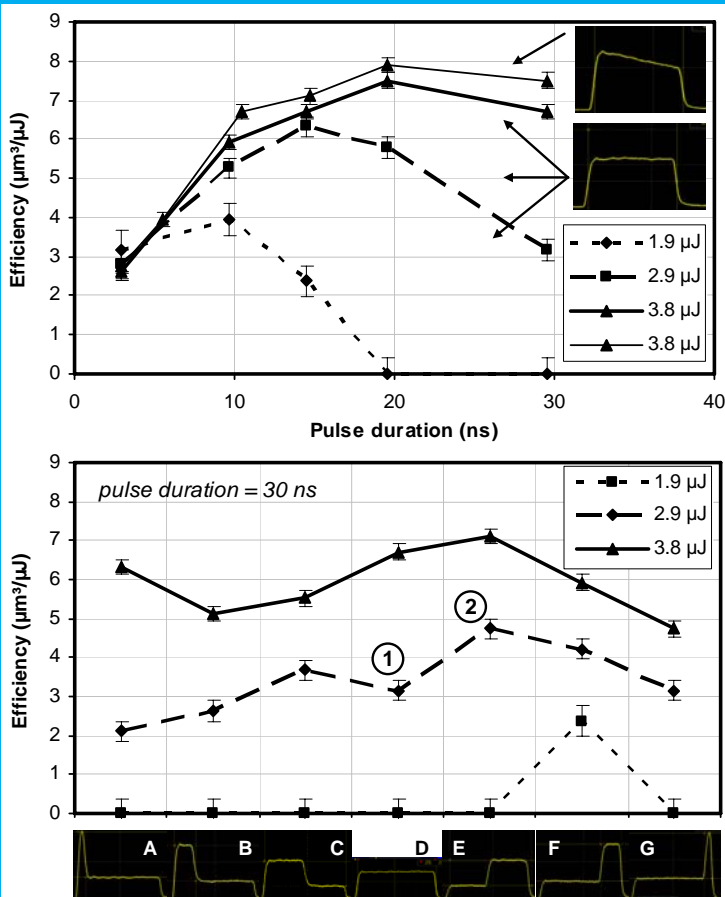


PULSED FIBER LASERS

DEVELOPMENT OF APPLICATIONS USING PROGRAMMABLE AMPLITUDE WAVEFORM

INO is a world-class center of expertise in industrial applications for optics and photonics and is a world leading technology developer and provider of Pulsed Fiber Lasers. INO uses its own patented technologies to design pulsed nanosecond fiber lasers allowing for control of the laser output spectrum in the Yb and Er emission bandwidths and pulse shape. INO also has the expertise and the facilities to develop laser micromachining processes.

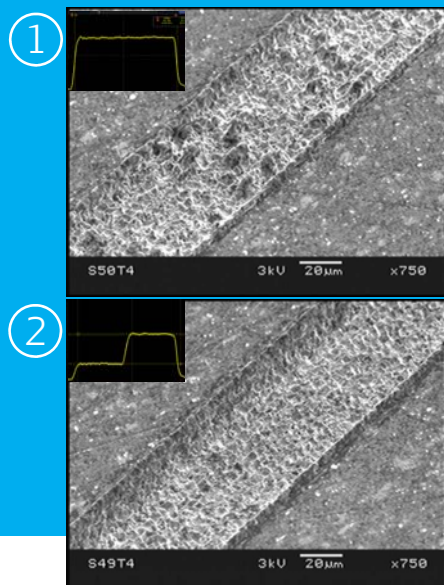
EXAMPLE OF APPLICATION: MICROMILLING



Material removal efficiency in aluminum as a function of pulse duration or pulse shape

VERSATILITY

- Provide straightforward control over pulse duration and pulse shape
- Speed up the optimization stage of laser micromachining processes



PULSED FIBER LASER

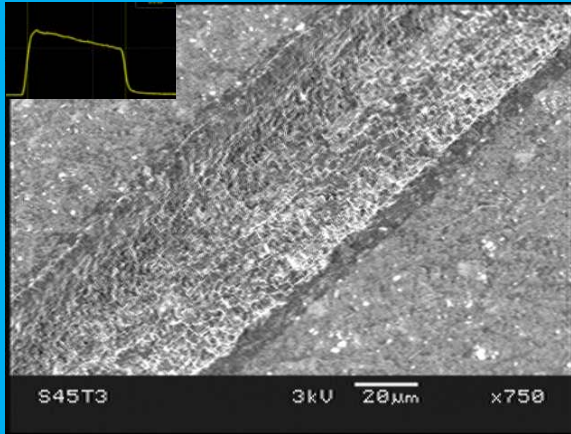
DEVELOPMENT OF APPLICATIONS USING
PROGRAMMABLE AMPLITUDE WAVEFORM

EXAMPLE OF APPLICATION: MICROMILLING

AGILITY

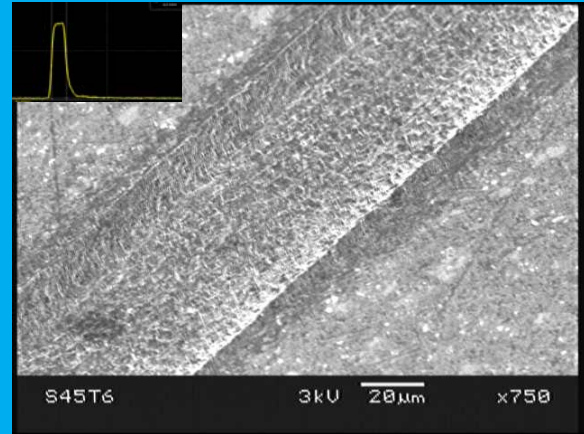
- . pulse-on-demand capability
- . pulse-to-pulse shape selection at high repetition rates
- . complex high-throughput laser processing

High Material Removal Efficiency



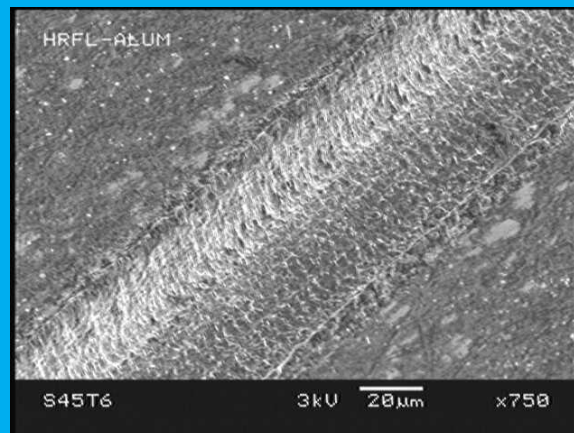
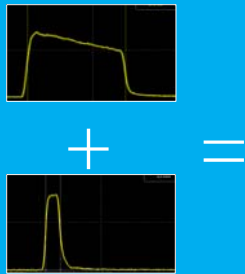
Energy = 3.8 μ J, Efficiency = 7.89 μ m³/ μ J
Power Density = 188 MW/cm², Δ t = 20 ns.

High Surface Quality



Energy = 3.8 μ J, Efficiency = 2.76 μ m³/ μ J
Power Density = 1219 MW/cm², Δ t = 2.9 ns.

Laser state can be quickly selected for a **maximum material removal rate together with a high-quality surface** using the same laser in a multi-step process



Energy = 3.8 μ J, Efficiency = 6.91 μ m³/ μ J