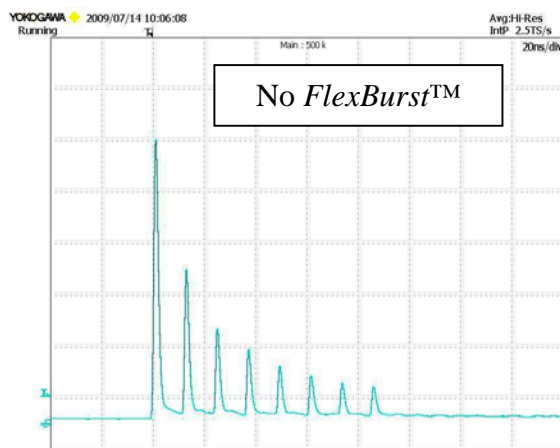


Fig.1: The oscilloscope trace displays one burst of eight picosecond pulses. Without applying the FlexBurst™ control mode, the pulse energies decrease due to gain depletion in the amplifier.

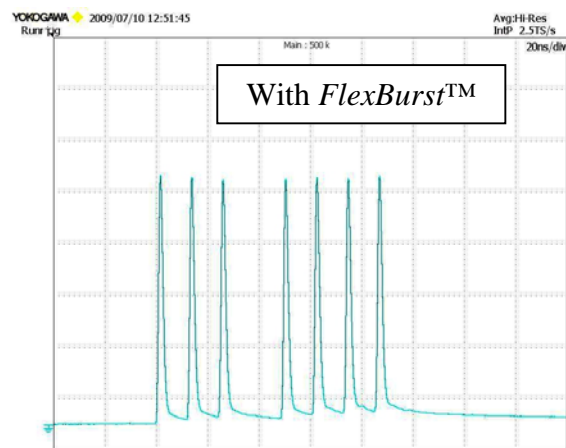
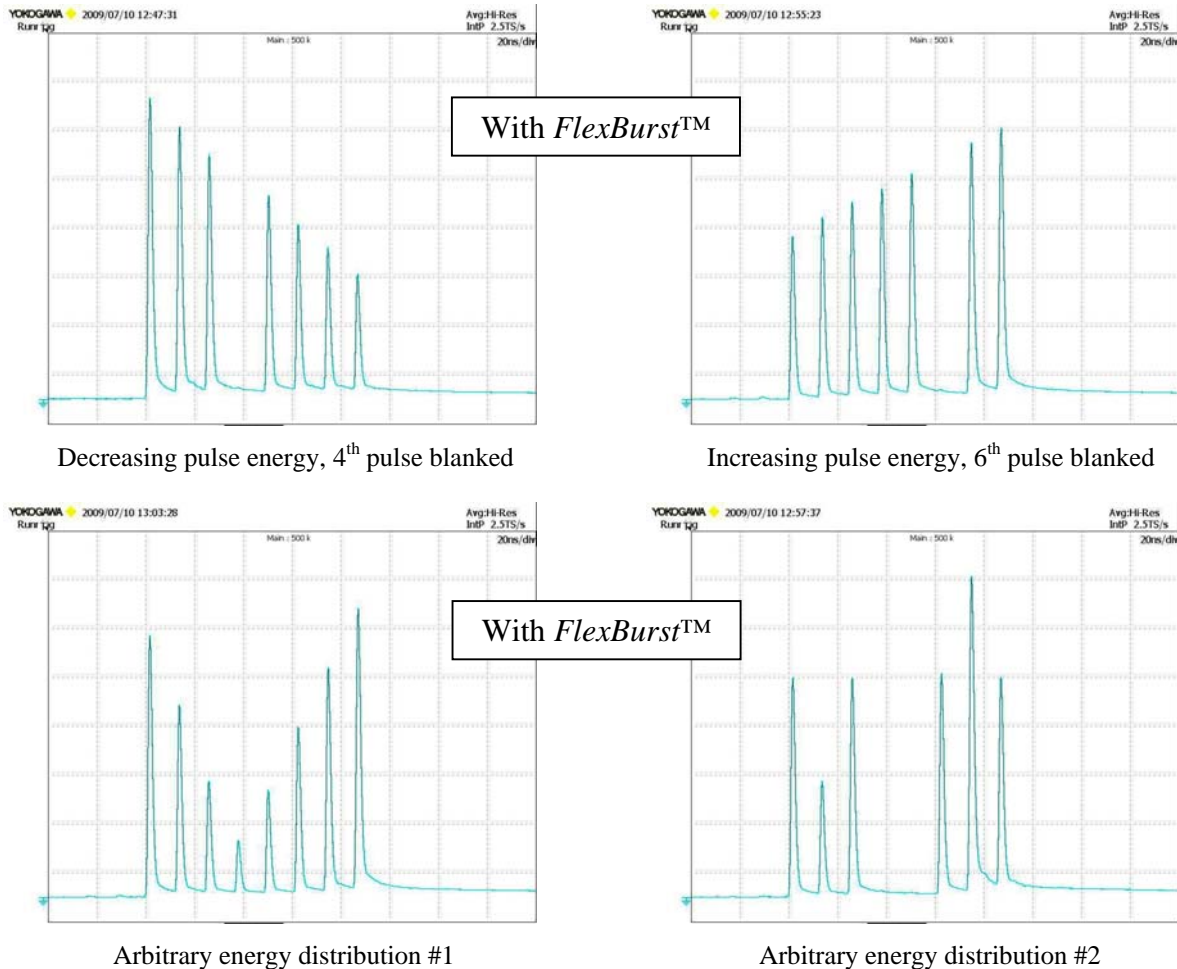


Fig.2: In this example, FlexBurst™ equalizes the intra-burst pulse energies and blanks the 4<sup>th</sup> pulse. In general, the user can set the energy of each pulse arbitrarily.

The following oscilloscope pictures further illustrate the versatility of the *FlexBurst™* mode. The traces display picosecond pulse bursts obtained with different settings of the pulse energy distribution. As the energy of each pulse can be arbitrarily set, it is possible to equalize pulse energies, obtain controlled increasing or decreasing pulse energies, blank intra-burst pulses, etc, with virtually no restrictions.



The single-pulse repetition rate of the Duetto™ laser can be set by the user in the range 50 kHz – 8 MHz. In the *FlexBurst™* mode, the lower repetition rate is unchanged, whereas the upper limit is given by 8 MHz divided by the number of pulses in the burst. For example, the repetition rate of a 4-pulse-burst can be set in the range 50 kHz – 2 MHz.

The *FlexBurst™* mode is compatible with all other options such as shorter wavelengths (SHG/THG), pulse on demand (PoD), additional power amplifiers (PA), etc.

With this new extension, the Duetto™ and Fuego™ are not only the fastest but also the most flexible picosecond micro-machining lasers currently available on the market.